

Ethics and Animal Welfare in Organic Animal Husbandry

An interdisciplinary approach

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Abstract

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Farm animals make important contributions to organic farming systems. This thesis deals with the values and aims of organic farming in relation to animal welfare concerns. The organic standards and other publications from the organic movement are analyzed to define basic values. These are related to ethical theory, and ecocentric ethics is suggested as an ethical position for organic farming. It is concluded that although the main concern is to develop sustainable and environmentally friendly farming systems, animal welfare is an important aim in organic farming.

Two studies have been made of Swedish organic livestock farmers to examine their values and beliefs about animal husbandry and animal welfare. The first study comprised 15 qualitative in-depth interviews. The second study was a quantitative questionnaire study, where answers were analyzed using principal component analysis (exploratory factor analysis). Both studies showed that the ecocentric position can be identified among Swedish organic livestock farmers in their perception of animal welfare.

An important finding is that the animal welfare concept is understood differently in organic farming from what is usual in conventional agriculture. It is interpreted in terms of natural living, which includes the possibility of performing a natural behavior, feeds adapted to the animal's physiology and a natural environment. Thus, it is important for the organic farmers to be explicit and communicate their view of animal welfare to other groups.

A literature study was performed to learn about the actual animal welfare situation in organic animal husbandry. Only 22 peer-reviewed articles were found. There were no indications in the literature that overall health is worse in organic than in conventional herds. A very careful conclusion was that animal health in organic farming is as good or perhaps better – with the important exception of parasitic diseases.

The thesis also analyzes conflicting values and dilemmas in organic animal husbandry, e.g., between the ecocentric position and aspects of animal welfare. The questionnaire study revealed two groups with partially differing values: farmers who see organic farming as a life style and who believe environmental issues and natural living are important, and entrepreneurial farmers who consider making money and new challenges more important. An ethical contract is proposed as a tool to handle the dilemmas.

It is concluded that it is important for organic farmers and for the organic movement to take animal health and welfare issues seriously.

Key words: Ecocentric ethics, ethical contract, animal welfare, natural behavior, organic farming, organic livestock production, organic animal husbandry

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LIVET
är förunderligt – är så starkt och mäktigt
Livet
är förunderligt – är så svagt och bräckligt
Som en vårfloed spränger alla dämningar
Gör sig fri
Som en blomdoft smyger tyst i skymningen
Drar förbi
ditt hus – så kan en människa aldrig fånga livet!

(LIFE
Is wondrous – so strong and powerful
Life
Is wondrous – so weak and fragile
Like a spring flood smashing all restrains
Breaking free
Like a scent of flowers sneaking silently
Past your house at dusk
A human can never capture life!)

To Sven and Tryggve

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Appendix

This thesis is based on the following papers, which will be referred to in the text by their Roman numerals:

- I. Lund, V. & Röcklinsberg, H. 2001. Outlining a concept of animal welfare for organic farming systems. *Journal of agricultural and environmental ethics* 14, 391-424.
- II. Lund, V., Anthony, R. & Röcklinsberg, H. The ethical contract as a tool in organic animal husbandry. Accepted for publication in *Journal of agricultural and environmental ethics* after revision.
- III. Lund, V. & Algers, B. Research on animal health and welfare in organic farming – a literature review. Accepted for publication in *Livestock production science*.
- IV. Lund, V., Hemlin, S. & Lockeretz, W. 2002. Organic livestock production as viewed by Swedish farmers and organic initiators. *Agriculture and human values* 19(3), 255-268.
- V. Lund, V., Hemlin, S. & White, J. Ethics and natural behavior - Swedish organic farmers' view on animal issues. Submitted to *Journal of agricultural and environmental ethics*.

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Introduction

Organic farming has developed from a sub-cultural protest movement in the 1970's to a more or less established part of contemporary farming (Christensen 1998). The movement has added color and flavor to the agricultural debate, to the extent that it has reached far beyond the usual scenes for agrotechnical disputes. In several countries it has engaged many sectors of society, including trade and commerce, politicians, and, in particular, the consumers. It is probably no overstatement that the organic movement is one of the successful alternative movements from the days of radical protests, at least measured in commercial terms. In 2000, the world market for organic food products netted an estimated US\$17.5 billion in retail sales and it is likely that there will be a further increase in organic agricultural production in the near future (International Trade Centre, 2002).

One striking feature about this debate is the many and strong opinions that have been raised. While the consumers have been consistently positive (although this is not always reflected in the sales records of organic products [Magnusson *et al.*, 2001; Te Velde *et al.*, 2002]), representatives from conventional agriculture have been remarkably critical – even now, when organic farming is turning profitable. The question may be asked: Are agricultural people really so slow in adopting new trends, is it just reactionary stubbornness, or do they, empowered by knowledge and experience, realize the “real truth” about organic farming? Or are there other explanations to the different attitudes among organic farmers, consumers, and the agriculturalists?

Although most of the debate has been focusing on technical issues, one might suspect that the big differences among the antagonists lie in basic values and beliefs. That is, it may be a question of ethics. It has been suggested that organic farming represents a paradigm shift in agriculture, that is, a new world view, and in this case a new way of understanding farming. A discussion between two competing paradigms is never quite satisfactory, as theories are incommensurable (‘having no common standard of comparison’ [Macquarie, 1981; in Wynen, 1998]) and proponents of each camp base their arguments on different assumptions and priorities (Wynen, 1998). Animal welfare is one of the debated issues. While veterinarians often consider welfare to be unacceptable in organic systems, consumers are delighted to see pictures of happy outdoor pigs, and calves suckling their mothers on a green pasture. This thesis is looking behind the clichés, trying to scrutinize values and beliefs in organic farming that are relevant to animal welfare, both in theory and practice. It has also studied the actual welfare situation in organic animal husbandry. As a conclusion, it is suggesting ways in which to deal with some problems and dilemmas connected to animal welfare in organic farming.

The outlook in the thesis is Scandinavian, with special emphasis on Sweden. This is an interesting example since organic farming, including livestock production, has transcended the pioneer stage and to a considerable extent become part of the agricultural establishment.

The relationship among ethics, animal welfare and interdisciplinarity

Practical ethics is the study of specific moral problems, and moral theory is the attempt to answer all the specific moral questions raised in practical ethics (McNaughton, 1988). The moral problems traditionally studied in ethics are always about humans: how we morally should relate to each other and, sometimes, to society. Already in 1789 the English philosopher Jeremy Bentham asked why animals not should be included in moral considerations (Bentham, 1789), but only in the latter part of the 20th century have animals been fully included in moral theories. The question whether or not animals should have moral standing is still debated among philosophers (*e.g.*, Narveson, 1983; Regan, 1983; Midgley, 1983; Singer, 1990). If the answer is affirmative, then two new questions follow: What is the basis for our duties towards animals, and what duties do we owe them? (Sandøe *et al.*, 1997).

These questions are discussed in this thesis, but the focus is limited to farm animals in organic farming. The basic issue of moral standing is not the focus for this thesis although it discusses whether or not animal welfare should be a concern in organic farming. The task here is to establish a basis for our duties towards animals *in organic systems*. Thus, it does not have much to say about whether animals should have moral standing at all – there may well be reasons why they should, regardless of what can be derived from the organic philosophy.

The question concerning human responsibilities in relation to farm animals puts animal welfare in focus. Animals in agricultural systems to a large extent depend on the human caretaker for their existence and living conditions (perhaps with the exception of very extensive systems of animal husbandry). Animal welfare is an often used but debated concept, both among philosophers and scientists. It refers to one or several aspects of an animal's quality of life, and a key question is how to interpret it, in theory as well as in practice. During the last quarter century both philosophers and scientists have worked to define it but no consensus has been reached, not even within each of these two groups. There also is disagreement over whether the notion is positive *per se* (Tannenbaum, 1991) or neutral, varying over a range (from "poor" to "good") (Broom, 1996). Today there is a widespread understanding that it includes both scientific aspects, describing the mental or physical status of the animal, and value aspects in terms of moral considerations regarding the animal's quality of life (Tannenbaum, 1991; Sandøe and Simonsen, 1992; Stafleu *et al.*, 1996). This view is, however, not undisputed. There are scientists who have argued that animal welfare can be objectively measured by science and that ethical considerations are to be made separately (Broom, 1991).

This thesis takes as its departure point that animal welfare is a composite concept, consisting of closely integrated scientific and ethical components. Another assumption is that the choice of animal welfare definition always reflects some basic valuation regarding what is considered (good) quality of life for animals. Also, the animal husbandry system reflects certain values or aims regarding what is considered as morally relevant. The values expressed in the chosen animal welfare concept ought to correspond to values aimed for in the husbandry system. This thesis is responding to the challenges of

putting this integrated concept under the magnifying glass, and furthermore to do it in the context of organic farming. Due to the interdisciplinary nature of these issues, it has been necessary to employ different research methods for the different studies included in the thesis. The choice of method has depended on the specific aim of each study and the overall aims of the thesis. This interdisciplinary approach has been the most interesting and challenging aspect of the thesis work. The interdisciplinarity is mirrored also in how the thesis is written: an effort has been made to make the text accessible for scholars of all disciplines, natural and social scientists as well as philosophers. Therefore some explanations are included that might be unnecessary for a publication appealing to only one of these groups.

What is organic animal husbandry?

The word “organic” has become a contemporary buzz-word, often used carelessly in marketing to signify something “natural” and inherently good. On the contrary, “organic animal husbandry” has a very strict definition: it denotes livestock production in organic farming; that is, farming systems that adhere to the IFOAM Basic Standards for Organic Agriculture and Food Processing (IFOAM, 2000). In this thesis the word “organic” is sometimes used as shorthand, signifying something that is related to organic farming (*e.g.*, “the organic philosophy”). The following section describes the organic standards and also gives a short overview of the historical development of organic farming.

The organic standards

IFOAM is the acronym for the International Federation of Organic Agricultural Movements, the umbrella organization for organic movements worldwide. One of its most important tasks is to set the international standards for what may be labeled as “organic”. IFOAM also coordinates the international network of organic organizations and represents, internationally, the organic movement in parliamentary, administrative and policy-making forums. The IFOAM standards are revised every other year (from 2003 every third year) and are ratified by the IFOAM General Assembly. They are implemented locally by national or regional certification and inspection organizations that adopt their own standards within the framework set by the Basic Standards. Some organic organizations used standards long before IFOAM adopted standards. For example, the biodynamic label was founded in 1924, and the British Soil Association standards were first published in 1967 (Rundgren, 2002). National and international legislation followed. The first legislation on organic farming was already adopted by the states of Oregon and California in the 1970’s (Rundgren, 2002), but most countries waited much longer. Table 1 shows when national standards were adopted in the Nordic countries. The Nordic standards were first enforced by independent certification bodies tied to the organic farmers’ organizations. Later, standards had to be government approved (partly because of an EU regulation). Denmark has two sets of standards, one issued by the Danish Organic Farmers’ organization (LØJ) and one by the government. Detailed standards for

Table 1. *Development of organic farming in the Nordic countries (Lund, 2000a)*

	Denmark	Finland	Iceland	Norway	Sweden
First organic farms (biodynamic)	1930's	1930's	1930	1932	1934
Establishment of organic farmers' organizations	1981 <i>Landsfor- eningen økologisk jordbrug (LØJ)</i>	1985 <i>Luonnon- mukaisen Viljelyn Liitto</i>	1993 <i>VOR</i>	1971 <i>Norsk Økologisk landbrukslag (NØLL) (From 1987 Økoprodu- sentane)</i>	1985** <i>Alternativ- odlarnas riksförbund (From 1994 Ekologiska lantbru- karna)</i>
National standards for organic farming*	1981 LØJ 1987 Government	1987 1994 Government	1995 Government	1987 1995 Government authorized	1985 1995 Government authorized
National standards for organic livestock	1981 LØJ 1987 Government	1988 1995 Government	1995 Government	1989 1995 Government authorized	1987 1995 Government authorized

*Standards for biodynamic farming existed before this. For example, certification of Swedish biodynamic farmers started in 1961 (Arman, 1990).

** There was an early Swedish organization for co-operation among organic farmers established in the mid 70's, Förbundet Organisk Biologisk Odling (The Association for Organic Biological Growing).

animal husbandry were generally developed later than standards for plant production. The American national regulations came into effect October 2002 (National Organic Program; AMS-USDA, 2000). On the international level, EU regulations for plant production were introduced in 1991 (Council Regulation, 1991) and for livestock in 1999 (Council Regulation, 1999). The FAO/WHO Codex Alimentarius guidelines were adopted for organic plant production in 1999 and for livestock in 2001 (FAO, 2001).

The organic standards have the dual function of providing guaranties to consumers that production rules have been adhered to as well as giving guidance and advice to the producers on how organic principles are to be applied on the farm, with the certification bodies acting as intermediaries between these two interest groups. Standards also act as the basis for the contract between producer and certification body, which is binding on both parties.

The development of organic farming

In order to understand what is taking place in today's world, and in order to direct development towards desirable and well-reasoned goals, current events needs to be examined in the clarifying light of history. This is especially true when it comes to values and beliefs, also for organic farming. Values and beliefs motivate behavior (Fishbein and Ajzen, 1975) and thereby affect development over time. It is a common mistake to see current beliefs as the "normal" and objective standards, when history shows that different values have been the norm under different epochs (MacIntyre, 1985; Ariansen, 1993; Worster, 1996). Organic farming is now experiencing a period of growth and rapid development where some basic values are being challenged in different ways (Woodward *et al.*, 1996). In order to decide on further courses of action it is important to understand both the departure point and how the current situation was arrived at, and also to make clear which values and beliefs were involved. The origin of today's organic farming can be traced back along several different lines, some which originated more than a century before the turbulent days of the 1970's when the current organic farming movement started.

The early pioneers

The early pioneers of organic farming can be found within a wide political spectrum, ranging from socialism to the far right, including even strains of anarchism and nazism¹ (Conford, 2001). Most of the early efforts focused on plant production and concern with human health (Woodward *et al.*, 1996). During the first half of the 20th century pioneer researchers as well as farmers were working to develop "natural" methods to enhance soil productivity. The very beginning of organic farming may be when Justus von Liebig (1803-1873) presented his revolutionary theories about the importance of minerals in plant nutrition. His ideas that inorganic nutrients could replace manure laid the foundation for chemical use in conventional agriculture² – and made it possible to develop an alternative. Less known is that von Liebig also advocated recycling of nutrients from urban areas back to the fields, the use of green manure, and a balanced crop rotation, in a way that would much please agroecologists of today (Conford, 2001).

In fact, he is quoted on IFOAM's internet home page (IFOAM, 2002a):

"I have sinned against the wisdom of the creator and, justly, I have been punished. I wanted to improve his work because, in my blindness, I believed that a link in the astonishing chain of laws that govern and constantly renew life on the surface of the Earth had been forgotten. It seemed to me that weak and insignificant man had to redress this oversight." (*Justus von Liebig, inventor of chemical agriculture, when looking back on his life and work. From: Agrikulturchemie, 8. Auflage, 1865*)

Among the many pioneers of organic farming, Albert Howard (1873-1947) and Lady Eve Balfour (1898-1990) were some of the most influential in the English-speaking world (Holmegård, 1997; Conford, 2001). Howard was an agricultural scientist, working in both India and England during the first half of the 20th century. He came to believe that there is

¹ Philip Conford devotes a section in his historical book to "The Radical Right", that had close connection to the organic movement in England during the 1930's and 40's (pp. 146-154).

² 'Conventional agriculture' is used in this thesis as a comprehensive phrase to describe non-organic agriculture.

a connection between a healthy soil and the health of plants, animals and humans, and that the key to a healthy soil is livestock manure and composting. This view was shared by many of the early critics of conventional farming (Conford, 2001). Howard inspired Eve Balfour to start an experimental farm where his ideas about cropping could be tested in practice. She also published a book, *The Living Soil* (Balfour, 1943), that spurred the founding of the Soil Association³ in 1946. The organization was started by individuals whose principal concerns included farm animals:

- The loss of soil through erosion and depletion,
- Decreased nutritional quality of intensively produced food,
- Exploitation of animals in intensive units,
- Impact of large intensive farming system on the countryside and wildlife.

(From the Soil Association internet home page [Soil Association, 2002])

There also were organic pioneers in German-speaking countries. The beginning of the 20th century saw the development of a movement for “Natürlicher Landbau”, working against urbanization and the industrialization of agriculture. The ideal was a harmonious life in the countryside, growing one’s own food with manual labor and eating vegetarian food (animals were not included in the cropping system). This movement was active during the first half of the century (Lindholm, 2001; Vogt, 2000). Better known, perhaps, is the “organic-biologic” cropping method, developed by the Swiss biologists Hans and Maria Müller together with the German physician Hans Peter Rusch during the 1950’s. This method focuses on creating a healthy soil microbiology (Rusch, 1968). It is still practiced in several European countries and products are marketed under a special label. However, it does not pay special attention to how to care for the farm animals.

Visions of more “natural” ways of farming can be found also in other contexts during the first half of the 20th century. One example is Elin Wägner (1882-1949), a Swedish author with a great commitment to the women’s liberation movement and international disarmament issues. She was inspired by the “Natürlicher Landbau” movement and saw agriculture and the handling of soil, animals and farmers/farm workers as parts in a complex of related issues (Gate, 1985). Together with a friend, Elisabeth Tamm, she presented her ideas in a small book *Peace with the Earth* (Swedish: *Fred med jorden*⁴ [Tamm and Wägner, 1940]). In the book she also discussed farm animal living conditions, advocating that animal husbandry should be performed according to “biological principles”. Her views were shared by other radical women of the time and were included in the program of the international “Women’s Organization for World Order” in 1937 (Gate, 1985).

Rudolf Steiner and biodynamic farming

The first person to outline an alternative system including farm animals was Rudolf Steiner (1861-1925), an Austrian philosopher, scientist and (perhaps one may say) mystic. In 1924 he held a series of lectures on agricultural production methods that were transcribed and published (Steiner, 1929). These lectures were the beginning of what today is biodynamic farming. The first biodynamic farms were then established in Europe in the late 1920’s.

³ Soil Association is a British certification and extension organization for organic farming.

⁴ The Swedish word ‘jorden’ can translate either into ‘the earth’ or ‘the soil’.

Steiner's ideas about farming reflected his esoteric world-view, which he called "anthroposophy," describing it as a "path to knowledge". It also included farm animals and provided guidelines for how farm animals should be fed and cared for. His arguments about why humans should care about these are based on spiritual convictions, referring to a cosmic reality where incarnation plays a big role. He stated that mankind is indebted to the animals since their sacrifices have made it possible for us to be incarnated as humans on earth. We therefore owe animals gratitude and respect, and this should be expressed through how farm animals are treated. Furthermore, humans and animals are spiritually related.

Steiner saw animals as a very important part of the "farm organism" (the other parts being soil, plants and humans). He thus considered animals a natural part of every biodynamic farm. Steiner's ideas regarding the importance of allowing the animals a natural behavior has led to husbandry practices close to those advocated by modern ethologists. He also advocated outdoor grazing for all livestock for spiritual reasons. Thus, even though the philosophical basis may be radically different, in practice biodynamic animal husbandry by large is similar to the organic animal husbandry prescribed by the IFOAM standards. Many of the early pioneers were also adherents of both Steiner and Howard (Conford, 2001). There are some evident differences that have metaphysical explanations; for example, in biodynamic farming cows should not be dehorned.

The 1960's and 70's: Agriculture in a new perspective

Rachel Carson's book *Silent Spring* (1963) became an environmental alarm clock for a whole world. It focused on an agricultural issue: the use of pesticides. Another book with similar effect, but focused on livestock production, was Ruth Harrison's *Animal Machines* (1964). Her book eventually led to the establishment of the British Brambell committee, with the task of enquiring into the welfare of intensively farmed animals. Its landmark report was published in 1965. Based on the biology and behavioral needs of the animals it introduced far-reaching (for the time) recommendations for animal husbandry (Brambell Committee, 1965). The committee considered a rearing system acceptable only if the innate behavior was not unreasonably violated.

Publications like this contributed to the new interest in alternative ways to practice agriculture that grew during the late 1960's, mainly among young people and mainly out of an interest in environmental issues and a wish to create an alternative livelihood. These enthusiasts to some extent embraced the veterans of the early alternative movements (mostly biodynamic and organic-biological farmers), taking their knowledge and experience as departure points for developing new agricultural practices that were thought to be in harmony with the land. Thus, today's organic farming grew out of the work of the early pioneers combined with the new and radical ideas flourishing at this time. Many of these ideas sprung out of a basic lack of confidence in values and practices in the established society (Christensen, 1998). Few conventional farmers engaged in the alternative agriculture movement, however, and most viewed the attempts to establish organic farming systems with great skepticism – an attitude that still exists, for example, in parts of the Swedish countryside (see paper IV in this thesis).

The criticism of industrialized animal husbandry was an integral part of the early organic movement, not least in the Scandinavian countries where the animal welfare and ethics debate took off in the late 1960's and early 70's. Harrison's book was already translated into Norwegian in 1965 (Jebsen Haave, 1965), and other books on this theme were to follow (e.g., Soller and Nilsson, 1971; Hemberg, 1976).

In 1972 IFOAM was founded on the initiative of the French organization *Nature et Progrès*. The other founding member organizations were the Biodynamic Association (Sweden), the Soil Association (Britain), the Soil Association of South Africa, and the Rodale Press (United States) (Langman, 1998). The organization grew slowly – during its first 15 years IFOAM was run by volunteers (Geier, 1998). The first IFOAM standards were published in 1980 (IFOAM, 1980). In the earliest years, standard-setting was focused on plant production, but after 1984 animals gained in importance (Schmidt, 1998). At the first IFOAM Scientific Conference, held in 1977, only one paper on animals was included in the proceedings volume (Besson and Vogtman, 1978). Today, no part of the IFOAM organization deals exclusively with livestock issues.

The 1980's and 90's: Becoming established

In the 1980's the organic movement in Western Europe changed from being a radical sub-cultural movement to become more integrated in the agricultural sector (Christensen, 1998). The Nordic organic farmers got better organized (table 1). The phrase "Alternative agriculture" was no longer considered appropriate and was replaced (table 2). Education in organic farming was started, funded by public money. Organic agricultural colleges were started in Denmark in 1982 (Holmegård, 1997) and in Norway in 1987 (O.A. Bø, pers. comm.). In Sweden a university course was started in 1983 (K. Höök, pers. comm.) Organic farming received increasing political support. Several politicians realized that some agricultural problems could get closer to a solution if farmers converted to less intensive forms of agriculture, for example the overproduction of agricultural produce that has been haunting EU's agricultural ministers, and the pollution of ground water, lakes and streams and coastal waters from herbicides, pesticides and chemical fertilizers. The Danish Parliament passed the first law promoting organic production in 1987

Table 2. *The term for "organic" agriculture in some European languages, according to Article 2 in the EEC regulation No 2092/91*

Language	Term
Danish	Økologisk
Dutch	Biologisch
English	Organic
Finnish	Luonnonmukainen
French	Biologique
German	Ökologisch, biologisch
Italian	Biologico
Portuguese	Biológico
Swedish	Ekologisk
Spanish	Ecológico

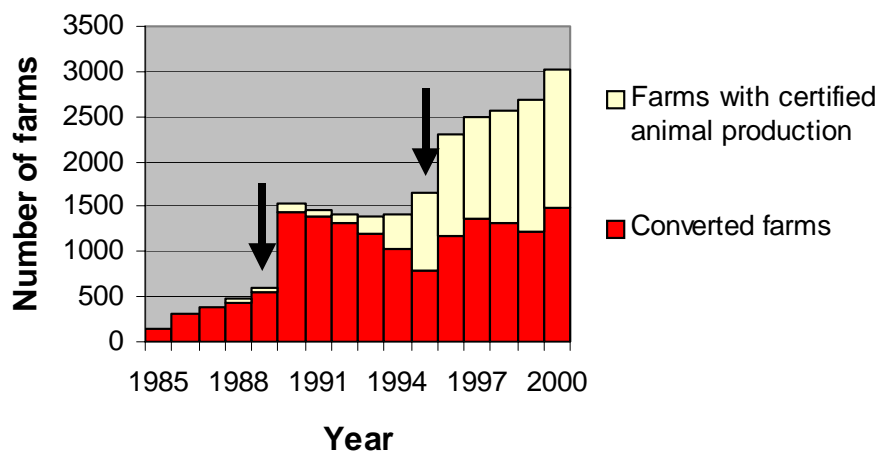


Fig. 1. KRAV-certified production in Sweden 1985-2000. Arrows indicate years when different types of government support for organic farming were introduced in Sweden (in 1989 national and in 1995 EU support schemes).

(Holmegård, 1997). The Swedish Parliament first decided on subsidies for conversion in 1989, while Finland and Norway introduced subsidies in 1990 (Lund, 2000a). The European Union's first ordinance on organic farming came in 1991 (Council Regulation, 1991). The agri-environment programme (EC Reg. 2078/92 [Council Regulation, 1992]) was passed in 1992 and implementation began in some countries in 1993. By 1996, all EU member states except Luxembourg had introduced policies to support organic farming (Lampkin *et al.*, 1999). This kind of support significantly increased the number of converted farms (figure 1). In 1994 the Swedish Parliament stated the goal of having 10% of arable land converted to organic agriculture by 2000. This decision was interpreted by the implementation body (the Swedish Board of Agriculture) as also including livestock. The goal was reached for the arable land but not for the livestock. In October 1999 a new goal was set by the Swedish Parliament: 20% of arable land is to be organic by 2005, and 10% of dairy, beef and sheep production (Andersson, 2001).

The development of organic livestock research

Much of the early organic research and development was done on farms and by farmers or by a few private research institutions (Niggli and Lockeretz, 1996; Wynen, 1998), and it was cheaper and easier to experiment with crops than to design livestock trials. As a result, organic livestock research lagged far behind organic plant and soil management research. The lack of an explicit philosophical basis for organic animal husbandry may also have contributed to hampering the development, since the direction for the development of the animal husbandry systems was less clear (Lund, 2000b). Universities have generally been slow to follow the organic trend (Beus and Dunlap, 1990, 1991; Lund, 1996a; Wynen, 1998) and there has been a reluctance among researchers to become involved in organic agriculture because of the difficulties in gaining recognition within the existing professional infrastructure (Wynen, 1998). This means that few "career scientists" focused on organic farming. Also, there is an abundance of anecdotal evidence

about the difficulties in receiving research money for organic farming projects in the early days. Wynen (1998) describes the situation as a paradigm shift, where in the beginning only few scientists take the step towards the new theory, and these are usually considered “nonscientific.” The early organic researchers, on the other hand, were not interested in to be reconciled with the scientific system of the time, which entailed the use of alternative channels for publishing research results (E. Boehncke, pers. comm.). They also claimed it was more difficult to publish articles dealing with organic farming in the established agricultural press (e.g. Youngberg, 1986; MacRae *et al.*, 1989), which is in line with the theory of paradigm shift. To counteract this resistance two journals for publishing organic farming results were started (Biological Agriculture and Horticulture [UK] in 1982, and *American Journal of Alternative Agriculture* in 1986).

Those early researchers who devoted themselves to organic farming generally felt an urgent need to find solutions to the many practical problems faced by organic livestock producers (Höök, 1997), rather than giving high priority to the slow and painstaking process of publishing scientific articles. Also, in the early organic farming movement there was outspoken criticism against conventional “reductionistic” science, which was rejected in favor of more “holistic” methods to explore reality (e.g. Howard, 1943, pp. 185-186, 189; Hodges, 1982). This resulted in favoring other types of research methods, for example on-farm and qualitative studies and participatory research, which contributed to the difficulties of publishing results in established scientific journals. The first chair in organic farming came in 1981 at Kassel University, Witzenhausen, Germany, and the first chair in organic animal husbandry was established at the same university in 1987 (E. Boehncke, pers. comm.). The first Nordic chair in organic farming was established at the Swedish University of Agriculture in 1990, and the first Nordic chair in organic animal husbandry systems was established at the Danish Royal Veterinary and Agricultural University in 1997 (Lund, 2000a).

The situation for research on organic livestock farming is changing, with organic farming becoming mainstream. It now does not attract only “odd thinking” researchers, and in several countries there is governmental research funding earmarked for organic farming. The difference between the organic and conventional epistemological approach has diminished. For example, systems research and qualitative methods are now more widely accepted in “conventional” research. This all means that scientific research and publications focusing on organic production can be expected to increase significantly in the coming years.

Entering the 21st century:

Demand and profit – a dilemma for the organic movement?

At the arrival of the new millennium, the organic movement is facing a new situation: Organic farming has become a world-wide phenomenon⁵, and continues to grow. For example, it is attracting increasing interest in third world countries, where it is perceived as a viable alternative for small family farmers who cannot afford industrialized, high-input farming. Also, in many countries organic products are increasingly being demanded

⁵ IFOAM has 750 member organizations and institutions in about 100 countries all over the world (IFOAM, 2002b).

Table 3. *KRAV certified production 1985-2001*

Year	KRAV certified acreage, ha*	Farmers*	Farmers with certified animals	Dairy cows	Fattening pigs	Layers
1985	1 500	150	no certification	-	-	-
1986	2 500	321	no certification	-	-	-
1987	3 770	386	2	0	0	0
1988	5 205	473	30	0	0	0
1989	7 547	606	54	0	0	0
1990	23 500	1 530	94	296	402	0
1991	27 709	1 474	81	971	611	0
1992	30 176	1 409	89	1 515	832	0
1993	31 889	1 385	189	1 656	1 414	0
1994	35 914	1 423	395	3 625	1 916	0
1995	47 589	1 658	866	7 141	5 393	9 818
1996	85 462	2 308	1 124	10 834	5 217	15 192
1997	106 062	2 503	1 114	11 202	6 547	45 823
1998	111 158	2 571	1 277	18 576	17 580	153 156
1999	118 479	2 695	1 312	17 449	15 816	137 494
2000	140 925	3 009	1 410	19 596	21 623	145 593
2001	205 000	5 316	1 571	19 911	22 485	185 929

*These figures only include KRAV-certified production (including Demeter-certified farms). In addition there are a considerable number of farms converted to organic production and receiving government support for this, but are not KRAV certified. Farms under conversion are not included. (KRAV Statistik 1992-2002).

by consumers. Although the growth has varied among different types of production and time periods, the overall trend has been positive. Growth in US organic retail sales has equaled 20% or more annually since 1990 (Dimitri and Green, 2002). A recent USDA report describes the growth in the organic food sector as dramatic: "Burgeoning consumer interest in organically grown food has opened new market opportunities for producers and is leading to a transformation in the organic foods industry" (Dimitri and Green, 2002). A study of the European market for organic food shows that Denmark and Austria have the highest organic share of total food production in 2000, with 6% and 5% respectively, followed by Switzerland, Finland and Sweden, each with a share of about 3% (Hamm *et al.*, 2002). In Denmark 29% of the consumers always buy organic milk (Anon., 2001a). There was generally a deficit in the European supply of organic animal products, especially of eggs, poultry and pork (Hamm *et al.*, 2002).

Sweden is among the countries with the most land converted. In 2001, about 13.5% of arable land was converted, but only 5% of dairy cows, 7% of beef cows and ewes, 3% of layers and 1% of the sows (P. Fredriksson, KRAV, pers. comm.). The Swedish market for organic produce has quadrupled since 1995 and is now estimated to be about 3 billion

In several countries the favorable market situation and the economic subsidies have created situations where organic production can be more profitable for farmers than conventional (Anon., 2001b; Nordgren, 2001; Oosting and de Boer, 2002; Tvedegaard, 2002), and organic farming has become relatively accepted by society at large as a viable form of agriculture. However, the success also creates a dilemma for the organic movement: Although the goal of having more land and farmers converted and reaching more consumers now is being fulfilled, the organic movement is also gradually being integrated in the established “technosystem” (Christensen, 1998, pp. 422-423) against which it originally rebelled. Thus, organic farming today attracts attention from agrobusiness and the food industry, and conventional farmers are enticed to convert because of prospects of profitable farming rather than because of ideological conviction. There also are more members from countries with traditions and values other than those predominant in the Western culture, from which the majority of the pioneers came. These newcomers may be less likely to share the ideology of the early organic movement fully, but rather have different ideas and goals that may influence the organic movement and different decision bodies dealing with organic farming. Concerns have been raised regarding what implications this may have for the future development of organic agriculture (*e.g.*, Woodward *et al.*, 1996; Frischknecht, 2000). It certainly is a challenge for the organic movement to take on the role as an established actor in the agricultural sector while continuing to develop according to the idealistic values it is based on and implementing those values in society. Christensen (1998) discusses this problem in relation to how the organic movement can help Danish agriculture to become more sustainable, but his thoughts can be applied to the entire situation faced by the organic movement today. He draws the following conclusion (p. 89, author’s translation):

“The challenge of finding new alternative ways for development remains. This is not to return to the understanding of the 1970’s. ... Nor is it equal to defining, and thus making final, sustainable development in a form that can be transformed into an operational goal-means hierarchy. Both alternatives would imply making the relative into something definite. The challenge is to find ways to solve material environmental problems in concord with social and cultural development, in a way that at the same time makes use of the potentials and confronts the deadlocked barriers pulling towards first order solutions⁶.”

Another problem that follows from the rapid growth in the organic sector is increased competition among different needs and interests within the movement. The conflicts may be inherent within the movement, caused by different but largely incompatible goals such as environmental, consumer, or animal welfare considerations, or they may be caused by external influences, such as legislation, subsidies, or market demands (figure 2, paper I). They may also be compelled by new interest groups entering the organic movement, bringing new values and goals. The newcomers are quite likely to have other priorities than the pioneers of the organic movement. Animal welfare is one area that may fall short in this new situation. In fact, it is an issue that has been under much discussion lately: the question has already been raised whether concern for animal welfare should be part of the organic farming aims. For example in England a discussion has taken place in which it has been argued that organic farming should not be an animal welfare scheme (Hovi, pers.

⁶ First order solutions are changes that remain within a given context, and in this sense are “deadlocked”. Second order solutions break the context (Christensen, 1998, p. 29).

comm.⁷). The English debate was partly brought up because of the criticism that organic farming has been exposed to from various sources. In several countries critics have questioned whether organic production methods imply good animal welfare (*e.g.*, Danish Ethical Council concerning Animals, 1995; Jensen, 1999; FAWC, 2001).

This animal welfare debate is made more difficult by the lack of a comprehensive “official ideology” endorsed by the organic movement. The official documents published by the movement in addition to the organic standards mainly comprise some position papers and declarations (mostly on sustainability, food security and genetic engineering; many of these can be found at the IFOAM homepage (IFOAM, 2002)). Thus, there is no elaborated and explicit philosophical basis that this kind of discussions can use as reference. In addition to this shortcoming, opinions are divided regarding facts, such as whether or not organic livestock in practice have good welfare. This confusion is likely to be hampering the development of organic animal husbandry.

⁷ Oral presentation at the 14th IFOAM Organic World Congress, August 21-24, 2002, Victoria, Canada.

Aims

The focus for this thesis is animal ethics and animal welfare in organic animal husbandry, both in theory and practice. The thesis aims to relate these two concepts to each other and to organic farming in ways that are descriptive and analytical as well as constructive and normative. More specifically the aims are:

- To describe and define organic animal husbandry from a value perspective in theory (with regard to the values and aims of the agricultural movement) as well as in practice (with regard to how organic farmers perceive organic animal husbandry) and in relation to animal welfare.
- To analyze whether animal welfare lies within the scope of organic farming and, if so, what the animal welfare concept means in the context of organic farming.
- To highlight and analyze some areas of conflicting values and interests in organic animal husbandry.
- To survey and analyze the scientific literature in order to describe the health and welfare situation in organic animal husbandry.
- To suggest an animal ethics that can be applied to organic animal husbandry.

Materials and methods

An interdisciplinary approach was chosen in this thesis because the issues studied theoretically fall into a fringe area between disciplines, and any single discipline appeared to be inadequate to handle the problem. Strategic co-operation with specialists from relevant fields has been applied. Research advice has been given by the supervisor and assistant supervisors who come from different disciplines: veterinary science, ethology, psychology, and ethics. Co-authors came from the following fields: papers I and II: ethics; paper III: veterinary science; paper IV: organic farming and psychology; paper V: family studies and psychology.

The first two papers (I, II) are dealing with ethical theory. They are based on literature studies and exhaustive discussions with the co-authors. Although both papers basically are philosophical essays, the form chosen especially for paper I largely follows the scientific tradition, starting with a descriptive part, placing the discussion under a separate heading later in the paper and resulting in conclusions. In paper II emphasis has been put on a researched, factual first part on which the subsequent argumentation is based. This differs from the traditional philosophical style of writing, in which the argumentation is built up and continues throughout the paper and where facts often are less emphasized (and less supported by references). The papers are kept close to the scientific form since the main author is trained in this style of writing (this is further discussed on page 28).

Paper III is based on an extensive literature study on organic animal health and welfare. A literature search was performed in October-November 2001 to investigate how well the organic aims regarding animal welfare match reality, and to find out what areas have been researched. The following databases were searched: Agricola, Agris, Biological Abstracts, CAB Abstracts and ISI databases. The search was limited to literature published since 1991 in English, German, French and the Scandinavian languages. All livestock species were included in the review. The following search words were used and matched with all categories of livestock (beef, dairy, pigs, *etc.*): [organic or ecological] and [agriculture or farming] and [welfare or disease or health]. Only articles published in the peer-reviewed scientific press were included. Also, requests were sent to some key persons (in Denmark, Sweden, Norway, Germany and England), asking if they knew any articles accepted for publication recently. Some of them in turn circulated the request within their research departments. Five articles were found that way. However, it is likely that not all submitted articles were captured. The collected articles were then compiled and analyzed according to scientific practice. Study aim, year of publication, size of sample population and the coincidence with target population, choice of methods *etc.* have been considered in the evaluation of the literature.

Paper IV is a qualitative study based on 15 interviews with Swedish organic farmers and initiators of organic farming in Sweden. Respondents were selected through purposive and heterogeneous sampling with regard to:

1. Conversion year
2. Type of production
3. Size of farm

These variables were chosen since they might signify differences among these groups because of the following reasons:

1. Conditions for conversion have changed over time. For example, in the beginning there were no subsidies or market incentives, while in the mid 1990's growing consumer demands made the food industry and several big retail chains support organic production.
2. Challenges are different depending on production type. For example, dairy production does not differ much from conventional production, while pig and poultry production differ substantially.
3. Problems faced by big farms may be different from those faced by small farms and farm size might influence farmer's worldview or vice versa.

Two conventional farmers were also included, as well as two 'initiators' (one advisor and one researcher). The latter two took part in the initial development of a policy for animal husbandry in the Swedish organic movement, and they were included in order to track what the early visions of the movement were like.

Focused, semi-structured interviews were used. An interview guide was used, but respondents could partly direct the conversation according to their interests. This means that in certain interviews some areas were more thoroughly discussed than others. Interviews were tape recorded and transcribed word by word. They were analyzed using a two-dimensional, conceptually clustered matrix into which interview data were transferred (Miles and Huberman, 1984). Data was categorized and frequencies of statements were measured within each cluster. Recurring patterns or themes were noted (Robson, 1993). This study was also a preparation for the following questionnaire study.

Paper V is dealing with the same issues as paper IV, *i.e.*, the views and attitudes among Swedish organic livestock farmers on animal husbandry and animal welfare issues, while paper V is taking a quantitative approach. It is based on a questionnaire mailed in April 2001 to Swedish organic farmers with certified animal husbandry. In total 575 questionnaires were sent out, addressing 56.5% of all Swedish organic livestock farmers at that time. Two reminders were sent, and the final response rate was 75.6%. The questionnaire was comprised of 60 items, dealing with different aspects of organic livestock production with special emphasis on animal welfare and value issues. The first part of the questionnaire covered pertinent background variables. Farmers were to indicate their views on a response scale from 1 to 7.

Descriptive statistics were obtained for each item (variable). In order to get a more manageable data set a principal components analysis (exploratory factor analysis) was performed (*e.g.*, Kerlinger and Pedhazur, 1973). The principal components factor analysis finds commonalties or high shared variance among all variables. Variables that load on a factor are then treated as a single coherent cluster in the following analysis. These clusters are assumed to represent underlying, more basic, conceptual variables (Williams, 1979). A matrix of intercorrelations between all pairs of variables was subsequently computed. The factors were then entered into a series of multiple regression models (Weinberg and Abramowitz, 2002) to explain five dependent variables. The procedures by which these dependent variables (factors) were constructed and the importance of these variables to the study is discussed below. Cronbach alpha values were computed to test the reliability of each index variable (Bohrnstedt and Knoke, 1994, pp. 266-268).

Results

Paper I

Paper I is a contribution to the interdisciplinary discourse regarding the animal welfare concept, exploring the basic values in organic animal husbandry and what these may imply for the understanding of animal welfare in organic farming. Three core values in the organic agriculture movement, relevant for the animal welfare concept, are suggested. The first two are suggested as 1) aim for holistic view and 2) aim for sustainability. The third core value is implicit and based on bio- and ecocentric views: 3) respect for nature. Two dilemmas are pointed out: One is inherent in ecocentric ethics, where system benefits are given priority over benefits for the individual in the system. The second dilemma springs from the third core value ("respect for nature"), which places a value per se on natural living, partly beyond the predominant understanding of animal welfare.

The three core values make it possible and relevant to formulate a specific "organic" definition of animal welfare. The following conclusions are drawn regarding such a definition:

- 1) The organic animal welfare concept should be complex and include multiple parameters, reflecting the holistic approach of organic agriculture.
- 2) Natural behavior, or natural living (understood as species-specific behavior, feed and environment [Algers, 1992]), is central, since it appears as the best way to cater to a good quality of animal life and system sustainability simultaneously. A telos-concept, for example defined as "the possibility to develop according to the animal's encoded genetic nature" (Fraser *et al.*, 1997), is suggested as a useful departure point when discussing how to implement the concept of natural living.
- 3) The systemic view advocated in organic farming makes it relevant to discuss welfare in relation to different systemic levels. An integrity concept (as suggested by Baars, 1999; also discussed by Röcklinsberg and Lund, 2000) may be used in relation to both individual and species level. It is also relevant to see individual welfare in relation to herd or farm level, which puts focus on breeding and management strategies, and even to the agroecosystem and the ecosystem, since the overall health of the system is essential for the health of the individual animal.

The systemic view also offers possibilities for new approaches to solve animal welfare problems, making for example breeding and management strategies, or changes in consumer attitudes and purchasing patterns, important tools for improvements. The optimal solution is when animal welfare can be integrated into the production system. The usual situation is rather that animal welfare is perceived as an inconvenience and a costly extra activity, which must be inflicted onto the system.

Paper II

Paper II is a philosophical essay, exploring what an animal ethics for organic farming might look like. It takes its departure point in the assumption that organic farming is substantially based in ecocentric ethics and that farm animals have the role of necessary and functional partners in sustainable agroecosystems. Their role should correspond to their moral standing. The ethical contract is suggested as a complementary to the ecocentric framework, with the aim to guarantee individual animal welfare. The contract protects animal interests against those of the stronger (human) partner and it can enjoin humans to share the created wealth and care for the welfare and needs of the individual animal, protecting animals from exploitation (just as human co-workers should not be exploited). Animals on their part contribute to the system with products and services.

In the paper the content of the contract is expounded. Three principles are suggested:

1. A human duty to exert justice (between humans and animals) and beneficence (to each individual animal),
2. A principle of nonmaleficence that limits what humans can demand from the animals and to human actions towards animals,
3. A precautionary principle in relation to ecosystem impact.

The ecocentric framework makes it permissible to slaughter animals. However, as long as they are alive contract principles are valid.

Finally it is suggested how the contract can be applied in practice. During conversion the organic farmer would be offered a short course where basic principles for organic farming and organic animal production would be elaborated. Practical issues of importance for animal welfare during conversion and production would also be discussed. At the end of the course the farmer would sign a formal contract where duties and responsibilities in relation to the animals would be stated. The contract would also include the certifying organizations. These would have to request advice from animal welfare scientists and ethologists when organic standards are created, and special farm animal ‘representatives’ with the right of veto would have to be appointed to serve on the standards committees.

Paper III

Paper III is a literature review on organic animal health and welfare, with the aim to scrutinize what the situation is like in practice. Only 22 peer-reviewed articles were found plus two overviews, all with the focus on clinical health; thus none addressed the question of behavior or welfare aspects other than health. The papers found were mainly dealing with dairy production and parasitology. Only ten were comparative studies of organic and conventional herds. In addition, two overviews were found. The overall tendency in the reviewed papers was that health (and presumably welfare) in organic herds was the same as or better than in conventional herds, with the exception for parasite-related diseases that were more frequent in organic farming. However, there is still lack of substantial evidence to allow general conclusions regarding animal welfare in organic farming.

The search also made it apparent that national and historical differences in organic standards and in the way organic farming is understood must be considered, as well as the time elapsed since conversion of the herd. The small number of papers published is not surprising in light of the history and development of organic farming and its philosophy. For example, organic researchers have been more interested in solving practical problems than publishing papers. Also, at many universities organic farming has only recently become accepted, explaining why few researchers have been interested in organic production and those that were had difficulties obtaining funding (Beus and Dunlap, 1990, 1991; Wynen, 1998). However, scientific publication dealing with organic systems can be expected to increase significantly in coming years.

A cautious conclusion based on this material is that except for parasite-related diseases, health and welfare in organic herds are the same as or better than in conventional herds.

Paper IV

Paper IV was an in-depth interview study of values and beliefs held by eleven Swedish organic farmers, two conventional farmers and two initiators (non-farmers who took part in shaping early organic livestock production in Sweden). The studied sample was well educated and with one exception the interviewees had a solid agricultural background. All respondents but two turned out to be positive towards organic animal husbandry. Conversion of livestock production on the studied farms took place between 1974 and 2000. Important reasons for conversion were a basic interest in environmental issues and a disappointment in conventional agriculture as well as personal characteristics like independence and a search for challenge. Personal beliefs were backed up by external influences, including economic incentives. These incentives were the single most important factor for the decision to convert, except for the pioneers who could not imagine farming in any other way. Based on respondents' statements it was concluded that there was still not full social acceptance in all parts of Sweden of being an organic farmer at the time of the study (2000).

There was a distinct difference in values between the pioneers who converted their farms early (before 1990) and those who converted later. The pioneer farmers shared their values with the initiators. They expressed a more ecocentric view, emphasizing a systemic approach, and they displayed a more holistic approach to questions, interpreting them in larger frameworks. They also had a more ecocentric understanding of animal welfare. There seems to be no major conflicts among IFOAM's, farmers' and consumers' ideas of animal welfare in organic systems. However there are differences in their understanding of what is important for welfare in practice. Genetic engineering is one area where perceptions differed between farmers and the certifying organizations. Farmers in this study were much less critical compared to the official organic policy, and some even approved of genetic engineering. Respondents also approved of the use of other kinds of new technology.

The later the conversion, the more dominant was the economic reason for conversion. There was also a tendency that the later conversion took place, the more superficial was

the farmer's relation to the organic principles for livestock production. However, there was also indications that farmers were increasingly influenced by organic values and integrated the "organic way of thinking" the longer they worked with organic farming.

Paper V

In the questionnaire study the respondents had long experience of farming, and 81% were full time farmers. Farms were classified according to their main type of production: 44% had beef or sheep production, 41% were dairy farms, 7.6% had pig production and 7.4% had layers. The high level of education (29% of respondents had some kind of university education, including 7.5% holding a one or two year university diploma in agriculture and rural management), and the high level of experience of work outside of agriculture (60%) could indicate that a large proportion of the sample was not "genuine" farmers but environmentalists who had turned to organic farming. However, this picture was contradicted by the fact that the majority had a farming background and was raised on a farm. The farmers generally tended to approve of the aim of the organic standards to allow animals a natural living. They generally also had a positive attitude towards organic animal husbandry.

The earlier conversion took place, the more likely the farmer was to regard natural living as important. Egg producers were more supportive than dairy producers of the idea that natural living is important (although this correlation was weak). Another interesting finding was that the more agricultural education the respondent had, the less important he or she considered natural living. Items related to animal ethics, dealing with dignity, intrinsic value and rights, and items related to the importance of allowing animals to live naturally appeared as two different concepts. The concept associated with animal ethics has always been embraced by animal protection movements but is not to the same extent inherent in the organic movement, and this also appeared to be true for the organic farmers. Those most critical of the organic standards were the full time farmers and farmers who had experienced conversion as difficult, while those who thought natural living is important tended not to agree with the criticism. Also those with an entrepreneurial attitude tended to be critical of the organic standards.

When analyzing the correlations between the factors, two groups emerged, representing different attitudes and behavioral dispositions. This indicated that there are two subgroups of organic livestock farmers in Sweden with partly separate values, farmers with pioneer attitudes ("organic enthusiasts") and entrepreneurial farmers, who consider making money and new challenges more important.

General discussion

Methodological considerations

Challenges associated with interdisciplinary work

This work has been labeled “interdisciplinary”. Since there are numerous definitions and variants of this word that furthermore are used interchangeably, it is actually a challenge to communicate what this label refers to. The word has been loosely defined as

“any challenge to the limitations or premises of the prevailing organization of knowledge or its representation in an institutionally recognized form” (Salter and Hearn, 1996)

The term “multidisciplinary” has been used for the same purpose (Lockeretz, 1991). More sophisticated distinctions have also been made. Rosenfield (1992) defined three levels of interaction among researchers working to address a common problem:

- Multidisciplinary– parallel or sequential work from disciplinary-specific base;
- Interdisciplinary – joint work but still from disciplinary-specific base;
- Transdisciplinary– joint work using shared conceptual framework drawing together disciplinary-specific theories, concepts, and approaches.

The term “nondisciplinary” has also been used to denote research where disciplines are ignored completely (Lockeretz, 1991), but again, both “interdisciplinary” (Johnson, 1971) and “multidisciplinary team work” (Blackwell, 1955) have been used for similar purposes. This short review is by no means complete but should be enough to give a picture of the existing semantic confusion. To stick to the terminology suggested by Rosenfield: the work within this thesis has generally been on the inter- and transdisciplinary levels. The endeavor has been to create a synthesis of knowledge from the different disciplines. The project has been a meeting place for science and the humanities: agronomy, ethology, veterinary and animal science on the one hand versus ethics, philosophy, social and behavioral science on the other. An obvious inefficiency in organizing the work this way, and particularly for transdisciplinary work, is that the researcher first has to learn about areas outside previous training (Lockeretz, 1991). Thus, to the extent it has succeeded it was made possible because supervisor, co-supervisors and co-authors from all the mentioned disciplines were involved.

The first six months of the thesis work were mainly spent trying to learn the language, methodology and traditions of ethics. For someone trained in natural sciences and not previously well educated in philosophy (as it turned out), it was frustrating to find that these were at least seemingly opposite from the norms used in science. To make a stereotyped and biased explanation of the problems encountered: whereas science heralds referenced facts and figures as good arguments, presented in short and concise format, the ethicists frown upon the accuracy of facts (“...because what is truth, anyway?”). They prefer lengthy and verbose argumentations whose focus and inherent logic may not always be clear to one unaware of the philosophical tradition and complex of problems behind it. What is self-evident in science is questionable in ethics, while the ethical doubt may appear as almost ridiculous at a first scientific glance. – This type of challenges is actually well described in the literature. Salter and Hearn (1996) describe them as the

translation problem, the language problem and the reception problem. By translation they mean the movement of information from one discipline to another, and they note that each disciplinary community has a different way of speaking about the topics and the conduct of its research. It is not only the technical terminology but also the manner in which information gains credibility, the order in which information is presented, the points of reference used, and the implicit agreements about what needs to be said and what can be taken for granted. Bella and Williamson (1976) talk about this as the epistemological and methodological tools of a disciplinary community. The language problem arises when a word is used in quite different ways in the different disciplines. At times this created big problems in this thesis work, since several of the words we use in an everyday manner have very specific meanings in ethics. Fortunately, the first frustrating encounters between disciplines in this project were followed by increasing understanding and appreciation of the alternate way to approach problems and formulate solutions. It also made way for a humble insight that both approaches are necessary to get a full understanding of problems and allow for optimal solutions: good and applicable ethics needs to be based on good science including relevant and accurate facts (Frankena, 1973), and good science leading to valuable results needs to recognize the value dimensions involved.

The last problem described by Salter and Hearne, the reception problem, appears when results from interdisciplinary work are to be communicated to the surrounding world. In what form, and where, should the results be published? It is still a fact that this thesis is written by a natural scientist. I have chosen to remain faithful to most of the formalities cherished in science. The whole construction of the thesis adheres to the scientific custom of writing separate papers to be published in peer-reviewed journals, thus making the actual thesis text a general introduction to the issues plus a concluding summary of published papers that are presented in an appendix. In the philosophical tradition, on the other hand, thesis work means to write a comprehensive book where the arguments follow from each other to create a logical whole, scarcely divisible into short papers of the scientific kind. There are of course advantages and disadvantages with both models of writing. The scientific model is perhaps less challenging since it makes the student approach the goal (to complete a PhD thesis) stepwise. The big disadvantage, however, comes when dealing with philosophical matters, because it does not fully allow for the process of letting thoughts and ideas mature, something even more necessary in ethics than in science that is primarily dealing with "hard facts" rather than values. Facts don't mature the way reasoning does. Hence, the scientific model does not allow early papers to be reworked in the light of later insights. This disadvantage may appear in this thesis.

The papers of philosophical character included in this thesis (papers I and II) were written in a scientific style with a descriptive part first (with referenced facts) and the argumentation and discussion in a separate, explicit section of the paper rather than constructing subsequent arguments all through the paper, as is customary in the work of philosophers. This manner is not self-evident, which some comments from reviewers have made clear, and it raises the question whether a person engaging in the philosophical debate must do it in the language of the philosophers. I believe that this should not be necessary. Both philosophers and scientists need to learn about each other's reality in order to make way for a constructive and fruitful debate. Fortunately there are signs of this happening, at least in the field of animal ethics and animal welfare science. Departing

from fixed positions where ethicists and scientists⁸ essentially were talking two separate languages like "Tibetan and English" (Snow, 1959), the premises for the discussion are now getting closer and the confusion of tongues may (in the best cases) rather be described as "South African and Scottish" (Fraser, 1999). There are ethicists looking to empirical research to evaluate and help resolve animal ethics issues (*e.g.*, Rollin, 1993; Thompson, 1993; Röcklinsberg, 2001) at the same time as animal welfare science has grown more compatible with the approaches used by some ethicists (both when it comes to recognizing the importance of subjective experiences of animals, *e.g.*, Wood-Gush, 1973; Dawkins, 1980; as well as a direct interest in ethical issues, *e.g.*, Sandøe and Simonsen, 1992; Fraser, 1995). An increasing number of scientists recognize animal welfare as a composite concept with normative as well as empirical elements, and many are attempting to understand the subjective experiences of animals, an area which for a long time has been taboo in science (see Burkhardt, 1997, for an overview). However, subjective experiences are ethically relevant and in some ethical theories (*e.g.*, hedonistic utilitarian ethics) the most important criteria for animal welfare. Fraser (1999) concludes:

"The increasing convergence of the scientific and philosophical approaches may lead to a more integrated field of study and to a greater awareness that neither empirical information nor ethical reflection can, by itself, answer questions about our proper relationship to animals of other species."

Papers I and II

The problems faced in papers I and II, stemming from being a natural scientist attempting to write a philosophical paper, have been scrutinized above. Paper I deals with the animal welfare concept. This is an area where an interdisciplinary debate has been going on since the 1970's (Fraser, 1999). At the time of writing this thesis, the discussion regarding how the animal welfare concept is best interpreted in organic farming had just started (Lund, 2000b; Alrøe *et al.*, 2001). This of course made it easier to approach the subject and elaborate on the thoughts presented in paper I. As for paper II no such previous work was found.

A problem that may be considered in connection with these papers is the relation between theory and reality, or more specifically: between the organic ideology and the opinions and practices of organic farmers. In paper I it is observed that a comprehensive "official IFOAM ideology" has never been published and that the organic movement never has been a homogenous group of people all sharing the same values (*e.g.*, Vartdal and Blekesaune, 1992; Kaltoft, 1997; Østergaard, 1998). A large study in the US Corn Belt in the mid 1970's and a follow-up study ten years later, looking at differences in attitudes between organic and conventional farmers, found little evidence of organic farmers having the metaphysical or philosophical outlook often associated with organic farming (Wernick and Lockeretz, 1977; Lockeretz and Wernick, 1980; Lockeretz and Madden, 1987). Rather, in most respects the farmers were closer to conventional farmers than to the stereotypic organic farmer driven by ideological conviction over economic

⁸ Singer (1990) and Regan (1983) may be prominent examples from the philosophical camp, while Tinbergen (1951), Lorenz (1963) and (more recently and involved in this debate) Broom (1991), may exemplify scientists not wanting science to get entangled with "unscientific" issues such as subjective experiences or ethics.

profit. On the other hand, there are several authors that describe basic differences in values between conventional and organic farming (Merrill, 1983; Spedding, 1988; Allen and Bernhardt, 1995; Sullivan *et al.*, 1996; Wynen, 1998; Christensen, 1998; Egri, 1999; DARCOF, 2000). Some even go as far as to say that organic agriculture represents a paradigmatic shift (Callicott, 1988; Beus and Dunlap, 1990, 1991; Beus *et al.*, 1991). Wynen (1998) did a special study on this subject and she is arguing that the move towards organic farming can be seen as satisfying Kuhn's (1970) description of what happens during a paradigm shift.

The organic standards are not static but develop and change over time. Still, an analysis shows that the basic values have not changed even though the scope has widened to include more spheres of action like processing, aquaculture, and fibre production. The conclusion is that organic farming represents a distinct difference in basic view compared to the "mainstream world view" (as described by Christensen, 1998, pp. 64-89), particularly of the relation between human and nature. This difference is expressed in the ontological, epistemological and practical approach to agriculture. The values were established by the early organic movement and they are still expressed in current organic standards. Paper I analyzes the IFOAM Basic standards to establish three "core values". These were constructed to capture the essence of the organic ideology in a way that is useful for the animal welfare discussion. Also a few other publications were used to support these core values, for example the Nordic Platform for organic farming. This is an influential policy document by the Nordic IFOAM group (Lindholm, 2001). However, it is important to note that the organic ideals for different reasons might not always be realized in the practical organic farming, and that all aspects of it is definitely not shared by all organic farmers – perhaps not even by a majority. Nevertheless, there is an ideology consistent enough to take as departure point for analysis of the animal welfare concept and animal ethics in relation to in organic farming. In paper II this is further developed.

Paper III

The main problem encountered in the work with the literature study on animal health and welfare (paper III) was the small number of published review articles dealing with organic animal husbandry. This may not be surprising. Researchers dealing with organic farming have so far been more interested in solving acute and practical problems than in publishing in scientific press (Höök, 1997), and big studies including comparisons with conventional production systems have not been perceived as relevant (Dlouhý and Nilsson, 1983). Rather, the feeling has been that organic farming should be developed in its own right (Lockeretz and Anderson, 1993; Wynen, 1998). Also, it has been argued that organic farming articles were more difficult to publish in the established agricultural press (Youngberg, 1986; MacRae *et al.*, 1989). The preference for alternative types of research methods (*e.g.*, on-farm and qualitative studies and participatory research) is likely to have contributed to these publishing difficulties. 16 of the 22 peer-reviewed articles found in this literature study were published within the last four years (1998 or later). This brought up the question whether the study should also include papers that were not peer-reviewed. A relatively large body of non-refereed literature exists presenting research results from organic farming, including papers dealing with animal health and welfare (DOCEA, 1997). However, it was decided that only peer-reviewed papers should be included in this study since the review process gives some guarantee of the scientific quality of the paper,

although this guarantee is incomplete and may even be used to screen out papers with new approaches. The latter criticism was raised by the early organic researchers and is discussed in paper III. Their criticism is supported by Wynen (1998)

A general observation from the literature study is that it is important to focus on recent research results since the organic farming practices as well as the standards have developed and changed over time. Also, organic feedstuffs have become much more available in the market, allowing other kinds of diets today. Thus, early results may not be representative of the current situation. Another important factor (perhaps the most important one) is that the average organic farmer likely has changed over time: several studies indicate a change from idealistic pioneers, having a profound knowledge of organic "ideology" but perhaps less experience as livestock producers, towards farmers converting mainly because of favorable economic conditions (Vartdal and Blekesaune, 1992; DARCOF, 2000; paper IV).

Paper IV

This study was a qualitative survey which implies specific problems related to qualitative research methods and the generalizability (*i.e.*, external validity [Robson, 1993, p. 72]) of the findings of such studies. The interview was chosen as research tool since it provides a rich and nuanced description of reality, leading to a deeper understanding less available with quantitative methods. It was considered appropriate because if the farmer's choice of production system is related to important personal values (which can be expected [Vartdal and Blekesaune, 1992; Østergaard, 1998; Fairweather, 1999]) it is a method that allows the respondent to reflect on these in his/her own words. The sample was constructed to be as representative as possible of Swedish organic livestock farmers. However, the findings cannot be generalized in the sense that attitudes and values expressed by the respondents are representative to the average organic livestock farmer in Sweden. Recorded data still make important contributions to the understanding of central issues in relation to the aim for the study. The qualitative inquiry in paper IV is exploratory, in the sense that it aims to seek new insights into the farmers' situation, their world view and attitudes of organic animal husbandry. It is also descriptive since it tries to portray an accurate profile of the situation with emphasis on qualitative aspects of their understanding of animal welfare and ethics. The lack of generalizability was less important in this case, since the interview study was followed by a quantitative questionnaire study of the same target population. Combining a qualitative and a quantitative method the way it was done in this thesis allows issues to be studied from several aspects. It also combines richness and preciseness in data.

The sample comprised farmers that were probably more active in farmers' interest organizations than the average organic farmer. This may at least partly be explained by the selection process. Advisory officers for organic livestock production in three different counties were asked for a list of farmers "with an interest in discussing animal husbandry issues", which may have favored a selection of people with opinions.

Paper V

The questionnaire was sent to a randomly selected sample, comprising 56.5% of the target population (all organic livestock farmers). Furthermore, the return rate was high (76.5%).

The third reminder was done over telephone and it was also asked why the farmer had not returned any of the two questionnaires sent out earlier. The most frequent excuse was lack of time, and many mentioned that they had received questionnaires from several different studies within a short period of time. (It is a well-known fact that the organic farmers are an interesting target group for different types of studies and research.) The high response rate may be seen as a sign that ethics and animal welfare are issues of high concern for the organic farmers. Because of practical problems with the registration of respondents' returned answers, no dropout analysis could be performed. Thus, there is no information on whether dropouts diverted from respondents, *e.g.*, non-respondents could consist of a group for which ethical issues are of less concern. However, the largeness of the sample is a strength because it allows many views to be expressed.

A tangible example of difficulties that may arise in interdisciplinary work concerns the measure to indicate the spread of the distribution of scores within an item. Three different measures were suggested as the best indicator (one from each discipline involved): standard deviation, standard error and the interquartile range.

Synthesis of papers I-V

The current debate regarding animal welfare in organic farming raises some interesting questions regarding principles. The first question is whether animal welfare at all is, or should be, a particular concern for organic farming. If so, a number of other questions arise: What kind of moral relation is there between humans and farm animals within the organic framework, and what does it imply for how we treat animals in organic farming? How do we handle the inevitable conflicts that occur, where animal welfare stands against other interests or values? There are many examples of such conflicts, *e.g.*:

- The EU regulation ban on routine use of antibiotics and anthelmintics (Council Regulation, 1999) grants the consumer “clean” food and minimizes the impact on the environment but may put animal welfare at risk (*consumer and environmental against animal welfare objectives*);
- Nose-ringing of pigs, allowed by some certification bodies, will keep a protective plant layer on the soil and minimize leakage of nutrients while preventing animals from performing a strongly motivated behavior (*environmental against animal welfare objectives*);
- Requirements regarding a safe working environment result in the dehorning and castration of cattle although mutilations of animals are by principle not allowed in the IFOAM standards (*worker interests against animal welfare and integrity objectives*);
- Artificial insemination is used in organic farming in order to achieve fast progress in breeding and production capacity, in spite of the basic principle to allow a natural living (*producer and consumer interests against animal welfare objectives*).
- Keeping dairy farms small versus loose housing for cows (*small-scale farming against animal welfare*).

In order to get a well-reasoned debate about these ethical questions it is necessary to scrutinize the values inherent to organic farming and to look to the philosophical foundation for organic livestock production in general and animal welfare issues in

particular. Thus, the moral status of livestock in organic farming must be clarified and related to a philosophy, or ethical theory, consistent with organic ideals. In the next step the concept of animal welfare must be defined for organic farming. The choice of animal welfare definition always reflects some basic evaluation regarding what is considered good quality of life for animals. Also the animal husbandry system reflects certain values or aims regarding what is considered morally relevant. The values expressed in the chosen animal welfare concept ought to correspond to values aimed for in the husbandry system (paper I). The philosophical framework for organic farming should also be able to give guidance on how to solve conflicting interests or values. These issues are discussed in papers I and II. In addition to these theoretical aspects of animal welfare in organic farming, the thesis also scrutinizes what animal welfare in organic herds looks like in practice (paper III), and available data on this are discussed below. Papers IV and V also look at reality, but focus on the values concerning animal husbandry and animal welfare held by Swedish organic livestock farmers.

Is animal welfare a concern for organic farming – or should it be?

Focus on sustainability

IFOAM Basic Standards state (IFOAM, 2000):

“Organic agriculture is a process which develops a viable and sustainable agroecosystem.”

From the principles of organic farming (IFOAM, 2000), as well as IFOAM’s published policy papers, it is quite clear that the organic movement’s primary goals focus on ecological sustainability rather than on animal welfare. Of 17 general principles stated in the IFOAM Basic Standards 13 deal with sustainability, and only one directly with animal welfare. In paper I this “aim for sustainability” has been proposed as a core value of organic farming. Another core value suggested in the paper is the “aim for holistic view”, including an alternative value orientation. It is a view emphasizing the functional relation between parts and wholes. Furthermore it demands that agricultural issues be placed in larger perspectives: ecological as well as social, local as well as global, and in a broad time frame paying respect to the past as well as to the future. IFOAM states as its mission (IFOAM, 2000):

“We are committed to a holistic approach in the development of organic farming systems including maintenance of a sustainable environment and respect for the need of humanity.”

In paper I it is argued that these two core values do not offer a sufficient basis for the extensive animal welfare aims in organic farming. They do it only indirectly, in that the aim for sustainability relates to welfare through the aim of allowing animals their natural behavior and the need to keep animals in good health (figure 1 in paper I).

Animal welfare concerns are important in practice

However, as discussed in paper I and described in the introduction (pages 11ff), there is a tradition of animal welfare concerns in organic farming: Organic farmers have from the start been concerned with animal welfare, and they still are (Niggli and Lockeretz, 1996; Boehncke, 1997; Roderick and Hovi, 1999). For example, in Canada the British Columbia Society for the Prevention of Cruelty to Animals (BC SPCA) and the Certified Organic Association of British Columbia are working together to develop a special animal welfare labeling scheme (Stoneman and Mowbray, 2002). This interest is also clearly demonstrated by the interview study (paper IV) and in the questionnaire study (paper V) of Swedish organic livestock farmers. In the latter, the two items scoring the highest mean of all were both dealing with animal welfare. Farmers agreed to that “Farm animals have the right to feel well (physically and mentally)” and “Farm animals should be allowed to live a dignified life” – both statements got an average of 6.69 on a scale of 7, with a standard deviation of 0.71 and 0.65 respectively. More than 99% of the farmers answered.

Animal welfare concerns are also formally laid down in the IFOAM standards. The first published IFOAM Standards listed seven “principle aims of organic agriculture” (IFOAM, 1980), one of which focused on farm animals:

“To give all livestock conditions of life that conforms to their physiological needs and to humanitarian principles”

The document continues:

“In order to obtain, or at least approach, these objectives, the organic agricultural movement has adopted certain techniques whose aim is:

- Avoidance of those products (chemical fertilizers, pesticides and other chemicals of various kinds) and those methods (forcing of plant and animal growth, industrial methods of livestock management, etc) which are in opposition of these aims.
- Respect for natural ecological balances.
- To do everything possible to ensure that the living organisms with which an agriculturist works (micro-organisms, plants and animals) become his allies rather than his enemies or his slaves.

In the latest version of the IFOAM Basic Standards (IFOAM, 2000) the concern for farm animals has become one of 17 principles under the heading “The principle aims of organic production and processing”, and it has been reworded:

“To give all livestock conditions of life with due consideration for the basic aspects of their innate behaviour”

However, the animal welfare concerns are more explicit in the standards section for animal husbandry, where they are stated as general principles for organic animal husbandry (IFOAM, 2000, 5.1. Animal husbandry management):

“Management techniques in animal husbandry should be governed by the physiological and ethological needs of the farm animals in question. This includes:

- That animals should be allowed to conduct their basic behavioural needs.

- That all management techniques, including those where production levels and speed of growth are concerned, should be directed to the good health and welfare of the animals.

Welfare concerns are also included in standards that deal with transport and slaughter.

The emphasis on animal welfare has reached and gained support among the public, and in several countries consumers perceive organic farming products as more “animal friendly” than conventional products (*e.g.*, Holmberg, 1999; Danish Ministry of Food, Agriculture and Fisheries, 1999; Harper and Henson, 2001). Animal welfare is used as a marketing argument for organic animal products, for example in Sweden.

It is clear that both in practice and in the organic standards, animal welfare is considered an important issue. The question is which philosophical framework would best correspond with the organic ideology in general and these far-reaching animal welfare aspirations in particular.

Ecocentric ethics as a philosophical basis for organic farming

Before further discussing the organic philosophy, some clarifying definitions must be made. Ethical theories dealing with questions regarding human-animal and human-nature relations are often roughly divided into four main categories: *anthropocentric*, *sentientistic*, *biocentric* and *ecocentric*. In this thesis the use of these terms relates to the theory’s focus on moral concern. They are defined as follows:

- Anthropocentrism is the view that humans, and only these, have direct moral status.
- Sentientism is the view that all sentient beings, and only these, have direct moral status.
- Biocentrism is the view that all living beings, and only these, have direct moral status.
- Ecocentrism is the view that also species, ecosystems and other relevant features in nature have direct moral status.

The relation among these different approaches can be illustrated with expanding circles (figure 2) (Leopold, 1949; Singer, 1981)⁹. As used here, these definitions do not deal with the question of intrinsic value, since it is theoretically possible to assign an entity intrinsic value but not direct moral concern, or an animal can be the focus of moral concern but independent of or without an intrinsic value (Röcklinsberg, 2001, for examples see Schlitt, 1992, pp. 52 and 170; Singer, 1993, pp. 105 *ff*; Wolf, 1990, pp. 69 *ff*).

Paper I argues that bio- or ecocentric theories correspond to core values in organic farming (the aim for sustainability and the aim for holistic view). A third core value, “respect for nature”, is suggested in the paper. Although the organic movement is not as explicit about this core value as the other two, it nevertheless is part of the basic outlook of organic farming. It states that humans are an inseparable part of nature and emphasizing the “interdependence of all living things in an organically unified order

⁹ The idea of an evolution of ethics has however been discussed by several philosophers before Leopold and Singer, *e.g.*, Albert Schweitzer, Thomas Huxley and Peter Kropotkin, as well as by Charles Darwin (Sörlin, 1991, p. 177).

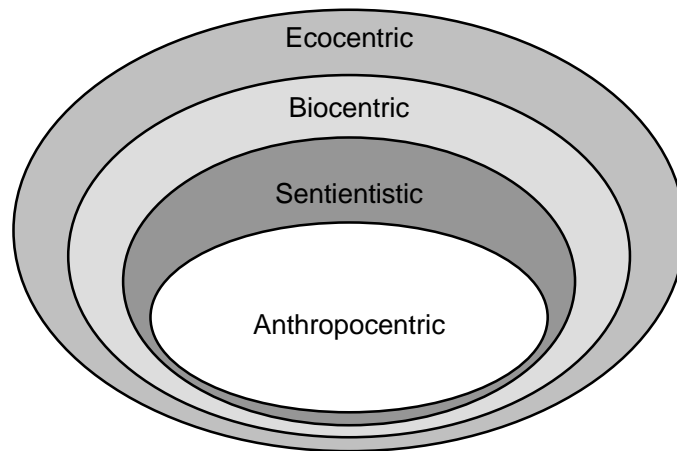


Fig. 2. The four main categories for ethical theories dealing with questions regarding human-animal and human-nature relations: *anthropocentric*, *sentientistic*, *biocentric* and *ecocentric*. In this thesis the use of these terms relates to the theory's focus on moral concern.

whose balance and stability are necessary conditions for the realization of the good of its constituent biotic communities". The wording is taken from the biocentric philosopher Paul W. Taylor (1981). From this view it can be argued that humans are but one species of many on this planet – just plain members of the biotic community. This does not award humans any moral priorities, thus human interests should not automatically have superiority over those of other species, whether wild or domesticated. However, paper I also points out the problems that arise when applying a biocentric theory to farming. These theories focus on the individual organisms, whose well-being is something to be realized as an end in itself (Taylor, 1981). Usually this is interpreted so that killing of animals is not morally permissible, which makes this view incompatible with organic agriculture: animal husbandry is important to the agroecological system and it presupposes slaughter (paper II). (Taylor himself does not advocate an absolute ban on killing of animals but sees questions related to land use as the main reason for vegetarianism.) This difficulty does not apply to ecocentric theories, where killing of animals only is a moral problem if they belong to a species threatened by extinction (Stenmark, 2002, p. 82). In this respect ecocentric theories are better suited as a moral framework for organic agriculture.

Other observations also support the view that ecocentric ethics is closer to the ideas of organic farming. It grew out of the same kind of concerns as organic farming and largely responds to the same kind of issues that organic farming views as central, in particular the environmental concerns and the aim for a holistic view. Thus the first two core values suggested in paper I express different aspects of an ecocentric position. This is also reflected in how the organic movement perceives animal welfare. In the interview study (paper IV) the pioneers do not talk much about individual animal welfare but they rather see welfare as a "spin-off effect" of a well-functioning system. This is further confirmed

in paper V, where the concept of allowing the animals a natural living turns out to be much more central than animal ethics concepts heralded by animal protection movements, such as “rights”, “dignity”, and “intrinsic value.” Also, the item ranked as the number one reason why farmers had converted their animal husbandry to organic production was that it “represents a more holistic approach to farming”, and the item ranked second was that it is “more future oriented”. “More environmentally friendly” was the third choice while “More animal welfare friendly” only ranked as number four (table 2 in paper V).

One of the most important theorists behind ecocentric ethics is Aldo Leopold (Ariansen, 1993; Stenmark, 2002, p. 81), a biologist and professor in Game Management, who also took an interest in philosophy. His thoughts have been further developed, especially by the philosopher J. Baird Callicott. Leopold wrote (Leopold, 1949, pp. 224-25):

“A thing is right when it tends to preserve the integrity, stability¹⁰, and beauty of the biotic community. It is wrong when it tends otherwise.”

This is usually interpreted as a consequent systems approach in which benefits for the biotic community or ecosystem are given right of precedence over benefits that may be gained by individuals in the system. Taken this way, Leopold represents a very radical form of ecocentrism, assigning individuals only an instrumental value. Accordingly ecocentrism has been accused of being a case of “environmental fascism” (Regan, 1983). There are other, less radical, versions of ecocentrism where individuals, also, are considered to have moral significance. These can be called ‘ecocentric pluralism’ (Stenmark, 2000, p. 107), assigning value both to ecological entities, such as ecosystems and species, and to individual organisms. Ecocentric pluralism can be either strong or weak. In strong ecocentric pluralism the most important (although not only) basis for judging whether or not an action is morally acceptable is whether or not it promotes the good of the biotic community (Callicott, 1989, p. 6):

“In every case the effect upon ecological systems is the decisive factor in the determination of the ethical quality of actions.”

¹⁰ According to Webster (1994), the problem of nature's stability has been in focus for lengthy discussions among biologists and ecologists, more or less since ecology emerged as a branch of science around the turn of the 20th century. Already in 1895 the Danish biologist Eugene Warming published a book where he claimed that plant societies developed towards a “climax state” (Warming, 1895). His ideas were further developed by other scientists during the first half of the 20th century, e.g. by the American biologist Frederic Clements (1936), but they were also questioned by a number of scientists. In the 1950's and 60's Eugene Odum and his brother Howard developed the view further, claiming that the ecosystem is Nature's basic functional unit, and that ecosystems are always striving towards biodiversity and balance (Odum, 1963; Odum, 1971). This view became important to the environmental movements in the 1970's (including the organic movement). However, it also became increasingly questioned among biologists, and by the mid 1980's it was brought into serious disrepute. Instead new approaches like chaos theory and neo-Darwinism came in fashion. (See Webster, 1994, for a detailed presentation and analysis of the history of ecology.) This has also provided reasons for questioning of the ecocentric position: if nature is in fact not stable nor benign in the way presumed, e.g., by the Odum school, can it then serve as a guiding rule for ethical aspirations, as suggested by Leopold? This may be considered a dilemma for the ecocentric approach (and perhaps a more offensive one to the scientist than to the ethicist). It is however not within the scope of this thesis to elaborate this issue further.

In weak ecocentric pluralism this is an important factor, but not necessarily the most important one, when judging an action (Rolston, 1988, p. 130):

“The obligation [to ecosystems] remains a *prima facie* one: humans ought to preserve so far as they can the richness of the biological community.”

However, applying ecocentric theories to agriculture is not entirely unproblematic, which is discussed in paper II. These theories usually focus on human actions in relation to wild nature, and they expound a preservationist, “hands-off” ethic that countenances the intrinsic worth of “untamed nature” (e.g., Leopold, 1949). Organic agriculture is consistent with the spirit of Leopold’s maxim although it is not preservationist since it is also committed to promote development. There is clearly some tension between Leopold’s holism inherent in organic farming and some organic aims and practices. However, striving toward an optimal amount of productive transformation of land and livestock for human consumption need not be antithetical to ecocentric ideals. Of the choices at hand, this is still the alternative that best complies with the spirit of organic farming.

Arguments for animal welfare concerns from an ecocentric position

Applying ecocentric theories to livestock farming also entails problems in the area of animal welfare, which is discussed in papers I and II. Because these theories focus on systems rather than on individuals, they do not provide an obvious basis for animal ethics or welfare concerns. In fact, this issue has been the focus of an agitated philosophical debate among ecocentric ethicists and animal welfare advocates. (A brief overview of this debate is given in paper II.) That discussion ended with reconciliation between the environmentalists and the animal welfare camp, pointing to the possibilities of arguing for animal welfare also from an ecocentric position. Paper I, but especially paper II, deal with this problem.

As pointed out by Regan (1993), uniting a radical form for ecocentrism with individual animal welfare concerns is a task that quickly runs into great difficulties. However, if ecocentric pluralism is taken as the departure point the picture changes. Accordingly, philosophers representing this position have commented on animal welfare issues. Rolston writes that humans have a duty to avoid causing unnecessary or pointless suffering to animals (1988, p. 83 and 85). He stipulates a “homologous principle” as a guideline for our moral relation to farm animals:

“Do not cause inordinate suffering, beyond those orders of nature from which the animals were taken. One ought to fit culture into the natural givens, where pain is inseparable from the transfer of values between sentient lives. Culturally imposed suffering must be comparable to ecologically functional suffering” (Rolston, 1988, p. 61)

As pointed out in paper I his statement is actually very similar to a frequently voiced view within the Swedish organic movement: “Organic animals ought to have at least as good a life as if they lived in the wild” (Lund, 1996b). – A problem with Rolston is that he does not clearly say *why* we should care about farm animals (Stenmark, 2000).

In papers I and II it is argued that there are also other approaches in ecocentric ethics that can open up far-reaching animal welfare concerns, for example in deep ecology¹¹ (often considered a form for strong ecocentrism), whose leading philosopher Arne Næss argues that on a deep level all living beings relate to one another (Næss, 1985, 1989). They also have an aspiration for self-realization. If this is translated in terms of natural behavior or natural living, and seen as a morally relevant aim, we should allow livestock self-realization through the use of rearing systems that allow natural living. The symbiosis between humans and animals on both a mystic and practical level urges humans to handle animals with great respect. Similar thoughts can be found with the German philosopher Meyer-Abich (1997, p. 295). Verhoog *et al.* (2002) also draw near this view. They distinguish between three different types of approaches to organic farming: the simplistic “no chemicals” approach, the agroecological approach that focus on well-functioning systems, and the integrity approach, referring to the characteristic nature of an entity. This last approach:

“... is the result of an inner process of involvement with the way of being of natural entities. [... The farmers] develop a respect for the wholeness, harmony, or identity of a living entity based on a personal involvement with the life of plants or animals”.

A problem with these theories is their metaphysical character, which makes them difficult to accept for some people. Yet another approach is to see the animals as part of the human mixed community, which was the solution suggested by the ecocentric philosopher J.B. Callicott¹² (1989, pp. 49-59) in the debate referred to above. Advocates for this view argues that domesticated animals have been part of the human community for thousands of years. Because of this they should also be included in the duties we have to members of the human community.

This discussion should not be brought to an end without noting why established moral theories like utilitarian animal ethics and animal rights are inadequate for anchoring animal welfare concerns in organic production systems. Utilitarianism, so far the dominating paradigm among Anglo-Saxon animal ethicists, fails to recognize important values inherent in organic as well as traditional agriculture. It fails to appreciate the dynamics (interconnectedness and interdependence) between the various actors that make up a flourishing agroecological community (Thompson, 1993; Rollin, 1995, pp. 3-26). It considers the suffering, needs, and interests of individual animals (Singer, 1990¹³), but its one-dimensional focus on consideration of utilities, interests or pleasure is less suitable for farming. Slaughter is not completely prohibited in Singer's utilitarian view, but whether or not it is permissible depends on how one values the interests of the actors involved (*e.g.*, the interest of the gourmet meat eater to consume meat must be weighed against the interests of the animal that is going to be slaughtered - maybe this animal has a fractured leg and faces a long and complicated convalescence, which may affect its interest in continuing life, or it could be argued that an animal has no concept of its death and thus does not get its interests violated if painlessly and unknowingly slaughtered).

¹¹ Deep ecology has for example influenced the Norwegian organic movement.

¹² Callicott is by no means the only one suggesting the mixed community as a basis for the moral standing of animals. The most well-known advocate of this approach is probably Mary Midgley (1983).

¹³ The first edition of Peter Singer's book *Animal Liberation* was published already in 1975.

Still, it is very difficult to justify commercial farming from a sentientistic utilitarian position.

In addition, preference utilitarian or hedonistic approaches do not work well with organic farming, which has a different understanding of the individual animal in the moral and ecological order as well as of pleasure, pain and suffering (this is discussed further on page 43). An ethical position setting the bounds for moral concern at sentient beings cannot work for organic agriculture, which also includes other objects as morally relevant (figure 2, page 37).

Animal rights theories (*e.g.*, Regan, 1983) fail as a complementary philosophy for organic animal husbandry since they aim for an egalitarianism (paying equal respect to the inherent value of sentient animals and humans) that excludes animal agriculture (Fraser, 1999). It seeks to abolish all forms of animal agriculture (Regan, 1983). As shown in paper II, farm animals and herbivores in particular, are almost indispensable to productive and sustainable farming systems. Thus, these two models of well known and frequently used animal ethics theories do not help organic farming.

To conclude, the answer to the question if animal welfare is (or should be) a concern for organic farming must be, yes. Animal welfare concerns were an integrated part of organic farming from the start, they are expressed by organic farmers in practice as well as in the standards, and they can also be defended in ecocentric pluralistic ethics. The next issue then is how to interpret the animal welfare concept in organic farming.

The animal welfare concept in organic farming

Different understandings of animal welfare

The animal welfare concept refers to an animal's quality of life. As already mentioned (pages 8 and 30), scientists as well as philosophers have made efforts to ascertain the real meaning of "quality of life": how should the animal welfare concept be understood in theory and then interpreted in practical terms, and how can it be measured? They have each approached the issue in their characteristic way: while the scientists primarily have tried to formulate a definition that makes welfare possible to measure and verify, the philosophers have discussed what is morally relevant (*e.g.*, the subjective experience of well-being, fulfillment of interest or self-realization) and from this they have tried to arrive at a definition of welfare (Röcklinsberg, 2001, pp. 56-57). Three major positions have emerged from this discussion (Duncan and Fraser, 1997):

The subjective experience approach, claiming that only animal feelings, such as suffering, pain or pleasure, should count when welfare status is evaluated (*e.g.*, Dawkins, 1988; Duncan, 1993; Wolf, 1990; Wolf, 1992). It is often combined with a utilitarian view, for example the preference utilitarianism proposed by Singer (1990), saying that only preferences or interests are morally relevant.

The biological functioning approach, arguing that it is a good quality of life when the animal's biological systems are functioning in a normal or satisfactory manner. Various

definitions have been given of biological functioning. Broom (1991) has suggested that good welfare depends on whether the animal can cope successfully with its environment and function normally from a biological perspective. Others have included high levels of growth and reproduction (McGlone, 1993) or even behavioral needs (Jensen and Toates, 1993; although these are considered of less importance than the physiological needs: Curtis, 1987).

The “natural living” approach, proposing that an animal’s welfare depends on the possibility of expressing its natural behavior (Webster *et al.*, 1986) and living a “natural” life according to its genetically encoded nature or “telos” (Rollin, 1993).

In reality the three positions partly overlap, to a degree that depends on the exact interpretation of each position (figure 3). Later in the animal welfare debate more complex definitions of animal welfare were proposed. For example, Fraser *et al.* (1997) have suggested an integrative model for judging animal welfare including all three approaches above, and Röcklinsberg (2001) has argued that a theocentric perspective can be formulated, starting from the animal as an individual (“you”) whose mental and physical state is to be respected. That is, the animal is to be respected in its species-specific behavior and as an entire being in its environment, and when this happens the animal's dignity also is respected. Röcklinsberg points to the need for ethological knowledge in showing the animal this kind of respect.

The organic interpretation

The problem of defining the concept of “animal welfare” for organic farming is the main focus of paper I. The organic philosophy, as expressed in three suggested core values, is taken as the departure point for the discussion. Based on these values it is argued that a specific “organic” interpretation is justified. The third core value, “Respect for nature”, becomes especially important for this interpretation. It states that humans as well as animals are inseparable parts of nature and emphasizes the interconnectedness among all living beings and between them and their environment. In agricultural contexts it advises humans to co-operate with nature, and nature is perceived as providing good models for human action (Rolston, 1988, pp. 230-232; Callicott, 1989, pp. 117-127). “Respect for nature” implies a fundamental belief in natural processes – and a conviction that it is a very difficult task to cheat or outwit nature. This means that human intervention in nature’s processes should be kept to a minimum (DARCOF, 2000, p. 10) and if necessary should mimic nature as much as possible. This is mirrored in the IFOAM Basic Standards (2000, introduction), stating that organic farming systems are “directed towards enhancing natural life cycles rather than suppressing nature”. Another example could be the organic ban on genetic engineering.

When this third core value is translated in terms of animal welfare, “natural behavior” comes in focus. Perhaps “natural living” is an even better expression, since not only behaviour, but also feed that is adapted to animal physiology and an environment that is similar to the biotope natural to the species, are considered important and are included in the concept. This approach resembles the last of the three positions presented above, although the organic version must be considered a quite radical version of it. Rollin writes (1993, p. 48):

“Not only will welfare mean control of pain and suffering, it will also entail nurturing and fulfillment of the animals' natures.”

1. Pigs outdoor in the summer, nice weather
2. Pigs with sub-clinical parasite infections, outdoors in bad weather
3. Sows weaning 25 piglets per year
4. Pigs fed with anti-stress substances such as amperozide
5. Pigs fed low dosage antibiotics
6. Pigs outdoors stressed by predators (fox sneaking around the field)
7. Pigs with subclinical parasite infection, outdoors in good weather

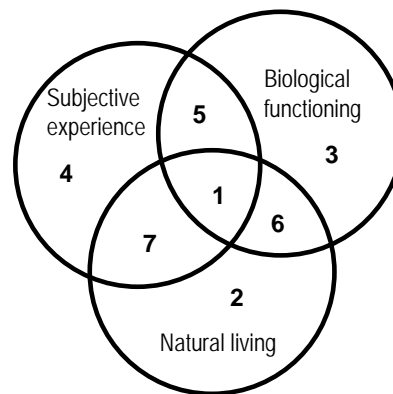


Fig. 3. Three definitions of the animal welfare concept. Circles represent: the subjective experience approach, the biological functioning approach and the natural living approach. Figure in a circle indicate different kinds of stress or ailments that could be considered acceptable by the particular welfare definition

Obviously, animal suffering should also be avoided in organic farming, but contrary to preference utilitarian and hedonistic theories, it is not the only aim. In the organic view natural living is assigned a value in itself, and the fulfillment of the animals' nature ranks higher than the control of pain and suffering: Natural living has not only an instrumental but also an inherent value. As an instrumental value it would be preferred only in as much as it makes the animal feel better or become healthier. But allowing animals a natural life is considered a good in itself, so that even some negative experiences for the individual may be tolerated. To an extent, such experiences are perceived as a natural part of life that can never be completely deleted from an individual animal's spectrum of experiences (Alrøe *et al.*, 2001; paper I; paper IV). This doesn't mean that such experiences are not negative for the individual as they happen, but rather that they are viewed as an important part of the functional feedback system connecting individual behavior and the surrounding world (see figure 3, paper I). This approach in organic farming is also discussed by Vaarst *et al.* (2001), who, discussing organic systems, argue that although "a natural life" does not guarantee the absence of pain, frustration and discomfort, contact with nature may add certain favorable qualities to the life of an animal, the implications of which are not always measurable. They prefer to talk about "valuable experiences" and "a good life" rather than animal welfare (p. 377):

"A valuable experience may (but not necessarily) contain elements that seem to have a short-term negative impact on the individual, but it nevertheless makes the individual learn something that is of longer term valuable. ... The choice of the expression 'good life' instead of 'animal welfare' is principally made in order not to exclude 'valuable experiences' from our understanding of what may constitute animal welfare."

Based on the third core value, different kinds of negative experiences may also be valued differently. For example, the stress caused because the animal lacks adaptive strategies to handle the situation (*e.g.*, from a noisy fan in the pig house) (figure 4) may be considered worse than the stress outdoor pigs experience with the fox sneaking around their paddock, since animals in the wild are primed to deal with unpredictable conditions,

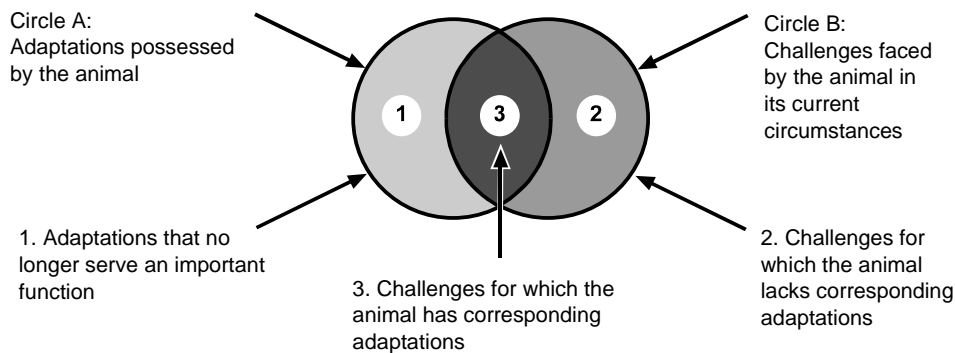


Fig.4. Many of the welfare challenges in contemporary farming occur either because the animal has an adaptation that no longer can find a function in modern rearing systems or because the animal lacks adaptations to such systems (After Fraser *et al.*, 1997).

of which predators are an important part. This should by no means stop the farmer from protecting his piglets from the fox (albeit by other means than by eradicating the fox population, since the means used must comply with the ecocentric framework). However, the pigs would have to live with the possibility of being exposed to this kind of stress, which should not be the case with the noisy fan. It could, of course, be questioned whether it would be a valuable experience for the pigs, in the sense discussed by Vaarst *et al.* (2001), but it would expose the animals to a wider range of experiences, and add "excitements" that would still be within their genetic adaptation. Thus, in figure 4 the fan would represent a "type 2 challenge", while the fox would be a "type 3 challenge".

Welfare in relation to different systemic levels

Another important feature of organic farming is expressed in the core value "aim for holistic view". Applied to the animal welfare concept it makes way for another alternative interpretation, as discussed in paper I. Traditionally, the focus when evaluating welfare has been only on the individual (*e.g.*, Singer, 1990; Regan, 1983; Wolf, 1990; Ryder, 1998), but the aim of a holistic view makes it necessary to broaden the view and look not only at the individual animal but at the animal in its contexts, that is, the different systems in which it functions. Thus, welfare can be discussed in relation to the herd, the farm, the agroecosystem (Faye *et al.*, 1999) or even the ecosystem in which the agroecosystem and the farm functions: if welfare is to be achieved in the long perspective this requires a healthy ecosystem. To include all these levels in one welfare concept would be to extend it far beyond its common use, and it would be almost impossible to make such a broad concept operational. What makes this view interesting, however, is that it automatically opens alternative approaches regarding how to solve welfare problems. When the focus no longer is exclusively on the individual, systemic solutions also become feasible (Alrøe *et al.*, 2001). This includes changes in breeding goals (herd level), farm structure (farm

level) or even consumption patterns (societal level). Thus, "the selection of appropriate breeds" is mentioned as the first principle for disease prevention in the EU regulation, and "an appropriate density of livestock" is another principle mentioned (Council Regulation, 1999, 5.1 [a] and [d]). (This is not to say that these "systemic" solutions are not also available in a more individual-focused interpretation of animal welfare, but they may not be chosen first or be as obvious as in a systemic approach.)

The importance of recognizing an alternative organic view

An alternative organic understanding of the animal welfare concept must be communicated to the surrounding world. The organic movement needs to be clear and explicit about what the animal welfare concept stands for in theory and practice when relating to others concerned with the issue, for example in the case with the Canadian animal welfare organization (the BC SPCA, page 35). Also, the consumers have the right to know where the organic movement stands in issues concerning animal welfare. The organic movement definitely needs to be explicit about the animal welfare definition when asked difficult questions by inquisitive media reporters (like "How can you expose organic piglets to threatening predators, while you are saying you are aiming for good animal welfare?" – and of course, in addition to explaining the emphasis on "natural life", the organic movement must then also be prepared to state the measures taken to prevent the pigs from being eaten by the predators.) It must be very clear to everyone (including to the organic farmers themselves) that an alternative organic understanding of the animal welfare concept does NOT imply that animal suffering or bad living conditions of any kind can be accepted and excused by referring to a principle of "natural living". Solutions must be sought for and found in order to realize the aim of giving the individual animal a good quality of life.

The relationship that exists between world view and production practices (Allen and Bernhardt, 1995; Kaltoft, 1997) makes understanding of the organic approach a necessary prerequisite for problem solving in organic systems. Advisors, veterinarians and other "support staff" working with the organic farmer need to have this understanding in order to help the organic farmer (Kaltoft, 1997; Egri, 1999). Vaarst and Bennedsgaard (2001) stress the need for veterinarians and advisors to learn how organic farmers think and to "convert" their own thinking in order to find solutions appropriate to the goals and intentions of the organic farmer as well as to organic farming in general. The "support staff" must be aware that some solutions that may seem obvious in conventional agriculture may not be available to organic farmers because these solutions do not agree with the organic definition of animal welfare, or fall outside the ecocentric framework. Another (and even more compelling) reason is that legislation may prescribe certain actions in order for products to be legally certified as organic. For example, the Swedish Veterinary Association has strongly criticized the Swedish certifying organization KRAV for requiring twice the withdrawal period after antibiotic treatment and has demanded this to be changed immediately (Beck-Friis, 2002). However, the withdrawal time is required by the EU regulation on organic animal husbandry (Council Regulation, 1999, paragraph 5.7 in the Annex). Such regulations could not be changed by a national certification organization, even if it wanted to do so. Veterinarians have generally been very critical towards organic farming (e.g., Roderick *et al.*, 1996; Anon., 1998; Beck-Friis, 2002), and a contributory cause is probably the difficulties the veterinarians have had in understanding the organic view and the difference in understanding of animal welfare. In

contrast to the organic emphasis on natural living, most veterinarians are likely to interpret the concept of animal welfare primarily in terms of physical health.

Having said this, it may also be pointed out that the communication problems between people trained in conventional agriculture and the organic farmers are likely to be greater the more peripheral the role that organic agriculture plays in the agricultural sector, and the more of a pioneer attitude the farmers have (*c.f.*, paper IV and V). This varies considerably among countries. For example, Egri (1999) found that Canadian conventional and organic farmers have significantly different patterns of information behavior and preferences. This is probably much less true in Sweden, where organic farming has become a more integrated part of agriculture.

Animal welfare in practice

Criticism and dilemmas

Although animal welfare is a goal in organic livestock production according to the IFOAM Basic Standards, organic farming has been criticized because of poor welfare (*e.g.*, Danish Ethical Council concerning Animals, 1995; Jensen, 1999). In paper I reasons behind this criticism are explored in terms of different values, and it is suggested that the ecocentric approach in organic farming lies behind several of the most strongly criticized practices. The ecocentric approach may be seen in both standards and practice. In fact, it is the cause of several difficult dilemmas for organic farming.

One such dilemma is caused by the systems view preferred in an ecocentric approach, and the priority given to system health rather than to individual welfare. The systems view was expressed in the interview study presented in paper IV, where the pioneers (*i.e.*, those converting to organic farming early) talked about animal welfare mostly in terms of "spinoff effects" from a well functioning agroecosystem. However, this relationship is not as straight-forward as anticipated, and just feeding organic food and allowing animals a natural life is not enough to guarantee them a good quality of life. For example, Swedish slaughterhouses until recently had problems with many organic animals being too thin, which made it difficult to sell much of the organic meat.

The emphasis on system health has made organic farming the target for extensive criticism, especially among veterinarians, since it manifests itself in a ban on routine use of antibiotics and anthelmintics (*e.g.*, Andrews, 1991; Vaarst *et al.*, 2001; Hovi, Kossaibati *et al.*, 2002). Organic farmers have been accused of being reluctant about administering this type of medication (although their reluctance could also be caused by economic considerations, since they could lose premiums for organic products if they do). The veterinarians argue that this is a serious threat against the individual animal's welfare. From an organic perspective there are, however, many reasons why these substances should not be allowed. Basically it is against the ecocentric view to solve problems with intrusive techniques of this kind (*i.e.*, killing microorganisms by using chemically synthesized preparations). An objective for organic farming is "to do everything possible to ensure that all living organisms the farmer works with, from micro-organisms to plants and animals, become allies" (Danish Ministry of Food, Agriculture and Fisheries, 1999).

The aim is not to eradicate pathogens but to control them. Instead, solutions should be found that co-operate with or resemble nature (paper I), for example disease should be prevented through enhancement of the animal's immune defense or through the use of alternative methods like phytotherapy, ayurvedic medicine or homeopathy¹⁴ (IFOAM, 2000; Council Regulation, 1999), and parasite infection through grazing with several species on the same pasture or through rotational grazing. When illness does occur the aim should be to find the cause and prevent future outbreaks by changing management practices and breeding. In UK the national organic livestock production standards include a statutory requirement for written animal health plans on organic livestock farms (Hovi *et al.*, 2002). The European Network for Animal Health and Welfare in Organic Agriculture (NAHWOA) states in its final report that animal health management on organic farms should involve on-going planning based on the actual health situation on each farm, preferably in the form of health plans¹⁵.

Also, as already mentioned it is considered an environmental problem and detrimental to ecosystem health to administer synthetic substances that may pass unaltered through the treated animal, affecting the microflora and fauna in the dung and maybe further in the ecosystem (Strong, 1993; McCracken, 1993). The practice can also be considered as unsustainable since the microorganisms eventually will become resistant against the medication (SOU, 1997; see also Hugoson & Wallén, 2000; Waller, 1997; van Wyk *et al.*, 1997; Sangster, 1999). In addition there is the risk of getting residues in food (SOU, 1997).

A further example of this type of conflict is species-specific behavior conflicting with environmental concerns, more specifically when rooting by free range pigs causes leakage of soil nutrients, which may happen during rainy periods and on certain soil types (Eriksen *et al.*, 1999; von Wachenfelt, 1999). To prevent rooting, nose ringing of pigs is used in many countries. This practice is also sometimes allowed in organic farming, *e.g.* in Denmark (The Danish Plant Directorate, 2000) and in the Spanish Dehesa-system (Trujillo and Mata, 2000), but it is likely to impede individual welfare since rooting is a basic pig behavior (Wood-Gush *et al.*, 1990; Studniz, 2001).

Another dilemma caused by the ecocentric approach (and another reason that animal welfare in organic farming has been questioned) is the conflict between the natural living principle maintained in organic farming versus individual welfare interpreted in more narrow terms of "prevention of suffering" or "promotion of health". The high value placed on natural living means that given a choice, a more natural (and thus less controlled) environment is preferred over a well-controlled environment where the animal is protected from dangers but less able to have a natural life. Thus, organic sows are kept outdoors rather than under confined indoor conditions, although the risk of piglet mortality and exposure to predators may be higher in outdoor systems (Vaarst *et al.*, 2000), although there is a big variation in mortality figures among farms (Kongsted,

¹⁴ The use of homeopathy has been a particularly hot issue in Sweden, where veterinarians are by law prohibited to use this method since it is not considered to be based on scientific evidence and reliable experience.

¹⁵ The NAHWOA final recommendations and proceedings from four workshops focusing on different aspects of organic animal husbandry can be found on the project web-site: <http://www.veeru.reading.ac.uk/organic>

1999). Likewise, free-range systems are stipulated for poultry (paper V) although outbreaks of feather pecking or cannibalism cause greater damage in these larger groups (Bilcik and Keeling, 1999). (However, the foraging opportunities in free range systems should lead to a reduced risk of outbreaks [Johnsen *et al.*, 1998; Wechsler and Huber-Eicher, 1998]). Organic poultry production was criticized in the mid-90's by the Danish Ethical Council concerning Animals, pointing at mortality figures twice as high in organic as in conventional poultry herds (Danish Ethical Council concerning Animals, 1995). Improved management, breeding and system development can overcome many of the problems connected with natural living, but they also reflect basic differences in underlying values. Further examples are the preference for natural mating, although artificial insemination programs are superior with regard to disease resistance and elimination of deformities, and the principle of outdoor grazing in spite of higher risks for parasitic diseases (*e.g.* *Coccidiosis* and *Ascarid* infections in poultry [Heuer, 2001; Permin, 1999]), piroplasmosis and severe gnat problems in cattle [Hammarberg, 2001], and trichinosis and *Erysipelas* infections [Kugelberg *et al.*, 2001] in pigs).

Another type of dilemma frequently discussed in relation to organic farming is the presumably high cost of implementing animal welfare in organic production systems. This is a big issue that has not been studied closely in this thesis, but one may note that the systemic perspective also opens new approaches to solve this dilemma. It demands that individual welfare is seen in a larger perspective. A true account of the economic cost for animal welfare (including health) should thus include the value of less obvious impacts of bad welfare and disease, generally referred to as hidden costs, for example shorter longevity, lower yields and treatment costs; these often are considerable (Ekesbo and Lund, 1993; Oltenacu, 2001). It should also consider costs occurring outside the farm. This includes environmental costs and costs connected with the occurrence of resistant strains of bacteria (particularly *Salmonella*), resulting from the liberal use of low dosage antibiotics to control problems caused by bad animal housing and management (Holmgren and Lundeheim, 1994). The dimensions of these resistance problems have become so big that the European Commission Scientific Steering Committee on antimicrobial resistance has recommended actions promptly to reduce the use of antimicrobials including feed additives also in conventional farming within the EU. Some legislation has already been adopted (Council Regulation, 1998).

Although it has not been the aim of this thesis to solve dilemmas, it is interesting to note that organic agriculture has developed as a response to the dilemmas faced by conventional agriculture, finding solutions transcending the context and creating new perspectives (Christensen, 1998, pp. 29-32 and 355-365). This innovative approach and creativity is needed henceforth to create "win-win" situations beneficial both to the system and the individual. For example, consider the situation of the squirrel hiding acorns in the fall: It is beneficial not only for the squirrel but also for the oak, other rodents, birds, and the entire oak forest ecosystem. Optimal solutions will integrate animal welfare as part of the *agroecosystem*, that is, the animal's behavior becomes a valuable contribution to the system. There are practical examples of this, for example the control of certain pests by pigs in the crop rotation (Karlsson *et al.*, 1996; Andresen, 2000) and in forestry (Beinlich, 1998) or by hens in raspberry and vegetable fields (Reid, 2002). Here welfare is perceived not as a cost for the system but as a benefit. Unfortunately gains on higher system levels often are not rewarded within our current capitalistic market system. The commitments in the contract may require public support schemes or legislation. (The

organic standards as well as the support schemes for organic agriculture in the EU and some other countries can partly be interpreted as examples of this.) Also, there is an urgent need for research directed towards development of this type of production system.

What current research can say about animal welfare in organic systems

The question is how much of the criticism discussed above can be confirmed or rejected by scientific research. Unfortunately the answer must be short: there is not much scientifically based knowledge about animal welfare in organic herds at the moment. A literature study yielded only 22 articles published in peer-reviewed journals (paper III). None of these articles focused on aspects of welfare other than health. Only eight studies were comparative, and the number of farms in many of these was small. Very few focused on pigs and poultry, where the biggest differences in housing and management are to be found compared to conventional farming. Also, many papers provided insufficient information regarding the time since conversion and the particular set of standards used, which also makes it more difficult to draw general conclusions from this material. For example, a large proportion of the dairy herds in these studies were likely under conversion or had converted only recently, raising the question of how much the effects of organic management really showed in these herds.

Having stated this, the few results presented were generally at least slightly positive for organic farming, with the important exception of parasitic diseases. No study found more health problems overall in organic herds than in conventional. Several authors found metabolic disorders (ketosis and milk fever) to be a minor problem in organic herds (Krutzinna *et al.*, 1996; Hardeng and Edge, 2001; Hamilton *et al.*, 2002). The comparative studies found mastitis to be less frequent in organic herds (Hardeng and Edge, 2001; Hamilton *et al.*, 2002; Toledo *et al.*, 2002) or found no significant differences compared to conventional herds (Vaarst and Bennedsgaard, 2001). However, with the exception of a Norwegian study (Hardeng and Edge, 2001), mastitis was considered the major health problem in all studies commenting on this. An interesting study (since it was so extensive) was made in Sweden, comparing carcass quality by analyzing all Swedish slaughterhouse statistics¹⁶ from 1997 (Hansson *et al.*, 2000). In this study organic cows and heifers showed significantly lower incidences of abscesses, arthritis, mastitis, and liver diseases such as lipidosis. 28% of organic and 27% of conventional beef cattle had registered abnormalities, and 28% of conventional and 17% of organic pigs had one or more registered lesions. Pathological findings in sheep were low both for conventional (10%) and organic (9%) animals. Most findings in organic animals were related to parasitic diseases.

This points to that the criticism against organic farming may be justified for problems related to parasite infections. All parasitological studies reported in paper III showed a higher prevalence of parasites in organic herds. Apparently the control of internal as well as external parasites is an area where organic farming has not yet managed to develop good alternatives to conventional treatments. This was true for pigs (Carstensen *et al.*, 2002), hens (Permin *et al.*, 1999), sheep (Lindqvist *et al.*, 2001), and probably also dairy

¹⁶ Meat inspectors from the Swedish National Food Administration register pathological and other findings at a post-mortem inspection of all slaughtered animals in Sweden.

cattle (Svensson *et al.*, 2000; Hansson *et al.*, 2000). The animal welfare effects of these parasitic infestations are difficult to judge, however, at least for pigs and poultry (Thamsborg, pers. comm.). But parasite infestation must be regarded as a risk factor for animal welfare even though no symptoms show, since a clinical outbreak may occur if, for example, the animal's general condition is impaired for other reasons.

As for the criticism regarding omitted antibiotic treatment several studies indicated that although this is often mentioned by veterinarians as a problem, it does not show as higher somatic cell counts or incidences of mastitis (Vaarst and Bennedsgaard, 2001; Vaarst *et al.*, 2001; Hardeng and Edge, 2001; Hamilton *et al.*, 2002; Toledo *et al.*, 2002). Two studies found that other methods were used instead, for example frequent milking of affected udder quarters and massage (Vaarst *et al.*, 2001; Hamilton *et al.*, 2002). A study of British farms found that although alternative remedies were regularly used the majority used antibiotic to treat the more severe cases (Weller and Bowling, 2000). Thus, this problem may be overestimated, although practices may differ among countries.

It is appropriate to add a few words of caution about what research generally tells us about organic animal husbandry. During the work with paper III it became clear that there are several circumstances necessary to consider when dealing with research results from organic herds. Organic farming techniques as well as the organic standards have developed over time, and both items may be different in different countries or even within a country. The typical organic farmer has also changed over time (Christensen, 1998). If early pioneers were likely to choose management solutions other than the newcomers, this may systematically affect animal health and welfare. It is suggested that the following should always be considered to get a full picture of the situation, allowing results to be properly evaluated: country where the study took place and the particular set of standards applied in the herd, conversion year and time since conversion. There are no research data available regarding the time it takes for conversion of feed and management routines to affect health, but studies using a big proportion of herds recently converted or under conversion should be aware of this problem and be cautious making conclusions regarding differences between conventional and these organic herds. This is usually not the case in the papers published so far.

A very cautious conclusion regarding animal health in organic systems based on this literature study is that parasite problems tend to be worse but other health traits tend to be the same or better in organic farming compared to conventional.

The potential of organic farming in relation to welfare

When discussing animal welfare in relation to organic farming, it is important to keep in mind that most organic animal husbandry systems are still under development, and also that research efforts helping this development so far have been quite limited. Therefore not only the current situation is of interest but also the potential of organic farming in relation to animal welfare should be considered. It may be noted that the organic animal husbandry standards are generally more far-reaching than the animal welfare legislation in any country. This is true also for Sweden, where the national organic standards in several aspects exceed legal demands. For example, the organic standards require that feed must be suitable to animal physiology (KRAV, 2002). They are also more detailed than the

legislation, for example regarding demands on enriched environment and access to outdoor runs or pasture.

But are the requirements in the standards enough to guarantee good welfare according to IFOAM's general principles for animal husbandry and in line with consumer expectations? Generally speaking the standards do provide a potential for this. Animals that get to live in stimulating environments (and usually this applies to free range conditions) where they can behave naturally generally have better welfare than animals kept in barren environments not allowing this (*e.g.*, Appleby & Hughes, 1991; de Jonge *et al.*, 1996; de Passillé, 2001; Wemesfelder and Birke, 1997). Thus, some welfare problems common to conventional farming do not appear at all, or very seldom, in organic animal husbandry: Diseases related to abnormal animal behavior (such as tail biting in pigs), extreme production levels, or feeding regimens not adapted to the biology of the animals are less likely to be found – but the studies found in the literature review do not specifically study this. (*E.g.*, tail biting is not registered at the regular post-mortem inspection at Swedish slaughter houses.) A further account of how organic standards provide preconditions for good living conditions and for practices aiming at improved welfare and health is given by Sundrum (2001).

However, every production system also has inherent problems (in addition to diseases that occur in both conventional and organic systems), and the alternative approach in the organic philosophy and standards also invites a unique spectrum of diseases, such as parasite related diseases. This must be taken into consideration when discussing the potentials of organic animal husbandry, and it is especially important to direct future research efforts towards such identified problem areas. Thus, diseases related to outdoor and loose housing/free range production are likely to be more frequent in organic farming. Longer withdrawal times and greater restrictions on medicine use prescribed in the standards may also affect animal health and welfare, as may different feeding principles (*e.g.* the ban on synthetic amino acids and vitamins as feed additives). During conversion, problems may appear as a result of this since the farmer must learn and adjust to new practices (Vaarst *et al.*, 2001).

The biggest health problem at present appears to be parasitic diseases. However, good management can bring down infections (Dimander *et al.*, 2000; Höglund *et al.*, 2001; Carstensen *et al.*, 2002), and most authors were cautiously optimistic regarding future possibilities for coping with parasites in ways acceptable to the organic standards (Niezen *et al.*, 1996; Thamsborg *et al.*, 1999). Another fact supporting an optimistic view is that also conventional farming is seriously looking for alternatives to chemical treatments, due to increasing problems with resistant parasites (*e.g.*, Barger, 1997; Gray, 1997; Waller, 1999). It is scarcely a coincidence that eight of the 22 published articles deal with parasitology.

Two important issues dealt with only briefly or not at all in this thesis are how the standards should be implemented with regard to the animal welfare aspects (paper II) and how animal welfare should be evaluated on the farm by the certifying organization in

order to control that stated goals are achieved and guarantee animal welfare in practice. These areas were not within the scope of this thesis but need to be focus for future research efforts.

Organic farmers' attitudes to ethics and animal welfare – a Swedish example

In this thesis it has been considered important not only to deal in theory with how the underlying values and ideals of organic farming relate to animal welfare and ethics, but also to compare theory with empirical studies of these same issues. The studies presented in paper IV and V have out of necessity been limited to Swedish organic farmers, in spite of the international character of the organic movement and the fact that the IFOAM standards regulate organic farming worldwide. However, the much greater challenges posed by a multi-cultural study of farmers in several countries and the limited resources available to deal with those problems have spelled out the limits for the current study. Instead of extending it geographically it has been expanded in depth through the application of both qualitative and quantitative research methods. Generally there was a consistency in answers between the two methods used.

The farmers generally showed positive attitudes towards organic farming and animal husbandry. In the interview study some farmers saw it as a way for small farmers to survive. But also the owner of a very large farm (under Swedish conditions) saw organic farming as a way to get new market opportunities. He also felt it was a more ethical, and thereby more satisfying, way of producing. Several expressed it was “more exciting every year” to farm organically. This is consistent with the picture emerging from the questionnaire study. Most farmers had positive expectations when they started with organic animal husbandry, but even so, 90% had become more positive towards organic livestock production after practicing it for a while, and only 3.5% were disappointed (and half of these would still continue organic production). They found organic livestock production more interesting compared to conventional production, and they saw less ethical problems. An overwhelming majority stated they wanted to continue organic if they were to continue livestock production. However, to some extent this positive attitude may also be explained as a psychological process in decision making, *i.e.*, that they backed up decisions once taken with arguments (Svensson, 1999). There is also the possibility that those who did not respond were more negative towards organic farming than those who did.

The reasons for conversion were examined in both studies, since they reveal something about what the farmer appreciates about organic animal husbandry, and implicitly about the underlying values that are important to the farmer. Both studies showed that to most farmers animal welfare was not the primary reason for conversion. Rather, it was environmental concerns (paper IV and V), and the more holistic approach in organic farming to the relation between plants, animals and environment (paper V). In both studies there was a tendency that the later conversion took place the more important were the economic incentives. This is in accordance with other studies (Svensson, 1991; Østergaard, 1998). The questionnaire study showed a moderate correlation between the entrepreneurial attitude and conversion year ($r=0.311$, $p<0.001$). However, the interview study resulted in a more nuanced picture. Several respondents pointed out that many of those who originally had converted for money had been “converted in their thinking”. The interviewed farmers seemed to integrate the “organic” way of thinking more with their own the longer they worked with organic farming. Thus, the process worked in two

directions: newcomers were less idealistic and would probably influence the organic movement in that direction, but as time went by they appeared to be more influenced by the organic values.

This difference in values and attitudes between farmers with a “pioneer” attitude and other farmers was found in both samples. Similar tendencies are described in other studies (Vartdal and Blekesaune, 1992; Fostvedt, 1993). In the interview study the pioneers displayed more of an ecocentric position, emphasizing the importance of well-functioning systems and taking a global perspective also when discussing farm level issues. An example of the latter was a pioneer dairy farmer who included land use issues in the third world in the discussion on cow nutrition and feeding. This approach was probably facilitated by the fact that many pioneers in both groups were well educated. In the questionnaire study an attitude was identified that signified a farmer who saw organic farming more as a lifestyle than as an enterprise and who identified him or herself with the organic aims. This attitude was closely related to a positive attitude towards organic animal husbandry, and it was also correlated to the attitude that animals should be allowed to live naturally. This is in accordance with an ecocentric position. Some of the pioneers in the interview study mentioned that farm animals should have a quality of life at least as good as if they would have lived in the wild, and one added that they should not be subjected to more suffering than is naturally. This is an idea similar to the “homologous principle” (Rolston, 1988).

The interviewed pioneers talked about animal welfare more in terms of “spinoff” effects from a well functioning agroecosystem, rather than in terms of individual welfare, rights or dignity. This was also true in the questionnaire study, where a positive attitude of organic farming was more correlated to “natural living” than to the attitude describing an animal ethics approach emphasizing rights, intrinsic value or dignity. Thus, the ecocentric position suggested in the theoretical part of this thesis seems to correspond to an ecocentric attitude existing among Swedish organic farmers. However, the questionnaire study indicated that there are two rather separate subpopulations of Swedish organic livestock farmers, partly holding different attitudes and behavioral dispositions. One group had attitudes that go together with appreciation of organic farming as a life style and the ecocentric understanding of animal welfare. The other group were entrepreneurial farmers who considered making money and new challenges more important. They also were more critical towards the organic standards. This does not speak against that an ecocentric position can be used as a departure point for an animal ethics for organic farming; rather, it indicates that not all Swedish organic farmers support important parts of the organic ideology.

A survey of Swedish consumers found that they have high expectations on animal welfare in organic farming including that livestock should be allowed a natural living (table 4) (Szatek, 2001). The report concluded that there is a big potential to increase organic market shares through information and marketing that focus on animal welfare and ethics. A Dutch study of farmers’ and consumers’ perceptions of animal welfare in livestock breeding found that this differed between the two groups (te Velde *et al.*, 2002). While farmers mainly interpreted animal welfare in terms of health and production (the biological functioning approach), the consumers interpreted it in terms of freedom to move and freedom to fulfill natural desires (the natural living approach). The authors note

Table 4. *Consumers' expectations of ethics and animal welfare in organic animal husbandry. Consumers were to give a score between 1 and 10, 1 indicating "not important at all" and 10 "very high importance" (after Szatek, 2001)*

Issue	Average score
Animals should not be stressed at slaughter	9.0
Animals should be allowed natural living, e.g., pigs should be able to root and poultry should be free-range	8.9
Medication should not be used as prevention but only when there is a real need	8.7
Calves should be able to suckle and be close to their mothers during their first period of life	8.7
Poultry should not be raised in cages	8.5
Animals should live their whole life on the same farm since this causes less stress and less diseases	8.1
Production should be based on ethical values	7.7
Pigs should have the possibility to be outdoors all year around	7.2

that "the value and integrity of the body, which is stressed by organizations such as the Dutch Association of Animal Protection, was not mentioned by any of the consumers". Thus, consumers in both Sweden and the Netherlands seem to have a similar understanding of animal welfare as the organic movement, while it seems to differ both from the understanding of animal welfare in traditional animal welfare organizations and the one frequently found among veterinarians and persons educated in conventional agriculture. This is actually supported by the questionnaire study, where agricultural education was conversely related to the attitude that natural living is important. This again underlines the importance of organic farmers being explicit regarding the understanding of "animal welfare" in organic farming.

A proposal of an ethical approach to the organic dilemma

As has been shown in this thesis, the dilemma faced by organic farming in relation to animal welfare is how to combine the ecocentric position that give priority to sustainability and environmental concerns, with the aim to secure the welfare of the individual animal. This problem must be recognized and should be the focus for serious discussions within the organic movement. In order to give farm animals a good life, and also to maintain credibility among consumers, it is necessary to find the problem areas as well as the solutions, both in theory and practice. The farm animals are our sentient co-

workers in the agroecosystem and this qualifies them to a good quality of life. This view is taken as departure point in paper II, and is used to suggest an animal ethics for organic farming.

The ethical approach suggested is to be applied within an ecocentric framework, and it is an agroecological approach rather than a metaphysical one (*c.f.* Verhoog *et al.*, 2002). Contrary to the “mixed community” approach suggested by Callicott (1989), the arguments developed in paper II do not depart from the view of farm animals as inferior and dependent members of the human community, but as indispensable partners in productive and sustainable agroecosystems. Thus, farm animals are assigned a stronger moral standing in relation to humans than in the approach suggested by Callicott. The ethics suggested in paper II corresponds to the organic view of agriculture as an agroecosystem rather than primarily an economic enterprise, and it points out the important ecological role farm animals have in sustainable agricultural systems: Animal contributions make the agroecosystem more stable and productive, given that the farm animal component meets certain, specified demands regarding species composition, number of animals in relation to available resources, and the design of the production system. The animals thus become our partners in a united strive to create well-functioning agroecosystems, from which both humans and animals (ideally) can benefit. An appropriate model to handle moral relations between partners is the contract. The metaphor of an ethical contract is thus suggested to regulate the human-farm animal relation within organic farming systems. This contract implies that humans must face up to what it means to be part of a mutually beneficial partnership with the farm animals as our ecological co-workers. Hence, the contract is essentially for humans and about the obligations humans have towards farm animals within the organic framework. The human partner becomes the system manager, which implies a different emphasis concerning responsibilities and considerations than for a managing director with primarily economic goals to realize. Since the contract is established within an ecocentric framework the sustainability of the system is still the primary guideline for actions. This implies, for example, that animals must be slaughtered in order to keep populations in balance, and that humans take the role as “top predators” in the agroecosystem.

An advantage with the contract metaphor is that it immediately can be applied in practice, explicitly spelling out human duties and limits to what we can demand from the animals. In paper II suggestions are made regarding how this can be done. The organic farmer could even sign a real contract, in order to clearly manifest these duties and make them tangible. Paper II also emphasizes that it becomes the responsibility of society as a whole to give farm animals their share of the gains yielded by the agroecosystem. That is, the human partner must pay the cost of giving them a good quality of life, including respect for natural living. The only limitations occur if severe ecological damage is likely from this. Thus the dilemma between environment and individual suffering might be solved within the contract. All levels of society, not only the farmers, must contribute economically to this: consumers, government, research funding bodies, *etc.*

Conclusions

Ecocentric ethics is suggested as an ethical position for organic farming. It corresponds to central values in organic farming expressed in the organic standards. Both ecocentric ethics and organic farming grew out of the same kind of concerns, focusing on ecological sustainability. Both take a holistic view that emphasizes the functional relation between parts and wholes. This position can also be identified among Swedish organic farmers in their perception of animal welfare.

Animal welfare should be a concern in organic farming. Although subordinate to environmental and sustainability goals, animal welfare concerns are an integrated part of the organic philosophy, and they have been part of organic farming aims at least since the organic movement started in the 1970's. Animal welfare concerns can be based in ecocentric ethics, and the systemic approach can promote new ways of thinking about welfare. Thus, it can facilitate finding solutions to welfare problems.

An important finding is that the animal welfare concept is understood differently in organic farming than what is usual in conventional agriculture. It is interpreted in terms of natural living, which includes the possibility to perform a natural behavior, feed which is adapted to animal physiology and an environment similar to the animal's natural biotope. This difference can explain some of the criticism from people educated in conventional agriculture, for example veterinarians, directed against organic animal husbandry. However, consumers and organic farmers appear to have a similar understanding of animal welfare. Thus, it is important for the organic farmers to be explicit and communicate their view of the animal welfare concept.

A major value conflict within organic animal husbandry is the one between the ecocentric emphasis on sustainability and system health, and the animal welfare aim. Another dilemma is the conflict between the natural living principle versus individual welfare interpreted more narrowly in terms of prevention of suffering or promotion of health. There are also other conflicting interests, and they can be expected to increase as new interest groups enter the organic movement, and as organic farming is becoming more profitable. For example, there seems to be two different groups among Swedish organic livestock producers: farmers who see organic farming as a life style and think environmental issues and natural living are important and entrepreneurial farmers who consider making money and new challenges more important.

There are no indications in the literature that animal health is worse in organic than in conventional herds. A very careful conclusion is that animal health in organic farming is as good or maybe better – with the important exception of parasitic diseases. However, it is necessary for organic farmers and for the organic movement to take animal health and welfare issues seriously, especially considering the conflict between different goals and aims within the organic movement. Problem areas must be defined and solutions must be found. However, organic farming has a potential in relation to animal welfare that can be further developed.

Because of the conflict between the ecocentric position and animal welfare, there is a need to secure a good quality of life for animals in organic farming. An ethical contract is suggested as a tool to do this within an ecocentric framework. It is based on the important ecological role farm animals have in sustainable agricultural systems which makes farm animals our partners. The contract could provide a theory to regulate the human-farm animal relation within organic farming systems, but it could also symbolically be made into a real contract, operating in practice.

Svensk sammanfattning

Husdjuren är viktiga för ett uthålligt och produktivt ekologiskt lantbruk, och de ökar det ekonomiska värdet av växtodlingsprodukterna. Denna avhandling har studerat hur det ekologiska lantbrukets värderingar och målsättningar relaterar till djuromsorgsfrågorna, och hur begreppet djurvälstånd bör tolkas i ekologiskt lantbruk. IFOAMs regelverk och andra skrifter som publicerats av den ekologiska rörelsen analyserades för att definiera grundläggande värderingar. Dessa relaterades sedan till etisk teori. Ekocentrisk etik föreslogs som en lämplig centrumposition för ekologiskt lantbruk eftersom ekocentriska etiska teorier har samma fokus som det ekologiska lantbruket, nämligen uthållighet och miljövänlighet samt en strävan efter helhetssyn och systemtänkande. Studien fann också att även om uthållighetsmålen är överordnade djuromsorgsmålen, så kan fortfarande god djuromsorg ses som en viktig målsättning enligt den ekologiska värdegrunden.

Två studier gjordes av svenska ekologiska lantbrukare med djurhållning. Den ena var en kvalitativ intervjustudie, där 13 lantbrukare (varav två konventionella) ingick samt två "pionjärer", som inte själva var lantbrukare men vilka var med när grunderna lades för svensk ekologisk djurhållning på 1970- och 80-talen. Semistrukturerade djupintervjuer användes och dessa nedtecknades ordagrant och analyserades i en tvådimensionell klusteranalys. Den andra studien var en kvantitativ studie baserad på ett frågeformulär som sändes ut till drygt hälften av de svenska ekologiska lantbrukarna med djurhållning under våren 2001. Svarefrekvensen var hög. Resultaten analyserades med hjälp av principalkomponentanalys (explorativ faktoranalys). Båda studierna visade att det finns en ekocentrisk syn på frågor som rör djuromsorg hos en stor grupp ekolantbrukare, och detta kan ses som ett stöd för resultaten i den teoretiska värdeanalysen.

Ett viktigt resultat är att djurvälståndsbegreppet tolkas något olika i ekologiskt och konventionellt lantbruk. I ekolantbruket lägger man vikt på att djuret ska leva ett "naturligt liv" för att ha god välfärd. Då inbegriper man både att det ska ha möjlighet att utföra ett naturligt beteende, att utfodringen är anpassad till djurslagets fysiologi samt att det ska få leva i en miljö som påminner om artens naturliga biotop. Inom konventionellt lantbruk lägger man mer vikt på djurens fysiska hälsa och produktion, dvs. om djuren är friska och växer bra eller mjölkar mycket, så tolkas detta som tecken på god välfärd. Inte minst veterinärerna lägger ofta vikt på hälsoaspekter vid bedömningen av djurvälstånd. Däremot överensstämmer ofta konsumenternas uppfattning om djurvälstånd med ekolantbrukets syn. Det är därför viktigt att det ekologiska lantbruket i sin kommunikation med omvärlden tydliggör hur man definierar djurvälstånd.

En litteraturstudie genomfördes för att undersöka hur ekodjurens välfärd ser ut i praktiken. Det visade sig att inte många vetenskapligt granskade artiklar har publicerats på området. Endast 22 artiklar hittades, huvudsakligen inom området mjölkproduktion och parasitologi. Det är svårt att dra någon slutsats på grundval av det begränsade materialet, men en mycket försiktig konklusion skulle kunna vara att djurvälstånden i stort sett är lika bra eller möjligen något bättre i ekologiska besättningar. Ett viktigt undantag från detta är emellertid parasitproblemen, som är större i ekologiska besättningar på grund av förbudet mot rutinmässig avmaskning.

Avhandlingen analyserar också ett antal konflikter och dilemman mellan djurväl-färden och andra intressen inom ekologiskt lantbruk. En huvudkonflikt är den mellan det ekocentriska synsättet, som ger företräde åt ekosystemhälsa istället för individers välfärd, och djuromsorgsmålen. En annan är den konflikt som finns mellan den ekocentriska förståelsen av begreppet vilken betonar betydelsen av ett naturligt liv, mot den konventionella tolkningen. Det finns också andra konflikter, och en del av dessa kanske kan förväntas öka när nya grupper blir medlemmar i den ekologiska rörelsen. Enkätundersökningen visade att de ekologiska djurbönderna tenderade att dela sig i två grupper, som delvis hade olika värderingar. Sambanden var svaga men signifikanta. Den ena gruppen var positiv till ekologiskt djurhållning och tenderade att se det som en livsstil. De tycker också att det är viktigt att djuren får leva naturligt. Detta upplevdes som viktigare än ”traditionella” djurskyddsbegrepp som integritet, rättigheter eller värdighet. Den andra gruppen bestod av ”entreprenörer” som tenderar att tycka att det är viktigare att tjäna pengar och möta nya utmaningar. De tenderade att vara kritiska till KRAVs djurregler och att ha en mer accepterande attityd till ingrepp som kastrering och embryotransfer, jämfört med den andra gruppen. Lantbruksutbildning gav en något mer negativ attityd till att djuren bör leva ett naturligt liv.

Eftersom det existerar en viss konflikt mellan den ekologiska grundsynen och djurskydds-målsättningen så behöver det ekologiska lantbruket utveckla strukturer som säkrar djurväl-färden. Detta är kanske ändå mer viktigt i ett internationellt perspektiv än i Sverige. I avhandlingen presenteras ett förslag till ett etiskt kontrakt, som skulle kunna användas i detta syfte både i teori och praktik. Det symboliska kontraktet skulle upprättas inom ett ekocentriskt ramverk och där reglera förhållandet mellan husdjur och människa, så att djuren skulle garanteras en viss välfärd. Det bygger på att djuren betraktas som viktiga partners i det agroekologiska system som det ekologiska jordbruket utgör.

References

- Algers, B. 1992. Natürliches Verhalten – ein natürlicher Begriff. [Natural behaviour – a natural concept.] *Berliner Münchener tierärztliche Wochenschrift* 105, 372-374.
- Allen, J.C. & Bernhardt, K. 1995. Farming practices and adherence to an alternative-conventional paradigm. *Rural sociology* 60(2), 297-309.
- Alrøe, H.F., Vaarst, M. & Kristensen, E.S. 2001. Does organic farming face distinctive livestock welfare issues? – A conceptual analysis. *Journal of agricultural and environmental ethics* 14, 275-299.
- AMS-USDA. 2000. *National Organic Program: Final Rule. Agricultural Marketing Service, Department of Agriculture. 7 CFR Part 205*. Federal Register, December 21, 2000. 80548-80684. (<http://www.ams.usda.gov/nop> Accessed 05-Oct-2002)
- Andersson, R. 2001. Ekologiska jordbruksprodukter och livsmedel – Aktionsplan 2005. [Organic agricultural products and food – Action plan 2005.] *Swedish Board of Agriculture, Jönköping, Sweden. Report No. 2001: 11*.
- Andresen, N. 2000. The foraging pig – Resource utilisation, interaction, performance and behaviour of pigs in cropping systems. Dissertation. *Agraria 227, Acta Universitatis Agriculturae Sueciae*, Uppsala. 40 pp.
- Andrews, T. 1991. Suffering animals in a green landscape? *Dairy Farmer* 38(5), 26-28.
- Anon. 1998. Editorial. *Dansk veterinærtidsskrift*, 81(9), 337.
- Anon. 2001a. Flere familier køber økologiske varer. [More families are purchasing organic products.] *Nyt fra Danmarks Statistik, no. 404. Emnegruppe: Miljø og energi*. 2 pp.
- Anon. 2001b. Ekologisk produktion av nöt- och lammkött. [Organic production of beef and mutton.] *Swedish Board of Agriculture, Jönköping, Sweden. Jordbruksinformation nr 5*.
- Appleby, M.C. & Hughes, B.O. 1991. Welfare of laying hens in cages and alternative systems: environmental, physical and behavioural aspects. *World's poultry science journal* 47, 109-128.
- Ariansen, P. 1993. *Miljöfilosofi – en introduktion*. [Environmental ethics – an introduction.] Nya Doxa. Nora, Sweden. 236 pp.
- Arman, K. 1990. Biodynamisk odling bärs av en genomtänkt jordbruksfilosofi. [Biodynamic farming is supported by a well-reasoned agricultural philosophy.] *Biodynamisk tidskrift* 1, 8-10.
- Baars, T. 1999. Review of animal health and welfare. In: Isart, J. & Llerena, J.J. (eds), *Organic farming research in the EU, towards 21st century. ENOF White Book*, Barcelona, 65-74.
- Balfour, E.B. 1943. *The living soil: evidence of the importance to human health of soil vitality, with special reference to post-war planning*. Faber and Faber. London. 248 pp.
- Barger, I.A. 1997. Control by management. *Veterinary parasitology* 72, 493-500.
- Beck-Friis, J. 2002. Varför inte ta steget full ut, KRAV? [Why not go all the way, KRAV?] Editorial. *Svensk veterinärtidning* 54(7), 347.
- Beinlich, B. 1998. Schweine-Freilandhaltung als dynamischer Faktor. *Naturschutz und Landschaftsplanung. Zeitschrift für angewandte Ökologie* 8-9, 263-267.
- Bella, D.A. & Williamson. 1976. Conflicts in interdisciplinary research. *Journal of environmental systems* 6(2), 105-124.
- Bentham, J. 1789. *Introduction to the principles of morals and legislation*. 1996 Imprint. Clarendon Press. Oxford. 343 pp.
- Berg, C. 2001. Health and welfare in organic poultry production. *Acta veterinaria scandinavica* 42(4), Suppl. 95, 37-45.

- Besson, J.-M. & Vogtmann, H. (eds). 1978. *Towards a sustainable agriculture*. Verlag Wirz AG. Aarau, Switzerland.
- Beus, C. & Dunlap, R. 1990. Conventional vs. alternative agriculture: The paradigmatic roots of the debate. *Rural sociology* 55(4), 590-616.
- Beus, C. & Dunlap R. 1991. Measuring adherence to alternative vs. conventional agricultural paradigms: A proposed scale. *Rural sociology* 56(3), 432-460.
- Beus, C., Dunlap, R., Jimmerson, R.M. & Lee Holmes, W. 1991. Competing paradigms: The debate between alternative and conventional agriculture. *Washington State University, Research Bulletin XB 1020*. 80 pp.
- Bilcik, B. & Keeling, L.J. 1999. Changes in feather condition in relation to feather pecking and aggressive behaviour in laying hens. *British poultry science* 40, 444-451.
- Blackwell, G.W. 1955. Multidisciplinary team research. *Social forces* 33(4), 367-74.
- Boehncke, E. 1997. Preventive strategies as a health resource for organic farming. In: Isart, J. & Llerena, J.J. (eds) *Resource use in organic farming. Proceedings of the 3rd ENOF Workshop, Ancona, Italy, June 5-6*, 25-35.
- Bohrnstedt, G.W. & Knoke, D. 1994. *Statistics for social data analysis* (3rd ed.). Peacock Publishers, Inc. Itasca, Illinois. 574 pp.
- Brambell committee. 1965. Report of the technical committee to enquire into the welfare of animals kept under intensive livestock husbandry systems. *Command Report 2836, Her Majesty's Stationery Office, London*.
- Broom, D.M. 1991. Animal welfare: concepts and measurement. *Journal of animal science* 69, 4167-4175.
- Broom, D. 1996. Animal welfare defined in terms of attempts to cope with the environment. *Acta Agricultura Scandinavica, Sect. A. Animal Science, Suppl. 27*, 22-28.
- Burkhardt, R.W., Jr. 1997. The founders of ethology and the problem of animal subjective experience. In: Dol, M., Kananmotalib, S., Lijmbach, S., Rivas, E. & van den Bos, R. (eds), *Animal Consciousness and Animal Ethics*. Van Gorcum: Aassen, 1-13.
- Callicott, J.B. 1988. Agroecology in context. *Journal of agricultural ethics* 1, 3-9.
- Callicott, J.B. 1989. *In defense of the land ethic*. State University of New York Press. Albany, N.Y. 325 pp.
- Carstensen, L., Vaarst, M. & Roepstorff, A. 2002. Helminth infections in Danish organic swine herds. *Veterinary parasitology* 106, 253-264
- Christensen, J. 1998. *Alternativer – natur – landbrug*. [Alternatives – nature – agriculture]. Akademisk forlag. Viborg. 463 pp.
- Clements, F.E. 1936. Nature and structure of the climax. *Journal of ecology* 24, 252-284.
- Conford, P. 2001. *The origins of the organic movement*. Floris Books. Edinburgh, Great Britain. 287 pp.
- Council Regulation. 1991. Council Regulation (EEC) No 2092/91 of 24 June 1991 on organic production of agricultural products and indications referring thereto on agricultural products and foodstuffs. *Official Journal L 198*, 22/07/1991, 0001 – 0015.
- Council Regulation. 1992. Council Regulation (EEC) No 2078/92 of 30 June 1992 on agricultural production methods compatible with the requirements of the protection of the environment and the maintenance of the countryside. *Official Journal L 215*, 30/07/1992, 0085 – 0090.
- Council Regulation. 1998. Council Regulation (EC) No 2821/98 of 17 December 1998 amending, as regards withdrawal of the authorisation of certain antibiotics, Directive 70/524/EEC concerning additives in feedingstuffs. *Official Journal L 351*, 29/12/1998, 0004 – 0008.
- Council Regulation. 1999. Council Regulation (EC) No 1804/1999 of 19 July 1999 supplementing Regulation (EEC) No 2092/91 on organic production of agricultural products and indications referring thereto on agricultural products and foodstuffs to include livestock production. *Official Journal L 222*, 24/08/1999, 0001-0028.

- Curtis, S.E. 1987. Animal well-being and animal care. *Veterinary clinics of North America: Food animal practice* 3, 369-382.
- Danish Ethical Council concerning Animals. 1995. *Udtalelse om økologisk husdyrproduktion*. [Statement regarding organic livestock production.] Det dyreetiske råd, Ministry of Justice, Copenhagen. 20 pp.
- Danish Ministry of Food, Agriculture and Fisheries. 1999. *Action plan II. Developments in organic farming*, English summary, Danish Directorate for Development, Copenhagen. (http://www.dffe.dk/in_english/index.htm Accessed 05-Oct-2002)
- Danish Plant directorate. 2000. *Vejledning om økologisk jordbrugsproduktion af 24/08 2000*, afsnit 4.9.3. [Advice on organic agricultural production from August 24 2000]. 76 pp. ISSN 1600-4760. (<http://www.pdir.dk> Accessed 20-Oct-2002)
- DARCOF. 2000. Principles of organic farming. *Discussion document prepared for DARCOF Users Committee*, November 2000. (<http://www.foejo.dk/GB/sider/darcof/discuss/Princip.pdf> Accessed 15-Oct-2002).
- Dawkins, M.S. 1980. *Animal suffering*. Chapman & Hall. London, UK. 179 pp.
- Dawkins, M.S. 1988. Behavioural deprivation: a central problem in animal welfare. *Applied animal behaviour science* 20, 209-225.
- Dimander, S.O., Höglund, J., Spörndly, E. & Waller, P.J. 2000. The impact of internal parasites on the productivity of young cattle organically reared on semi-natural pastures in Sweden. *Veterinary parasitology* 90, 271-284.
- Dimitri, C. & Greene, C. 2002. Recent growth patterns in the U.S. organic foods market. *ERS Agriculture Information Bulletin No. AIB777*. September. 42 pp. (<http://www.ers.usda.gov/publications/AIB777> Accessed 5-Oct-2002)
- Dlouhý, J. & Nilsson, G. (eds) 1983. Proceedings, International scientific colloquium on comparison between farming systems, Uppsala, March 21-24. *Swedish University of Agricultural Sciences, Dept. for plant production, Report 63*.
- DOCEA. 1997. Cooperation possibilities between documentation centres for ecological agriculture in Europe. DOCEA (Development of a strategy for cooperation on optimal documentation and supply of literature on ecological agriculture), Concerted Action AIR3-CT94-2135. *Report of workshop 3, 24-25 January 1997 in Wageningen, The Netherlands*. (<http://www.organic-research.com/research/Projects/DOCEA/report3.asp> Accessed 15-Oct-2002.)
- Duncan, I.J.H. 1993. Welfare is to do with what animals feel. *Journal of agricultural and environmental ethics* 6, Suppl. 2, 8-14.
- Duncan, I.J.H. & Fraser, D. 1997. Understanding animal welfare. In: Appleby, M.C. & Hughes, B.O. (eds). *Animal welfare*. CAB International. Wallingford, 19-31.
- Egri, C.P. 1999. Attitudes, backgrounds and Information preferences of Canadian organic and conventional farmers: Implications for organic farming advocacy and extension. *Journal of sustainable agriculture* 13(3), 45-72.
- Ekesbo, I. & Lund, V. 1993. Svensk djurskyddslagstiftning i EG-perspektiv. Djurhålsomässiga och ekonomiska konsekvenser av svensk djurskyddslagstiftning i förhållande till EG-området. *Bilaga, Jordbruksverkets Rapport 1993:21*. Jönköping, 129 pp.
- Eriksen, J., Petersen, S.O. & Sommer, S.G. 1999. Er udendørs sohold miljømæssig forsvarligt? [Are outdoor sows environmentally defensible?] *Forskningsnytt om økologisk landbrug i Norden* 8, 20-21.
- Fairweather, J.R. 1999. Understanding how farmers choose between organic and conventional production: Results from New Zealand and policy implications. *Agriculture and human values* 16, 51-63.
- FAO. 2001. Guidelines for the production, processing, labeling and marketing of organically produced foods (GL 32 – 1999, Rev. 1 – 2001). FAO, Rome. (<http://www.fao.org/organicag/doc/glorganicfinal.pdf> Accessed 15-Oct-2002).

- FAWC. 2001. *Interim report on the animal welfare implications of farm assurance schemes*. London. Pp. 45.
- Faye, B., Waltner-Toews, D. & McDermott, J. 1999. From “ecopathology” to “agroecosystem health”. *Preventive veterinary medicine* 39, 111-128.
- Fishbein, M. & Ajzen, I. 1975. *Belief, attitude, intention and behavior: An introduction to theory and research*. Addison-Wesley. Reading, Massachusetts. 578 pp.
- Frankena, W.K. 1973. *Ethics*, 2nd ed. Prentice-Hall. Englewood Cliffs. 125 pp.
- Fostvedt, I., 1993. Profesjonalitet, liv og visjoner [Professionalism, life and visions]. Norwegian Centre for Organic Farming, *Rapport 14 fra 30-bruksprosjektet, Tingvoll, Norway*.
- Fraser, D. 1995. Science, values and animal welfare: Exploring the “inextricable connection”. *Animal welfare* 4, 103-117.
- Fraser, D. 1999. Animal ethics and animal welfare science: Bridging the two cultures. *Applied animal behaviour science* 65, 171-189.
- Fraser, D., Weary, D.M., Pajor, E.A. & Milligan, B.N. 1997. A scientific concept of animal welfare that reflects ethical concerns. *Animal welfare* 6, 187-205.
- Frischknecht, E. 2000. Organic farming must not lose the holistic approach of its pioneers. In: Alföldi, T. Lockeretz, W. & Niggli, U. (eds). *Proceedings of the 13th International IFOAM Scientific Conference, Basel, August 28-31*. Hochschulverlag AG an der ETH, Zürich, Switzerland, 732.
- Gate, F. 1985. Några ord om Fred med jorden. [A few words about the book “Fred med jorden”.] Preface to reprint of Wägner, E. & Tamm, E. *Fred med jorden*. Arkturus, Knivsta, Sweden. 73 pp.
- Geier, B. 1998. A look at the development of IFOAM in its first 25 years. In: Geier, B. (ed.). *25 years of IFOAM. Special issue of Ecology and Farming* 17, 14-24.
- Gray, G.D. 1997. The use of genetically resistant sheep to control nematode parasitism. *Veterinary parasitology* 72, 345-366.
- Hamilton, C., Hansson, I., Ekman, T., Emanuelson, U. & Forslund, K. 2002. Health of cows, calves and young stock on 26 organic dairy herds in Sweden. *The veterinary record* 150, 503-508.
- Hamm, U., Gronefeld, F. & Darren, H. 2002. *Analysis of the European market for organic food*. Organic marketing initiatives and rural development: Volume one. Aberystwyth, Wales: School of Management and Business, University of Wales.
- Hammarberg, K.-E. 2001. Animal welfare in relation to standards in organic farming. *Acta veterinaria scandinavica, Suppl.* 95, 17-25.
- Hansson, I., Hamilton, C., Ekman, T. & Forslund, K. 2000. Carcass quality in certified organic production compared with conventional livestock production. *Journal of veterinary medicine B* 47, 111-120.
- Hardeng, F. & Edge, V.L. 2001. Mastitis, ketosis, and milk fever in 31 organic and 93 conventional Norwegian dairy herds. *Journal of dairy science* 84, 2673-2679.
- Harper, G.C. & Henson, S.J. 2001. Consumer concerns about animal welfare and the impact on food choice – *The final report. EU FAIR CT98 3678. The University of Reading*.
- Harrison, R. 1964. *Animal machines : the new factory farming industry*. Stuart. London. 186 pp.
- Hemberg, J. 1976. *Djuretik*. Verbum. Stockholm. 139 pp.
- Heuer, O.E., Pedersen, K., Andersen, J.S. & Madsen, M. 2001. Prevalence of thermophilic *Campylobacter* and antimicrobial susceptibility patterns of zoonotic and indicator bacteria from organic and conventional broilers in Denmark. Paper presented at *NKVet Symposium on veterinary challenges in organic farming, Hverdagerdi, Iceland, 5-8 Oct., 2000*.
- Hodges, R.D. 1982. Agriculture and horticulture; the need for a more biological approach. *Biological agriculture and horticulture* 1(1), 1-13.

- Holmberg, H.-E. 1999. *Konsumentundersökning om ekologisk produktion/KRAV* [Consumer survey on organic production/KRAV]. LUI ref. number 30-7866, published 1999-12-21. (<http://www.krav.se/arkiv/rapporter/luuund.pdf> Accessed 20-Oct-2002)
- Holmegård, J. 1997. *Økologiens pionertid*. [The pioneering era for organics.] Erhvervsskolernes forlag. Odense, Danmark. 32 pp.
- Holmgren, N. & Lundeheim, N. 1994. Djurhälsomässiga behovet av fodermedelsantibiotika i smågrisproducerande besättningar. [The need for feed antibiotics in relation to herd health in different pig weaning systems.] *Svensk veterinärtidning* 46, 57-65.
- Hovi, M., Sundrum, A. & Thamsborg, S. 2002. Animal health and welfare in organic livestock production in Europe – current state and future challenges. Accepted for publication in *Livestock production science*.
- Hovi, M., Kossaibati, M., Bennett, R., Edwards, S.A., Robertson, J. & Roderick, S. 2002. Specialist perceptions of animal health and welfare on organic farms – results from a questionnaire survey. *Submitted to Animal welfare*.
- Howard, A. 1943. *An agricultural testament*. 2nd ed. Oxford University Press. New York & London.
- Hugoson, G. & Wallén, C. (eds). 2000. Proceedings of the Symposium on antibiotic resistance with emphasis on animal-human transfer. Falkenberg, Sweden. *Acta veterinaria scandinavica, Suppl. 93*.
- Höök, K., 1997. Ecological Agriculture and Horticulture. Research in seven European countries. *Report, Swedish Council for Forestry and Agricultural Research, Stockholm*.
- IFOAM, 1980. *IFOAM Recommendations for international standards of biological agriculture, with restricted validity to 2 years*. Adopted September 6, 1980. IFOAM Secretariat. Topsfield, Massachusetts.
- IFOAM, 2000. *IFOAM Basic Standards*. Tholey-Theley, Germany: International Federation of Organic Movements. (<http://www.ifoam.org/standard/basics.htm> Accessed 15-Oct-2002)
- IFOAM, 2002a. IFOAM homepage. (<http://www.ifoam.org/whoisifoam/generel.html> Accessed 05-Oct-2002).
- IFOAM, 2002b. IFOAM homepage. (<http://www.ifoam.org> Accessed 05-Oct-2002)
- International Trade Centre. 2002. Overview world market for organic food & beverages. (<http://www.intracen.org/mds/sectors/organic/overview.pdf> Accessed 15-Oct-2002).
- Jebsen Haave, I.J. 1965. *Når dyr blir maskiner*. Tanum. Oslo. 199 pp.
- Jerkebring, K., Alarik, M., Odelros, Å., Hagström, E. & Larsson, L. 2002. *Växande marknad. Det aktuella marknadsläget för ekologiska livsmedel*. [Expanding market. The current market situation for organic foods.] Ekologiska lantbrukarna, handout, June 2002. (<http://www.ekolantbruk.se/PDFer/vaxandemarknad.pdf> Accessed 20-Oct-2002)
- Jensen, P. 1999. Animal welfare and ecological farming – are they always compatible? In: *Proceedings NJF XXI congress, Ås, Norway*, 232.
- Jensen, P. & Toates, F.M. 1993. Who needs 'behavioural needs'? Motivational aspects of the needs of animals. *Applied animal behaviour science* 37, 161-181.
- de Jonge, F.H., Bokkers, E.A.M., Schouten, W.G.P. & Helmond, F.A. 1996. Rearing piglets in a poor environment: Developmental aspects of social stress in pigs. *Physiology & behavior* 60(2), 389-396.
- Johnsen, P.F., Vestergaard, K.S. & Norgaard-Nielsen, G. 1998. Influence of early rearing conditions on the development of feather pecking and cannibalism in domestic fowl. *Applied animal behavior science* 60, 25-41.
- Johnson, G.L. 1971. The quest for relevance in agricultural economics. *American journal of agricultural economics* 53, 728-539.
- Kaltoft, P. 1997. *Naturetik som praksisbegrep. En undersøgelse af naturforståelse, praksis og viden i økologisk jordbrug*. [Nature ethics as a practical concept. A study of the understanding of nature, practices and knowledge in organic farming.] Skriftserie No. 5.

- Department of Technology and Social Sciences, Technical University of Denmark. Copenhagen, Denmark. Dissertation. 302 pp.
- Karlsson, L., Andresen, N. & Ciszuk P. 1996. Svinproduktion i odlingssystemet. [Pig production in the cropping system.] *Forskningsnytt om økologisk landbruk i Norden* 1, 12-13.
- Kerlinger, F.N. & Pedhazur, E.J. *Multiple Regression in Behavioral Research*. Holt, Rinehard & Winston, New York, N.Y. 1973. 534 pp.
- Kongsted, A.G. & Larsen, V.A. 1999. Pattegrisedødelighed i frilandssohold. *DJF rapport Husdyrbrug* 2(11). 56 pp.
- KRAV. 2002. *KRAV-regler* [KRAV standards]. Uppsala, Sweden. 143 pp. (<http://www.krav.se> Accessed 15-Oct-2002).
- Krutzinna, C., Boehncke, E. & Herrmann, H.-J. 1996. Organic milk production in Germany. *Biological agriculture and horticulture* 13, 351-358.
- Kuhn, S. 1970. *The structure of scientific revolutions*. 2nd ed. University of Chicago Press. Chicago. 210 pp.
- Kugelberg, C., Johansson, G., Sjögren, U., Bornsten, S. & Wallgren, P. 2001. Infektionssjukdomar och ectoparasiter hos slaktsvin - hälsoläget hos utomhusgrisar. [Infectious diseases and ectoparasites in fattening pigs - the health situation in outdoor pigs.] *Svensk veterinärtidning* 53(4), 197-204.
- Lampkin, N.H., Foster, C., Padel, S. & Midmore, P. 1999. *The policy and regulatory environment for organic farming in Europe*. Organic farming in Europe: economics and policy, 1. University of Hohenheim; Hohenheim.
- Langman, M. 1998. Memories and notes on the beginning and early history of IFOAM. In: Geier, B. (ed.) 25 years of IFOAM. *Special issue of Ecology and Farming no. 17*, 10-12.
- Lindqvist, Å., Ljungström, B., Nilsson, O. & Waller, P.J. 2001. The dynamics, prevalence and impact of nematode parasite infections in organically raised sheep in Sweden. *Acta veterinaria scandinavica* 42(3), 377-389.
- Leopold, A. 1949. *A Sand County almanac*. Oxford University Press. London.
- Lindholm, S. 2001. *Helhet och mångfald. Det ekologiska lantbrukets bärande idéer i relation till miljöetik teori*. [Entirety and manifoldness. The basic ideas of organic farming in relation to environmental ethics.] Acta Universitatis Agriculturae Sueciae, Uppsala, Sweden. Agraria 272. Dissertation. 110 pp.
- Lockeretz, W. 1991. Multidisciplinary research and sustainable agriculture. *Biological agriculture and horticulture* 8, 101-122.
- Lockeretz, W. & Anderson, M.D. 1993. *Agricultural research alternatives*. University of Nebraska Press, Lincoln, Nebraska and London.
- Lockeretz, W. and Madden, P. 1987. Midwestern organic farming: A ten year follow up. *American journal of alternative agriculture* 2(2), 57-63.
- Lockeretz, W. and Wernick, S. 1980. Commercial organic farming in the corn belt in comparison to conventional practice. *Rural Sociology* 45, 708-722.
- Lorenz, K. 1963. Do animals undergo subjective experience? In: Lorenz, K. *Studies in animal and human behaviour*. Vol. 2. Methuen, London, UK, 323-337.
- Lund, V., 1996a. Svensk lantbruksforskning – i tiden? [Swedish agricultural research – moving with the times?] *Forskningsnytt om økologisk landbruk i Norden*. 3, 1-2.
- Lund, V. 1996b. Etik och ekonomi i ekologisk djurhållning. [Ethics and economy in organic farming.] *Ekologiskt lantbruk* 20, Swedish University of Agriculture, 102-107.
- Lund, V. 2000a. What is ecological animal husbandry? In: Hermansen, J.E., Lund, V. & Thuen, E. (eds). Ecological Animal Husbandry in the Nordic Countries. *DARCOF Report No. 2/2000*, 9-15.
- Lund, V. 2000b. Is there such a thing as "organic" animal welfare? In: Hovi, M. & Trujillo, G. (eds). Diversity of livestock systems and definition of animal welfare. *Proceedings of the 2nd NAHWOA workshop, Córdoba, 8-11 January*, 151-160.

- MacIntyre, A. 1985. *After virtue: a study in moral theory*. 2nd edition. Duckworth. London. 286 pp.
- Macquarie. 1982. *Macquarie Dictionary*. Macquarie Library, Australia.
- MacRae, R.J., Hill, S.B., Henning, J. & Mehuys, G.R. 1989. Agricultural science and sustainable agriculture: a review of the existing scientific barriers to sustainable food production and potential solutions. *Biological agriculture and horticulture* 6, 173-219.
- Magnusson, M., Arvola, A. & Koivisto Hursti, U.-K. 2001. Attitudes towards organic foods among Swedish consumers. *British food journal* 103(3), 209-226.
- Meyer-Abich, K. M. 1997. *Praktische Naturphilosophie. Erinnerungen an einen vergessenen Traum*. C.H. Beck. München.
- McCracken, D.I. 1993. The potential for avermectins to affect wildlife. *Veterinary parasitology* 48, 273-280.
- McGlone, J.J. 1993. What is animal welfare? *Journal of agricultural and environmental ethics* 6, Suppl. 2, 26-36.
- McNaughton, D. 1988. *Moral vision. An introduction to ethics*. Blackwell Publishers. Oxford, UK and Cambridge, Massachusetts. 214 pp.
- Merrill, M.C. 1983. Eco-Agriculture: A review of its history and philosophy. *Biological agriculture and horticulture* 1, 181-210.
- Midgley, M. 1983. *Animals and why they matter*. University of Georgia Press. Athens, Georgia. 158 pp.
- Miles, M.B. & Huberman, A.M. 1984. *Qualitative data analysis: a sourcebook of new methods*. Sage. Newbury Park and London. 263 pp.
- Narveson, J. 1983. Animal rights revisited. In: Miller, H.B. and Williams, W.H. (eds) *Ethics and animals*. Humana Press. Clifton, New Jersey, 45-59.
- Næss, A. 1985. Identification as a Source of Deep Ecological Attitudes. In: M. Tobias (ed.), *Deep ecology*, Avanti Books. San Diego. 295 pp.
- Næss, A. 1989. *Ecology, community and lifestyle*. Cambridge University Press. Cambridge. 223 pp.
- Niezen, J. H., Charleston, W. A. G., Hodgson, J., Mackay, A. D. & Leathwick, D.M. 1996. Controlling internal parasites in grazing ruminants without recourse to anthelmintics: Approaches, experiences and prospects. *International journal of parasitology* 26(8/9), 983-992.
- Niggli, U. & Lockeretz W. 1996. Development of research in organic agriculture. In: Østergaard, T.V. (ed.) *Fundamentals of Organic Agriculture. Proceedings Vol. 1, 11th IFOAM International Scientific Conference, 11-15 August, Copenhagen*, 9-23.
- Nordgren, P. 2001. *Ekonomisk värdering av tillväxtstrategier för mjölkföretag*. [Economic evaluation of growth strategies for dairy farms.] *Report, Agroväst, Skara, Sweden*. 23 pp. (<http://www.agrovast.se> Accessed 15-Oct-2002)
- Odum, E.P. 1963. *Ecology*. Holt, Rinehart and Winston. New York, N.Y. 152 pp.
- Odum, H.T. 1971. *Environment, power, and society*. New York, N.Y.
- Oltenuacu, P.A. 2001. Does animal welfare pay? The cost of diseases. In: *Food chain 2001. Safe, sustainable, ethical. Programme abstracts, March 14-16, Uppsala, Sweden*, 160-164. ISBN 91-576-6022-0
- Oosting, S.J. & de Boer, I.J.M. 2002. Sustainability of organic dairy farming in the Netherlands. In: Kyriazakis, I. & Zervas, G. (eds). *Organic meat and milk from ruminants. Proceedings of a joint international conference organized by the Hellenic Society of Animal Production and the British Society of Animal Science. EAAP publication no. 106, Wageningen Academic Publishers, The Netherlands*, 101-107.
- de Passillé, A.M. 2001. Sucking motivation and related problems in calves. *Applied animal behavior science* 72, 175-187.

- Permin, A., Bisgaard, M., Fransen F., Pearman M., Nansen, P. & Kold, J. 1999. The prevalence of gastrointestinal helminths in different poultry production systems. *British poultry science* 40, 439-443.
- Regan, T. 1983. *A case for animal rights*. Berkley. Los Angeles. 425 pp.
- Reid, F. 2002. Integrating layer chickens into a certified organic raspberry and vegetable farm. In: Thompson, R. (ed.). Cultivating communities. *Proceedings of the 14th IFOAM Organic World Congress, 21-24 August, Victoria, Canada*, 80.
- Robson, C. 1993. *Real world research*. Blackwell Publishers. Oxford. 510 pp.
- Roderick, S. & Hovi, M. 1999. Animal health and welfare in organic livestock systems: Identification of constraints and priorities. *Report to the Ministry of Agriculture, Fisheries and Food (MAFF), VEERU, Department of Agriculture, University of Reading*.
- Roderick, S., Short, N. & Hovi, M. 1996. Organic livestock production: Animal health and welfare research priorities. *Report. The University of Reading*.
- Roepstorff, A., Jørgensen, R.J., Nansen, P., Henriksen, S.A., Pedersen, J.S. & Andreasen, M. 1992. Parasitter hos økologiske svin. [Parasites in organic pigs.] *Report paper from a project financed by the Danish Ministry of Agriculture*. 36 pp.
- Rollin, B.E. 1993. Animal welfare, science and value. *Journal of agricultural and environmental ethics* 6, Suppl. 2, 44-50.
- Rollin, B.E. 1995. *Farm animal welfare*. Iowa State University Press. Ames, Iowa.
- Rolston, H. III. 1988. *Environmental Ethics. Duties to and values in the natural world*. Temple University Press. Philadelphia. 390 pp.
- Rosenfield, P.L. 1992. The potential of transdisciplinary research for sustaining and extending linkages between the health and social sciences. *Social science and medicine* 35(11), 1343-1357.
- Rundgren, G. 2002. History of organic certification and regulation. In: Rundgren, G. & Lockeretz, W. *Reader, IFOAM Conference on organic guarantee systems, 17-19 Feb., Nuremberg, Germany*. ISBN 3-934055-17-6
- Rusch, H.P. 1968. *Bodenfruchtbarkeit, eine Studie biologischen Denkens*. Haug Verlag, Heidelberg.
- Ryder, R.D. 1998. *The political animal: the conquest of speciesism*. McFarland & Co. Jefferson, N.C. 147 pp.
- Röcklinsberg, H. 2001. *Das seufzende Schwein. Zur Theorie und Praxis in Deutschen Modellen zur Tierethik*. Dissertation. Harald Fischer Verlag. Erlangen. 451 pp.
- Röcklinsberg, H. & Lund, V. 2000. Is well-being all that matters in animal ethics? Some comments on welfare and dignity in relation to animal ethics within organic farming. In: Robinson, P. (ed.). EurSafe 2000, Preprints Copenhagen, 24-26 August. *Centre for Bioethics and Risk Assessment, Royal Veterinary and Agricultural University, Copenhagen, Denmark*, 227-229.
- Salter, L. & Hearn, A. 1996. *Outside the lines. Issues in interdisciplinary research*. McGill-Queen's University Press. Montreal & Kingston, London, Buffalo. 212 pp.
- Sandøe, P. & Simonsen, H.B. 1992. Assessing animal welfare: Where does science end and philosophy begin? *Animal welfare* 1, 257-267.
- Sandøe, P., Crisp, R. & Holtug, N. Ethics. 1997. In: Appleby, M.C. & Hughes, B.O. (eds). *Animal welfare*. CAB International. Wallingford, 3-17.
- Sangster, N.C. 1999. Anthelmintic resistance: past, present and future. *International journal for parasitology* 29, 115-124.
- Schlitt, M. 1992. *Umweltethik. Philosophisch-ethische Reflexionen – Theologische Grundlagen – Kriterien*. Ferdinand Schöning. Paderborn.
- Schmidt, O. 1998. The history of the standards committee of IFOAM. In: Geier, B. (ed.). 25 years of IFOAM. *Special issue of Ecology and Farming* 17, 26-27.
- Singer, P. 1981. *The expanding circle: ethics and sociobiology*. Farrar, Straus & Giroux. New York, N.Y. 190 pp.

- Singer, P. 1990. *Animal liberation*, 2nd edition. New York Review of Books. New York, N.Y. 320 pp.
- Singer, P. 1993. *Practical Ethics*, 2nd edition. Cambridge University Press. Cambridge. 395 pp.
- Snow, C.P. 1959. *The two cultures and the scientific revolution*. Cambridge Univ. Press. Cambridge. 52 pp.
- Soil Association. 2002.
<http://www.soilassociation.org/sa/saweb.nsf/librarytitles/articles29071998> Accessed 05-Oct-2002.
- Soller, B. & Nilsson, S. A. 1971. *Djurfabriken*. Stockholm: Rabén & Sjögren. 167 pp.
- Spedding, C. 1988. *An Introduction to Agricultural Systems*. 2nd ed. Elsevier Applied Science. London. 189 pp.
- SOU, 1997. Antimicrobial feed additives. Report from the Commission on Antimicrobial Feed Additives. *Government official reports, Ministry of Agriculture. Stockholm, SOU:132*.
- Steiner, R. 1929. *Landwirtschaftlicher Kursus*. Dornach: Section for Natural Science of the Antroposophic Society.
- Staffleu, F.R., Grommers, F.J. & Vorstenbosch, J. 1996. Animal Welfare: Evolution and erosion of a moral concept. *Animal welfare* 5, 225-234.
- Stenmark, M. 2000. *Miljöetik och miljövård*. [Environmental ethics and policy making]. Studentlitteratur. Lund, Sweden. 199 pp.
- Stenmark, M. 2002. *Environmental ethics and policy making*. Ashgate. Aldershot; Burlington, VT. 161 pp.
- Stoneman, A.B. & Mowbray, L. 2002. Humane Labeling Programs: Can they work with organic certification programs? In: Thompson, R. (ed.) *Cultivating Communities. Proceedings of the 14th IFOAM Organic World Congress, 21-24 August, Victoria, Canada*. 74.
- Strong, L. 1993. Overview: the impact of avermectins on pastureland ecology. *Veterinary parasitology* 48, 3-17.
- Studniz, M. 2001. *Tryneringnings betydning for udegående poltes adfærd og velfærd*. [Influence of nose ringing on the behavior and welfare of outdoor gilts.] Dissertation. Sektion for etologi og sundhed, Institut for husdyrbrug og husdyrsundhed, The Royal Veterinary and Agricultural University, Copenhagen, Denmark.
- Sullivan, S., McCann, E., De Young, R. & Erickson, D. 1996. Farmers' attitudes about farming and the environment: a survey of conventional and organic farmers. *Journal of agricultural and environmental ethics* 9(2), 123-143.
- Sundrum, A. 2001. Organic livestock farming. A critical review. *Livestock production science* 67(3), 207-215.
- Svenson, O. 1999. Differentiation and consolidation theory: Decision making processes before and after a choice. In: Juslin, P. & Montgomery, H. (eds), *Judgment and decision making. Neo-Brunswikian and process-tracing approaches*. Lawrence Erlbaum Associates, Publishers. Mahwah, New Jersey, 175-197.
- Svensson, I. 1991. Statligt stöd till alternativ odling 1989. [Public support for organic farming in 1989.] Forsknings- och försöksnämnden för Alternativ odling, SLU. *Alternativ odling* 7.
- Svensson, C., Hessle, A. & Höglund, J. 2000. Parasite control methods in organic and conventional dairy herds in Sweden. *Livestock production science* 66, 57-59.
- Szatek, A. 2001. Vägen till marknaden. Kvantitativ undersökning bland allmänheten. Slutrapport. *Internal report for Swedish Farmers' Association (LRF). LUI Marknadsinformation AB. Stockholm, Sweden*. (<http://www.ekolantbruk.se> Accessed 20-Oct-2002).

- Sörlin, S. 1991. *Naturkontraktet. Om naturumgängets historia*. Carlssons. Stockholm. 293 pp.
- Tamm, E. & Wägner, E. 1940. *Fred med jorden*. [Peace with the earth.] Bonnier. Stockholm. 91 pp.
- Tannenbaum, J. 1991. Ethics and animal welfare: The inextricable connection. *JAVMA*, 198(8), 1360-1376.
- Taylor, P.W. 1981. The ethics of respect for nature. *Environmental Ethics* 3(3), 197-218.
- Te Velde, H., Aarts, N. & van Workum, C. 2002. Dealing with ambivalence: Farmers' and consumers' perceptions of animal welfare in livestock breeding. *Journal of agricultural and environmental ethics* 15, 203-219.
- Tinbergen, N. 1951. *The study of instinct*. Clarendon Press. Oxford, UK
- Thamsborg, S.M., Roepsdorff, A. & Larsen, M. 1999. Integrated and biological control of parasites in organic and conventional production systems. *Veterinary parasitology* 84, 169-186.
- Thompson, P.B. 1993. Animals in the agrarian ideal. *Journal of agricultural and environmental ethics* 6, Suppl. 1, 36-49.
- Toledo, P., Andrén, A. & Björck, L. 2002. Composition of raw milk from sustainable production systems. *International dairy journal* 12, 75-80.
- Trujillo, G.R. & Mata, C. 2000. The Dehesa: an extensive livestock system in the Iberian Peninsula. *Proceedings of the 2nd NAHWOA Workshop, Cordoba, 8-11 January, 2000*, 50-61.
- Tvedegaard, N. 2002. Økologisk mælkeproduktion – økonomiske analyser. [Organic milk production – economical analyses.] *Copenhagen: Fødevareøkonomisk Institut, Rapport 137*. 67 pp. (<http://www.foi.dk> Accessed 15-Oct-2002).
- Vaarst, M. & Bennedsgaard, T.W. 2001. Reduced medication in organic farming with emphasis on organic dairy production. *Acta veterinaria scandinavica* 42:4, Suppl. 95, 51-57.
- Vaarst, M., Roepstorff, A., Feenestra, A., Høgedal, P., Larsen, V.A., Lauritsen, H.B. & Hermansen, J. E. 2000. Animal health and welfare aspects in organic pig production. In: Hermansen, J.E., Lund, V. & Thuen, E. (eds) *Ecological Animal Husbandry in the Nordic Countries. Proceedings, NJF-seminar 303*, 177-78.
- Vaarst, M., Alban, L., Mogensen, L., Thamsborg, S.M. & Kristensen, E.S. 2001. Health and welfare in Danish dairy cattle in the transition to organic production: problems, priorities and perspectives. *Journal of agricultural and environmental ethics* 14, 367-390.
- von Wachenfelt, H. 1999. Grisar som vistas ute, påverkan på mark och miljö. [Outdoor pigs, effects on soil and environment.] *Konferens i Ekologiskt Lantbruk, Alnarp, Sweden. Proceedings*, 151-154. (<http://www.cul.slu.se/publik/abstracts.pdf> Accessed 20-Oct-2002)
- Van Wyk J.A., Malan, F.S. & Randles, J.L. 1997. How long before resistance makes it impossible to control some field strains of *Haemonchus contortus* in South Africa with any anthelmintics. *Veterinary parasitology* 70, 111-122.
- Vartdal, B. & Blekesaune, A. 1992. Sosiale sider ved økologisk jordbruk. Ein sosiologisk studie av omleggingsprosessen. [Social aspects of organic farming. A sociological study of the conversion process]. *Senter for Bygdeforskning. Trondheim. Rapport 1/92*.
- Waller P.J. 1997. Anthelmintic resistance. *Veterinary parasitology* 72, 391-412.
- Waller P.J. 1999. International approaches to the concept of integrated control of nematode parasites of livestock. *International journal for parasitology* 29, 155-164.
- Warming, E. 1895. *Plantesaafund*. Copenhagen. 335 pp.
- Webster, J., Saville, C. & Welchman, D. 1986. *Improved husbandry systems for veal calves*. Farm Animal Care Trust, London, UK
- Wechsler, B. & Huber-Eicher, B. 1998. The effect of foraging material and perch height on feather pecking and feather damage in laying hens. *Applied animal behavior science* 58, 131-141.

- Weinberg, S.L. & Abramowitz, S.K. 2002. *Data analysis for the behavioral sciences using SPSS*. Cambridge University Press, Cambridge, UK. 737 pp.
- Weller, R.F. & Bowling, P. J. 2000. Health status of dairy herds in organic farming. *The veterinary record* 146, 80-81.
- Wemesfelder, F. & Birke, L. 1997. Environmental challenge. In: Appleby, C. & Hughes, B.O. (eds). *Animal welfare*. CAB International. Wallingford, 35-48.
- Verhoog, H., Matze, M., Lammerts van Bueren, E. & Baars, T. 2002. The role of the concept of the natural (naturalness) in organic farming. Accepted for publication in *Journal of agricultural and environmental ethics*.
- Williams, F. 1979. *Reasoning with statistics*. 2nd ed. Holt, Rinehart & Winston. New York, New York. 204 pp.
- Wernick, S. & Lockeretz, W. 1977. Diversity of personal and enterprise characteristics among organic growers in the northeastern United States. *Biological agriculture and horticulture* 14, 13-24.
- Vogt, G. 2000. Entstehung und Entwicklung des ökologischen Landbaus. *Ökologische Konzepte* 99. Stiftung Ökologie und Landbau, Bad Dürkheim.
- Wolf, U. 1990. *Das Tier in der Moral*. Klostermann. Frankfurt am Main. 169 pp.
- Wolf, J.-C. 1992. *Tierethik: neue Perspektiven für Menschen und Tiere*. Paulusverlag. Freiburg, Switzerland. 188 pp.
- Wood-Gush, D.G.M. 1973. Animal welfare in modern agriculture. *British veterinary journal* 129, 167-174.
- Wood-Gush, D.G.M., Jensen, P. & Algers, B. 1990. Behavior of pigs in a novel semi-natural environment. *Biology of behaviour* 15, 62-73.
- Woodward, L., Fleming, D. & Vogtman, H. 1996. Reflections on the past, outlook for the future. In: Østergaard, T.V. (ed.), *Fundamentals of organic agriculture, Proceedings 11th IFOAM Scientific Conference, Copenhagen 1*, 259-270.
- Worster, D. 1996. *De ekologiska ideernas historia, [Nature's economy: A History of Ecological Ideas, Swedish edition.]* Stockholm: SNS Förlag. 352 pp.
- Wynen, E. 1998. Research implications of a paradigm shift in agriculture: the case of organic farming. In: Dragun, A.K. & Jakobsson, K.M. (eds) *Frontiers in environmental economics. Department of Economics, Swedish University of Agricultural Sciences, Uppsala, Report 119*.
- Youngberg, G. 1986. Why another journal? *American journal of alternative agriculture* 1(1), 2.
- Østergaard, E. 1998. Ett skritt tilbake og to frem. En fenomenologisk studie av bønder i omstilling til økologisk landbruk. *Doctor Scientiarum Theses 1998:25. Department of Horticultural and Crop Sciences, Agricultural University of Norway. Ås, Norway*.

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The power and majesty of nature in all its aspects is lost on him who contemplates it merely in the detail of its parts, and not as a whole.
Plinius (23-79 A.D.), *Historia Naturalis*, Bk. VII, Ch. 1

OUTLINING A CONCEPTION OF ANIMAL WELFARE FOR ORGANIC FARMING SYSTEMS

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ABSTRACT. The concept of animal welfare refers to the animal's quality of life. The choice of definition always reflects some basic valuation. This makes a particular conception of welfare value-dependent. Also, the animal husbandry system reflects certain values or aims. The values reflected in the chosen conception of animal welfare ought to correspond to values aimed for in the husbandry system. The IFOAM Basic Standards and other writings dealing with organic animal husbandry should be taken as a departure point for a discussion of how to interpret the conception of welfare in organic farming systems. The conception of welfare is related to two core values in the organic agriculture movement. These core values should be considered in terms of (1) aim for holistic view and (2) aim for sustainability. A third, implicit core value, based on bio- and ecocentric views: (3) respect for nature is needed as a supplement to these two core values. There are important implications of these core values for an "organic" conception of animal welfare and for confronting two dilemmas due to conflicting interests. Comparisons among the three commonly used welfare definitions will show the superiority of the third approach, which can provide an outline for a conception of animal welfare more suitable for organic farming systems. This outline combines a holistic ecocentric approach with respect for the individual animal, and it can be used as the basis for a complex definition with emphasis on natural behavior. Such a systemic approach considers welfare in relation to different systemic levels. The systemic view also offers possibilities for resolving the dilemmas in new ways.

KEY WORDS: animal ethics, animal welfare, organic animal husbandry, organic farming, organic livestock production, systemic approach

INTRODUCTION

Animal welfare is an often used but debated concept. During the last quarter century, natural scientists have engaged in defining it, but no consensus has been reached. There is even a disagreement about whether the notion is positive per se (Tannenbaum, 1991) or whether the term itself is neutral, varying over a range (from "poor" to "good") (Broom, 1996). Generally, the concept of animal welfare refers to one or several aspects of an animal's quality of life. It has been argued that it contains both a scientific part (describing the status of the animal) and a value part (since it implies moral considerations regarding the animal's quality of life) (Tannenbaum, 1991; Sandøe and Simonsen, 1992; Stafleu et al.,



1996). In contrast, some scientists have argued that animal welfare can be objectively measured scientifically and that ethical considerations are to be made separately (Broom, 1991).

During the last twenty-five years, organic farming has become increasingly widespread worldwide.¹ Animal husbandry is an important feature of most organic farms, since livestock make important contributions to farm nutrient management and resource efficiency in organic farming systems and they increase their diversity and balance. The question is how the welfare concept ought to be interpreted in the context of organic farming.

AIMS

The starting point for this paper is the assumption that the choice of animal welfare definition always reflects some basic valuing regarding what is considered good quality of life for animals. Also the animal husbandry system reflects certain values or aims regarding what is considered as morally relevant. The values expressed in the chosen conception of animal welfare ought to correspond to values aimed for in the husbandry system. Our aim is to: (a) identify some core values in organic farming on which an organic conception of animal welfare can be based, (b) give a closer look at two identified dilemmas, and (c) discuss and suggest a suitable conception of animal welfare for organic animal husbandry systems based on these core values.

MATERIALS AND METHODS

The discussion regarding core values is mainly based on the IFOAM Basic Standards (1998). Materials from the Scandinavian countries, of different kinds and collected under a longer period of time, have also been scrutinized. Organic animal husbandry systems are comparatively well developed in these countries. In addition, we have used the work of the Welsh Institute for Rural Studies (WIRS), since this institute has had great influence on organic farming, e.g., through the publication of widespread and comprehensive textbooks (e.g., Lampkin, 1990; Lampkin and Padel, 1994). We do not see the suggested core values as fixed but as useful departure points for a discussion regarding welfare in organic animal husbandry systems.

¹ In this paper the term "organic animal husbandry" is used to describe animal husbandry performed in organic farming systems according to the IFOAM Basic Standards.

The outlining of an organic conception of welfare is performed in the following steps:

1. Two central “core values” for organic agriculture are identified, and some conclusions are drawn regarding what demands these raise for an “organic” conception of welfare.
2. A third “core value” is suggested based on bio- and ecocentric views, and implications of this core value for the conception of welfare is discussed.
3. Two dilemmas for organic agriculture are identified and discussed more in depth.
4. A comparison is made with three commonly used animal welfare definitions.
5. The features of an organic conception of animal welfare are discussed, and some possible approaches to the identified dilemmas are suggested.

THE ORGANIC VIEW OF LIVESTOCK PRODUCTION AND TWO CORE VALUES IN ORGANIC AGRICULTURE

The View of Livestock Production

Organic farmers from the start have been concerned with animal welfare and they still are (Niggli and Lockeretz, 1996; Roderick and Hovi, 1999; WIRS, 2000). Ideas of more “natural” and animal friendly ways to raise livestock were embraced by the early organic agriculture movement, and farmers started to develop alternatives to “factory farming” based on ideas regarding natural animal behavior.² The organic standards were developed to promote the development of good organic practice and provide guarantees and information to consumers on organic agriculture. IFOAM Basic Standards for animal husbandry were introduced in 1980. In 1999, the European Union adopted a regulation for organic livestock production (Council Regulation (EC) No 18804/1999 (Anon., 1999)). Both IFOAM and EU pose minimum requirements. Additional national standards are issued by accredited national certification organizations. Several national standards state higher animal welfare requirements within one or several areas.

² By natural behavior we mean in this paper those sets of control systems developed by the evolutionary process to allow the animal to register and react to internal and external stimuli in order to optimize survival and reproduction (see Figure 3). Thus, a natural behavior is the behavior normally performed by an animal in a species-specific biotope (Algers, 1992a). We also include species-specific feed in the concept.

IFOAM has stated 17 principle aims for organic farming (Table I). One of these is “to give all livestock conditions of life with due consideration for the basic aspects of their innate behaviour.” As a general principle for animal husbandry, it is further stated “that all management techniques, including those where production levels and speed of growth are concerned, should be directed to the good health and welfare of the animals” (IFOAM, 1998: 13). The welfare concerns include transports and slaughter (IFOAM, 1998):

5.8.1. Throughout the different steps of the process there shall be a person responsible for the well-being of the animal.

5.8.2 The handling during transport and slaughter shall be calm and gentle. [...]

6.11 Stress and suffering connected with the slaughter process should be minimized. Slaughter management and techniques should be governed by careful consideration with regard to physiology and ethology of the organisms in question, as well as to accepted ethical standards.³

In several countries, animal welfare has become a marketing argument for organic animal products. For example, Swedish consumers believe organic livestock experience better animal welfare than animals in conventional farming (Holmberg, 1999). The Danish Ministry of Food, Agriculture and Fisheries states (Ministry of Food, Agriculture, and Fisheries, 1999):

As one of the important tenets of organic farming is to provide all livestock with good living conditions in keeping with their natural behaviour and needs, it must be accepted that consumers naturally assume that organic livestock enjoy high standards of welfare.

Animal Welfare and Core Values in the Organic Movement

There are several problems connected to identifying core values embraced by the organic agriculture movement. A major one is that a comprehensive “official IFOAM ideology” explicitly stating these values has never been published.⁴ Also, the organic movement has never been a homogenous group of people all sharing the same values. For example,

³ The paragraph refers to aquatic production. One may note that these regulations came later than the ones dealing with land-based animal husbandry.

⁴ The biodynamic movement, however, is based on the published lectures of Rudolf Steiner (1929). In this paper, we will deal only briefly with the specific ideas of biodynamic farming, since these represent a distinct philosophy of its own adhered to by a minority of organic farmers.

TABLE I

The aims for organic agriculture as stated in three different documents. The 1980 IFOAM recommendations were the first IFOAM standards issued. The 1998 Basic Standards were the most recent ones at the time for this analysis. KRAV is the Swedish certification organization for organic production and the largest national certification organization accredited by IFOAM

Issue	Document
Systems thinking	<p data-bbox="592 1211 655 1525">IFOAM Recommendations 1980 The principle aims of organic agriculture</p> <p data-bbox="735 1211 831 1525">To work as much as possible within a closed system and draw upon local resources</p> <p data-bbox="592 920 655 1189">IFOAM Basic standards 1998 Principle Aims of Organic Production and Processing</p> <p data-bbox="735 920 831 1189">To interact in a constructive and life-enhancing way with natural systems and cycles.</p> <p data-bbox="592 719 655 898">KRAV Standards (2000)¹ Aims of organic agriculture</p> <p data-bbox="735 719 935 898">Organic agriculture aims to strengthen the ties between town and country by recirculation of nutritive substances and humus. It also aims to strengthen the ties between producer and consumer by being as open as possible about the operation.</p> <p data-bbox="983 719 1177 898">To encourage and enhance biological cycles within the farming system, involving micro-organisms, soil flora and fauna, plants and animals.</p> <p data-bbox="1046 719 1177 898">To create a harmonious balance between crop production and animal husbandry.</p> <p data-bbox="983 719 1177 1189">The striving should be to respect natural processes and behavior through the entire chain from farm to the final consumer. Activities (farming, processing, distribution, etc.) should be designed with the following principles in mind:</p>

TABLE I
Continued

Issue	Document		
Soil fertility	To maintain the long term fertility of soils	The long term productivity of the soil and other parts of the agricultural eco-system should be preserved and enhanced	To maintain and increase long term fertility of soils
Environmental impact	To avoid all forms of pollution that may result from agricultural techniques	The use of man-made substances should be avoided . . . the discharge of pollutants should be minimized	To minimize all forms of pollution
Food quality and quantity	To produce foodstuffs of optimal nutritional quality in sufficient quantities	The aim is to produce high-quality products in a sustainable manner and to do so in a credible and reliable way.	To produce food of high quality in sufficient quantity
		Organic foodstuffs should be available to the consumer at reasonable prices	
Resource use	To reduce the use of fossil energy in agricultural practice to the minimum	The use of fossil fuels and other non-renewable resources . . . should be minimized	To use, as far as possible, renewable resources in locally organized production systems

TABLE I
Continued

Issue	Document
Animal husbandry	<p>To give all livestock conditions of life that conform to their physiological needs and to humanitarian principles</p> <p>Farm animals should be kept in a manner that promotes good health and dignity. It should especially give the animals opportunity to express their natural behavior</p> <p>To give all livestock conditions of life with due consideration for the basic aspects of their innate behavior</p>
Conditions for producers	<p>To make it possible for agricultural producers to earn a living through their work and to develop their potentialities as human beings.</p> <p>The farmer should enjoy a reasonable income, a safe working environment, and the opportunity to experience joy and satisfaction in his or her work</p> <p>To allow everyone involved in organic production and processing a quality of life that meets their basic needs and allows an adequate return and satisfaction from their work, including a safe working environment</p>
Biodiversity	<p>The biological diversity of the agricultural environment should be protected and developed</p> <p>To maintain the genetic diversity of the production system and its surroundings, including the protection of plant and wildlife habitats</p>
Social responsibility, global solidarity	<p>The basic features of ecological agriculture are two: care for nature's fundamental functions and the idea of global solidarity</p> <p>To consider the wider social and ecological impact of the organic production and processing system</p>

TABLE I
Continued

Issue	Document
Water	To progress toward an entire production, processing, and distribution chain that is both socially just and ecologically responsible
	To develop a valuable and sustainable aquatic ecosystem
	To promote the healthy use and proper care of water, water resources, and all life therein
Organic Processing	To process organic products using renewable resources
	To produce textiles that are long-lasting and of good quality

¹ Stated by the KRAV board in Nov., 1995.

biodynamic farmers that adhere to anthroposophy have a different worldview compared to the majority of organic farmers, who base their farming on the natural sciences. Vartdal and Blekesaune (1992) studied Norwegian organic farmers before and in conversion and classified them in three categories depending on motives for conversion and general worldview ("ecosophists," reformists, and anthroposophists). Kaltoft (1997) identified four types of nature views in an interview study of Danish organic farmers (the conventional view, "traditional" organic view, biodynamic view, and communication view, which includes and combines parts of the two previous views).

On the other hand, several authors describe certain basic differences in values between conventional and organic farming. Merrill (1983) states that the fundamental difference is that organic farming represents an alternative view of nature and the human relation to nature. This is analyzed in depth by Christensen (1998: 421–323). He describes the organic movement evolving as an alternative⁵ to the prevailing Western mainstream view of nature and society that is based on the understanding of the world as material properties and on functional technology implying controlled command over casualties that can be empirically tested. Spedding (1988) observes that "organic farming has come to mean both an attitude of mind and a set of farming practices." Other authors argue that organic agriculture represents a paradigmatic shift from the dominating agricultural paradigm, and that agriculture, being part of nature, is more complicated than generally assumed within the conventional paradigm (Callicott, 1988a; Beus and Dunlap, 1990, 1991; Beus et al., 1991; Wynen, 1998). This causes a shift from reliance on chemistry to a broader understanding of biological and ecological processes, and the understanding that all life on earth is interconnected and interdependent. The latter is mirrored in the choice of the name "ecological agriculture" in the Scandinavian, Spanish, and German speaking countries, recognizing agriculture's connection to ecosystems and seeing agriculture as ecosystem management. This is recognized also in English speaking countries even though the word ecological is not used (WIRS, 2000). Comparisons among standards show that the principles, expressed as national livestock standards, have been interpreted in similar ways in different countries, although national interpretations may differ depending on the national situation and the consciousness of the organization (Schmid, 1996, 2000).

Another problem when identifying core values is that the view of the organic movement is not static but has developed over time. The

⁵ The original name of the organic agricultural movement in, e.g., Sweden, was Alternative Growers Association.

IFOAM standards are revised every other year, indicating this development. Christensen (1998: 64–89) states that organic farming has changed from being an isolated sub-cultural “view of life”-agriculture in the 1970s and early 1980s, to a predominantly technical production system today, integrated into the established agricultural system. He points out that, at the same time, the establishment has modified its worldview towards the organic view, making the difference between the organic and conventional view less distinct. Kaltoft (1997: 280) found that the institutionalization of Danish organic agriculture has caused a shift in its understanding of nature, from its having a value of its own (focusing on soil fertility), towards “non-toxic” agriculture (focusing on the exchange of substances in the soil). Woodward et al. (1996) criticizes the organic movement for abandoning important values advocated by the early organic movement. As economic benefits increase through government support schemes, price bonuses, and increasing market demands, an increasing part of organic farmers and traders of organic produce do not adhere to the organic ideals but mainly aim for better economic net returns. However, as shown in Table I, the Principal Aims for Organic Production and Processing stated by IFOAM in 1980 and 1998 both express the same values, although the scope has widened to include more spheres of action (processing, aquaculture, and fiber production).

As a conclusion, we argue that organic agriculture has a different basic view of the relation between human and nature compared to the “mainstream worldview,” as discussed by Christensen. The difference is expressed in its ontological, epistemological, and practical approach to agriculture. The values were established by the early organic movement and are still expressed in the organic standards today – even though certainly not all certified farmers embrace these values. Based on the IFOAM standards (1998) we suggest the following two “core values”: (1) Aim for holistic view, and (2) Aim for sustainability.

Core Value 1: Aim for Holistic View

IFOAM states as its mission (IFOAM, 1998: back cover):

We are committed to a holistic approach in the development of organic farming systems including maintenance of a sustainable environment and respect for the need of humanity.

The aim for the holistic view is also expressed in the Nordic Platform (a consensus document adopted by the Nordic IFOAM group in 1989 that has had profound influence on the development of organic agriculture in the Nordic countries). Under the heading “Conceptual background” it states:

Organic agriculture is based on a holistic view that encompasses the ecological, economic and social aspects of agricultural production, both in a local and global perspective. Thus, in organic agriculture nature is viewed as a whole which has a value in itself [...]

Lindholm (1997) writes that the “holistic systems perspective,” i.e., “systems, wholes and interdependence,” has had a fundamental impact on the development of organic agriculture. Although widely used by the organic movement, most philosophers perceive the term holistic as problematic, since it is open for several interpretations (just as “welfare” is). Usually it is used in opposition to what is described as the common mechanistic and reductionistic thinking in conventional agriculture (Callicott, 1988a, 1990; Høgh-Jensen, 1998). Christensen describes the organic aim for holism as originating from criticism of the dominating view of nature and the human use of nature, both regarding the attitude towards nature and the epistemological question how we gain knowledge about nature. A new value orientation appears in the alternative movements. Christensen writes⁶ (1998: 419, our translation),

The “holistic view” is a key concept for an alternative perception of reality in which reductionism corresponds to holism, quantity corresponds to quality, not only in our understanding of “nature” but in the widest sense, relating to our way of living, living together and living with nature.

In this article, we refer to holism as this alternative value orientation. It is a view emphasizing the functional relation between parts and wholes and demanding agricultural issues to be placed in larger perspectives: ecological as well as social, local as well as global, and, in a wide time frame, paying respect to the past as well as to the future.

The aim for the holistic view has old roots in Western philosophical tradition (Worster, 1996: 45), and it has epistemological consequences. There is within the organic movement an outspoken criticism against the positivistic ideal in science (e.g., Borgen, 1998). The idea of an objective science is rejected (Christensen, 1998; Alrøe, 1998; Rasmussen et al., 1997). Systems thinking is perceived as one important way to achieve the desired holistic view. A characteristic feature of systems is the emergent properties appearing at higher levels of organization (Odum, 1993). Humans are also included as actors in the agricultural system (as discussed by Checkland, 1981; Bawden, 1995; Alrøe and Kristensen, 1998). Both the holistic perception of reality and the methodological approach have consequences for the understanding of animal welfare.

⁶ However, Christensen also points out that in a wide sense, the aim for a holistic view appears as a paradox, since all worldviews are a product of the context in which it has developed – any interpretation of reality is a conception of reality, not reality in itself. In this perspective, every concept is reductionistic.

Core Value 2: Aim for Sustainability

The aim for sustainability can be viewed as a result of the aim for the holistic view but it can also be seen as a value in itself. It is the most recurrent theme in writings dealing with organic agriculture. Also this concept is disputed among scientists and philosophers. Social sustainability is usually said to deal with stewardship of human resources, seeking to identify political and ethical limits for agricultural systems and practices (e.g., Douglass, 1984). Economic sustainability can be given several definitions, e.g., that agricultural practices must be economically viable, or it can deal with the management of man-made and natural capital in a broader sense (Daly, 1994). Ecological sustainability refers to the life supporting ecological and biological functions on the planet (Crews et al., 1991), and, for agriculture, it implies an agroecological system that will not deplete non-renewable resources nor seriously impair life supporting functions or the resilience of the ecosystem of which it is part.

The IFOAM Basic Standards deal with all three areas, although ecological concerns come out most strongly: 13 of the 17 general principles deal with these (Table 1). Accordingly, “aim for sustainability” in this article refers mainly to the ecological concerns.⁷ The Basic Standards state (IFOAM, 1998: 5), “Organic agriculture is a process which develops a viable and sustainable agroecosystem.”

WIRS (2000) writes,

The objective of sustainability lies at the heart of organic farming and is one of the major factors determining the acceptability or otherwise of specific production practices. The term “sustainable” is used in its widest sense, to encompass not just conservation of non-renewable resources (soil, energy, minerals) but also issues of environmental, economic and social sustainability.

Thompson (1997; Thompson and Nardone, 1999) has suggested that sustainability can be viewed under two different but not incompatible paradigms: resource sufficiency and functional integrity. While the first calls for anticipation and control (e.g., of resource use), functional integrity focuses on resilience and the functioning of regenerative processes in the system and it recognizes current ignorance, e.g., regarding complex systems and systemic interactions. Also, it presumes that norms and values are components of agroecosystems (emanating from the humans in the systems). The functional integrity view is predominantly taken on by organic agriculture (Alrøe and Kristensen, 1998).

⁷ This does not mean that we do not see economic and social sustainability as important, only that these aspects need not be considered for the purpose of this paper.

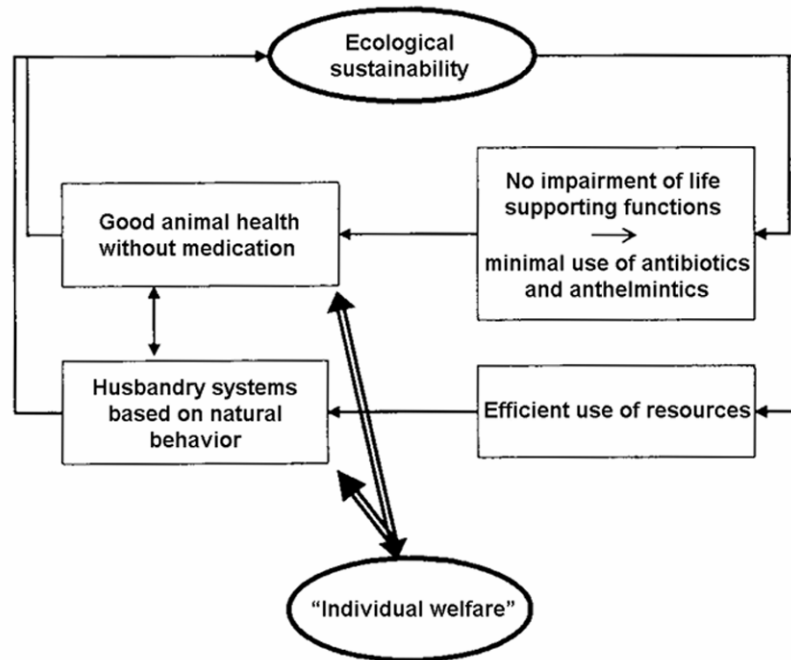


Figure 1. The relation between ecological sustainability and individual animal welfare in organic farming systems.

Implications of Core Value 1 and 2 for the Conception of Welfare

The aim for the holistic view advocates a complex welfare definition rather than one focusing on one or a few single parameters and includes positive parameters. The critique of reductionistic and positivistic scientific methodology implies that animal welfare should be considered a composite concept, based both on values and scientific measurements that must not be limited to what is measurable according to current scientific knowledge. The work by Wemelsfelder et al. (2000) is thus considered a promising example by many in the organic movement.

Another consequence of the aim for the holistic view is that farm animals must be perceived as part of the whole agroecological system when welfare aspects are evaluated.

The aim for sustainability relates to welfare but only indirectly through (1) the aim for natural behavior and (2) good animal health (Figure 1). Health status and/or natural behavior are included in several animal welfare definitions.

- (1) From an organic perspective (i.e., trusting nature), husbandry systems based on natural behavior are likely to provide the most efficient use of resources and the best departure point for any attempt to create a sustainable system. Many of the welfare challenges in modern farming derive either from the fact that the animal has an adaptation that no longer serves an important function or that it lacks adaptations to the rearing system (Kiley-Worthington, 1989; Fraser et al., 1997). Breeding has not been able to change basic behaviors and make farm animals better adapted to intense housing systems or abnormal social structures (Andersson, 2000). Thus a system based on natural behavior is likely to pose less challenges to welfare.
- (2) Omissions of substances of low degradability and/or high toxicity, such as antibiotics and anthelmintics, should be minimized in a sustainable system, so that life-supporting systems are not impaired. This means that organic livestock must be kept in good health without use of (in particular allopathic and chemically synthesized) medication (IFOAM, 1998; Anon., 1999). This makes natural behavior important (including that transportation and mixing of animals from different herds are to be avoided), since this is shown to be essential for low stress levels and thereby for good health (Bäckström, 1973; Vestergaard and Hansen, 1984; Lawrence et al., 1992, 1994).

Thus, natural behavior and good animal health are interconnected, and the possibility of performing evolutionarily evolved behavior is important for an organic conception of welfare when the aim for sustainability is considered.

A THIRD CORE VALUE

Core Value 3: Respect for Nature

The above suggested core values are insufficient as a complete and direct basis for the extensive animal welfare aims actually present in organic agriculture. This is a problem for the organic movement, especially if it wants to maintain and develop these aims. There are, however, other important (but less explicit) attitudes within the movement that can be used to provide more direct arguments. We suggest using bio- and ecocentric ethical theories,⁸ since these were developed as a theoretical response to the same questions addressed by the organic agricultural movement

⁸ Ethical theories dealing with questions regarding human-animal and human-nature relations are often roughly divided into four main categories: anthropocentric, sentientistic, biocentric, and ecocentric views. In this article, the use of these terms is related to where

in practice, and they tend to reflect basic organic attitudes (Callicott, 1980; Lindholm, 1997; Høgh-Jensen, 1998). We thus suggest “respect for nature” as the third core value of importance for the organic animal welfare discussions. The concept is central for the biocentric theory developed by Taylor (1986). His description of the belief system underlying his concept “respect for nature” can be applied also to the belief system underlying the organic movement:

This belief system underlying the attitude of respect for nature I call (for want of better name) “the biocentric outlook on nature” ...one of its major tenets is the great lesson we have learnt from the science of ecology: the interdependence of all living things in an organically unified order whose balance and stability are necessary conditions for the realization of the good of its constituent biotic communities (Taylor, 1981).

The suggested third core value thus states that humans are an inseparable part of nature and emphasizes their interconnectedness. In agricultural contexts, it advises humans to co-operate with nature, since nature is perceived as providing good models for human action (Rolston, 1988: 230–232; Callicott, 1989: 117–127). Human intervention in nature’s processes should be kept at a minimum, and when necessary the aim should be to resemble natural processes as much as possible. Thus the IFOAM Basic Standards introduction (1998: 1) states that organic farming systems are “directed towards enhancing natural life cycles rather than suppressing nature.” Another example are the organic standards issued by the Danish association for organic farming, where an objective for organic farming is “to do everything possible to ensure that all living organisms the farmer works with, from micro-organisms to plants and animals, become ‘allies’ ” (Ministry of Food, Agriculture, and Fisheries, 1999).

However, Taylor’s biocentric theory cannot be adopted straight away as a basis for organic animal welfare aims. It puts the natural ecosystems’ *individual* organisms in focus for moral concern, arguing that their well-being, as well as human well-being, is something to be realized *as an end in itself* (Taylor, 1981). When this is interpreted so that the killing

focus for moral concern is (according to the proponents). We have defined these as follows: Anthropocentrism is the view that only humans are in focus for moral concern. Sentientism is the view that all and only sentient beings have direct moral status. Biocentrism is the view that all living beings, and only these, have direct moral status, while ecocentrism is the view that in addition to all living beings also species, ecosystems, and other relevant features in nature have direct moral status. Thus, this definition does not relate to the question of what is assigned intrinsic value, since it is theoretically possible to assign an entity intrinsic value and still not consider it in the center of moral concern (Schlitt, 1992: 52, 170), or an animal may be considered as focus for moral concern but independent of or without an intrinsic value (Singer, 1993: 105 ff; Wolf, 1990: 69ff).

of animals is not allowed,⁹ this view is incompatible with organic agriculture: animal husbandry is important to the agroecological system and it presupposes slaughter. In this respect, organic agriculture has its departure point in an ecocentric view, where killing of animals is not a major moral problem (unless the animal belongs to a species threatened by extinction) and yet humans are not regarded as having superior moral status. Death and even killing are part of the cycles in nature. Callicott states (1980), advocating an ecocentric view, “On the ethical question of what to eat, it [*ecocentrism*] answers, not vegetables instead of animals, but organically as opposed to mechanico-chemically produced food.”

On the other hand, a consistent ecocentric theory has difficulties providing arguments for individual animal welfare, since its main interest lies in the well-functioning ecosystem. Both bio- and ecocentric theories have thus been considered incompatible with sentientistic animal welfare ethics that limit the concerns to sentient beings, and this may be one reason why finding a philosophical basis for an animal ethics is problematic for organic agriculture. However, attempts to bridge the gap have been made, e.g., by Callicott (1988b) and Warren (1983). Hargrove (1992) points out that the two types of theories rather complement each other. Stenmark (2000: 98–115) distinguishes between weak¹⁰ and strong bio- and ecocentric views, depending on their degree of consistency. He argues that weak bio- and ecocentric views will have similar consequences for livestock handling: provided that animals are given a good life and a painless death, killing them for food can be allowed. Organic agriculture can be considered to be taking this pragmatic stance, stating that farm animals must be treated with respect – until death. Thus animal handling at slaughter is considered in the IFOAM standards.

Rolston (1988: 61) tries to solve the ecocentric problem by saying that there is a human obligation to avoid inflicting pointless pain on animals. He introduces a “homologous principle” to be applied in animal husbandry (this idea can actually be found within the organic movement (Lund, 1994)): “Do not cause inordinate suffering, beyond those orders of nature from which the animals were taken [...]. Culturally imposed suffering must be comparable to ecologically functional suffering.”

Further direct justifications for far-reaching animal welfare aims can be found with other environmentally focused philosophers. One example is Næss (1985, 1989), whose thinking has influenced the Norwegian organic

⁹ Taylor himself does not advocate an absolute ban on killing of animals, but he sees questions related to land use as the main reason for vegetarianism.

¹⁰ “Weak” indicates that human interests must be essential in order to win over, e.g., animal interests.

movement. He argues that on a deep level, all living beings relate to one another and that they have an aspiration for self-realization, and are trying to develop their “excellence.” If this is translated in terms of natural behavior and seen as a morally relevant aim, it can be interpreted so that livestock should be allowed self-realization, using rearing systems that allow natural behavior. The symbiosis between humans and animals on both a mystical and practical level urges humans to handle animals with great respect. Næss argues that when all life is interrelated, violation of animals can even be interpreted as an indirect violation of oneself. Similar thoughts can be found in Meyer-Abich (1997: 295). Emphasizing the term “*naturale desiderium*,” he argues that not only living entities but every “natural entity” contributes to the whole through expressing its inner being (*Wesen* in German). Humans, too, are part of this whole, and their ethical task, corresponding to their inner being, is “*auf die bestmögliche Weise das zu sein, wofür sie ihrer Natur nach gut sind*” (to be what in the best possible way is good according to her nature). He relates this to a human responsibility to allow all living beings the same, i.e., to live according to their inner strivings.

It is also possible to motivate organic agriculture from a (weak) anthropocentric view: humans must pay consideration to nature because otherwise environmental problems will have negative consequences for humans. Evaluation is made in relation to human benefit: animal welfare is important as long as it doesn’t impair (vital) human interests. Farm animals can still be assigned intrinsic value (as opposed to instrumental value) although they have lower moral standing than humans. We think, however, that bio- and especially ecocentric theories better correspond to central values in organic farming.

Implications of Third Core Value for the Welfare Concept

The basis for organic welfare concerns according to the third core value is the understanding of interdependence and deep respect for other living entities in nature, in combination with insights in the ecology and biology that create the basis for life on earth. The respect for nature-view considers farm animals as fellow members of the biotic community, and as having some kind of intrinsic value, independent of their instrumental value in agricultural production, and direct moral status. When intrinsic value is to be considered, concepts like integrity or dignity become interesting. The dignity concept is used in the aims for organic agriculture stated in the Swedish national standards (Table I). Grommers (1997) argues that the principle of respect for the integrity of animals can be related to, or seen as an addition to, the concept of “sustainability” of agro-ecosystems

as perceived by organic farmers. Baars (1999) argues that the animal's intrinsic value should always be considered in matters concerning animal welfare in organic farming systems. He sees intrinsic value as incorporated into the definition of integrity, and states that the respect for an animal's integrity (defined according to Grommers et al., 1995) is one principle of organic farming:

- respect for an animal's wholeness, not mutilating the animal (individual animal)
- respect for a species' unique ecological balance (animal in relation to its environment)
- respect for the animal's ability to survive independently in a species-specific environment (animal as a species¹¹).

(A similar definition has been presented by Rutgers and Heeger (1999), although they focus on "the species-specific balance of the creature," i.e., the individual animal.)

The attitude to respect animal integrity and dignity could be further developed into a claim on animal self-realization, similar to Næss's reasoning. This thought is expressed in an organic policy manifesto published by the Norwegian Organic Farmers' Association (Aanestad et al., 1987: 15, our translation):

[...] all species of living beings should have the possibility of developing according to their species-specific nature. This means that actions leading to violation of other species' possibility to realize this development must be justified by the self-realization of the human nature. For all species that we want to keep confined as farm animals, the human need for the product must be evaluated, and this need must then be evaluated against the degree to which the animals can develop according to their nature under the conditions that humans can offer them.

TWO DILEMMAS

The organic core values create several dilemmas regarding how to prioritize between central but divergent interests. One often mentioned dilemma (not exclusive to organic farming!) is the conflict between the (individual) human interest of economic profit in agriculture, low food prices, and the cost of individual animal welfare. Here, we will focus on two other dilemmas, correlated to the problems bio- and ecocentric views have in dealing with individual welfare. The first emerges in the relation between

¹¹ Genetic engineering is rejected by IFOAM both from an individual and a system level (IFOAM Policy on Genetic Engineering, March 1998).

the system and the individual animal, and the second deals with a “natural” life as an ideal versus the welfare of the individual animal.

System vs. Individual

Organic agriculture aims at optimizing the agroecological system. When a systems approach is emphasized, conflicts arise when the interests of the individual do not coincide with those of the system. In ecocentric theories, system interests are generally given priority. Thus, if environmental protection (system health) conflicts with individual welfare, the latter may be given less priority. This conflict has been mirrored in the philosophical debate between environmentalists and animal liberationists as mentioned earlier. An ecocentric approach seems to a certain extent to be reflected in organic practice. For example, the organic standards prohibit routine use of antibiotics and anthelmintics. There is also reluctance among organic farmers to administer this type of medication (although also due to economic reasons, since benefits for organic produce can be lost). This reluctance has been strongly criticized by veterinarians as well as others, arguing that animal welfare is put at stake (e.g. Jensen, 1999). Statistics from Swedish slaughterhouses showed more internal parasites in organic beef cattle and sheep (Hansson et al., 1999). Problems with parasite infections and/or underfeeding have been reported with outdoor rearing of dairy calves in Denmark (Vaarst et al., 2000a). In some cases, the individual welfare of these animals may be seriously questioned.

In cases of severe disease or diseases where recidives are common (e.g., mastitis), slaughter is considered a better alternative than antibiotic treatment (Granstedt et al., 1998).

Further examples of conflicts are when species-specific behavior conflict with environmental concerns, as can be the case with free range pigs during rainy periods and on certain soil types (Eriksen et al., 1999; von Wachenfelt, 1999). Nose-ringing of pigs is used in many countries to prevent rooting behavior in outdoor pigs. This is likely to impede individual welfare, since rooting is a basic pig behavior (Jensen, pers. comm.).

A Natural Life vs. Individual Welfare

In the organic movement, welfare has extensively been interpreted in terms of natural behavior (e.g., Fölsch and Hörning, 1996), and this is also expressed in the IFOAM standards (see Table I). The importance of a “natural” life is further emphasized, since nature is seen as providing “good models” for husbandry. Having a choice between a well-controlled environment in which the animal is protected from dangers but not able

to perform a natural behavior, a more natural (less controlled) environment would be preferred even though this might mean higher risks, e.g., of injuries and thus more suffering. (This is also in accordance to the homologous principle (Rolston, 1988), at least as long as risks do not exceed what the animals would experience in nature.) Sows in organic systems should thus be kept in outdoor huts rather than in controlled but confined indoor conditions in spite of the fact that the first system can imply higher piglet mortality (Vaarst et al., 2000b) and risk for suffering due to predators. Thus, it is a challenge for organic agriculture to protect animals from suffering in a system granting natural behavior. Organic farmers have not always been successful in meeting this challenge. For example, the Danish Animal Ethics Council has criticized organic poultry production, pointing to mortality figures twice as high in organic as in conventional poultry herds (Anon., 1995). Vaarst et al. (2000a) discusses the problem in relation to a study of farms in conversion, where calves often did not receive proper care, since organic rearing demanded new and time-consuming management routines and close follow up.

Improved management and system development can overcome some of these problems, but there are also principal differences. The negative attitude towards artificial insemination in the organic standards is one example. Both IFOAM (1998) and the Council Regulation (EC) (Anon., 1999) states that reproduction techniques should be natural, although artificial insemination is permitted. Thus, natural mating is preferred in spite of the fact that artificial insemination programs are superior with regard to disease prevention, elimination of deformities, etc. (The welfare aspects of natural mating vs. artificial insemination as such are largely unknown.) Further examples are the principle of outdoor grazing in spite of higher risks for certain diseases (e.g., *Coccidiosis* and *Ascarid* infections in poultry, piroplasmosis and severe gnat problems in cattle, and trichinosis and *Erysipelas* infections in pigs) or the insistence on free-range systems for poultry in spite of the fact that outbreaks of feather pecking and cannibalism may cause greater damage in these systems. Also, all kinds of mutilations, including dehorning of cattle, are prohibited in the IFOAM Basic Standards,¹² although risks for injuries to both animals and stockpersons increase with horned animals, especially in loose housing systems.

¹² The local certification program, however, may state exceptions.

DISCUSSION

Current Welfare Definitions and Organic Values

In the following discussion, we will consider whether any of the three currently most used welfare definitions is suitable for organic agriculture, given the requirements we have derived from the suggested core values.

(a) The Subjective Experience Approach

This approach claims that only animal feelings, such as suffering, pain, or pleasure, count when welfare status is evaluated (e.g., Duncan, 1993; Wolf, 1990, 1992; Sandøe and Simonsen, 1992). It is often combined with a utilitarian view, e.g., the preference utilitarianism proposed by Singer (1990) saying that only preferences or interests are morally relevant. This approach has the important advantage that it coheres with most people's intuition of what welfare is. In an organic view this "common sense" is important.

An obvious disadvantage is the difficulty of measuring feelings, especially if these must be quantified in order to compare different negative or positive experiences (Duncan and Fraser, 1997). From an organic point of view this could be more of a practical than a principal objection, since the conception of welfare must not be limited to what is measurable according to current scientific knowledge. The main criticism would rather be that the approach is too narrow, since it *only* deals with animal feelings. Thus it does not protect from genetic manipulation nor does it give any special value to "natural behavior." Also, if this definition is understood as if only feelings are morally relevant, welfare issues could be solved through administering "happiness pills." This is not acceptable to an organic view. Further, since a natural life does not mean freedom from negative experiences, the latter cannot be accepted as an exclusive criterion for a good life.

(b) The Biological Functioning Approach

Others have argued that quality of life is when the animal's biological systems are functioning in a normal/satisfactory manner. Various definitions have been given of biological functioning. Broom (1991) has suggested that welfare depends on whether the animal can cope successfully with its environment and function normally from a biological perspective, while others emphasize natural behavior as crucial for biological functioning. Duncan and Fraser (1997) include high levels of growth and reproduction. From an organic point of view, it is positive that this approach can allow emphasis on natural behavior, but it does not

put any value on it per se. Also, the link between functioning and welfare can be questioned – there is, for example, no simple connection between high levels of production and individual welfare. This is recognized by the organic movement where limitations in production levels (e.g., through change of breeding goals; Haiger, 1991) have been seriously considered.

A narrow focus on physical health is rejected as a prime goal in organic agriculture. IFOAM is, for example, not accepting SPF-systems for raising piglets in spite of the fact that these aim at good animal health, since it is too narrow an understanding of health and excludes natural behavior. Instead, systems are prescribed where animals are allowed to interact with the environment, even if health hazards may be greater in such systems. So even though biological functioning is important, it is not enough in organic farming.

(c) *The “Natural Living” Approach*

A third type of approach is the “natural Living” approach, which proposes that an animal’s welfare depends on the possibility of performing its natural behavior and of living a “natural” life according to its genetically encoded nature or “telos” (Rollin, 1993; Duncan and Fraser, 1997). This might better meet the demands of organic farming, since it puts the main emphasis on natural behavior. It could allow a ban on extreme production levels and other phenomena criticized by organic agriculture as unnatural, unsustainable, or otherwise morally relevant for how animals should be treated. It could also include a ban on violating the animal’s nature through genetic engineering, or it could be connected to a concept of self-realization.

However, there is a problem in defining what the “telos” actually is. Even so, it is difficult to use the concept for guidance in all welfare issues, since the farm situation is unnatural per se (Fraser et al., 1997). Natural living will not suffice as a single principle, since pain and suffering can be caused by livestock systems either not natural enough – or “too” natural. Also it does not fully correspond to a systemic approach. However, it is the best of the three and a good departure point, if not sufficient, for an organic conception of animal welfare.

Complex Approaches

Better understanding and co-operation between scientists and philosophers can result in broader and more complex definitions that also will be more useful in practice (Fraser, 1999). Interdisciplinary approaches are in line with holistic thinking. Several authors have argued for a complex

definition of animal welfare (also the “natural living” approach could be considered one). Fraser et al. (1997) suggest an integrative model for judging animal welfare that includes all three current approaches to animal welfare definitions. Rollin (1993) and Mench (1998) suggest a move to a broader quality-of-life conception not only including high level of biological functioning and freedom from suffering, but also positive experiences. Grommers (1997) suggests using the integrity concept. Röcklinsberg (2001) has presented an alternative that includes features other than those asked for in a hedonist utilitarian perspective. She argues that a theocentric perspective grounded in the animal’s intrinsic value can be formulated that gives respect to the entire being in its environment, and also, but not only, to its mental or physical state as respect for the species-specific behavior.

Outlining an Organic Welfare Concept

So far, we have concluded that organic agriculture demands a wider conception of animal welfare than those currently most used, and one where the animal’s possibility of performing natural behavior is central. The next question is how to concretize these demands, and, further, how to solve the dilemmas related to the core values. (We don’t intend to give a complete analysis here but to point at some possibilities.)

We believe that the best philosophical departure point for “organic animal welfare” is to combine a (weak) ecocentric approach with a (weak biocentric) respect for the individual farm animal’s integrity as a fellow member of the biotic community. Thus, it is a conception for finding a balance in the mentioned dilemma between emphasis on the system or on the individual animal. The ecocentric part allows the holistic view aimed for and it puts emphasis on natural behavior. Further, human harvest of the surplus (animals included) produced yearly by the agroecological system is not only acceptable but even necessary in order to keep the system healthy and balanced. The systemic view, however, must be combined with the recognition of the farm animal’s subjective experiences as well as its intrinsic value, to theoretically motivate welfare on the individual level as it is actually expressed in the far-reaching welfare concerns in organic practice and in its standards. It is particularly important to be clear on this point, since more areas of concern are included in the organic standards and since an increasing number of people representing various interests are entering the movement (Figure 2). The practical conclusion of this “double” view is that farm animals must be treated respectfully in an environment to which they are evolutionary adapted until they are painlessly slaughtered.

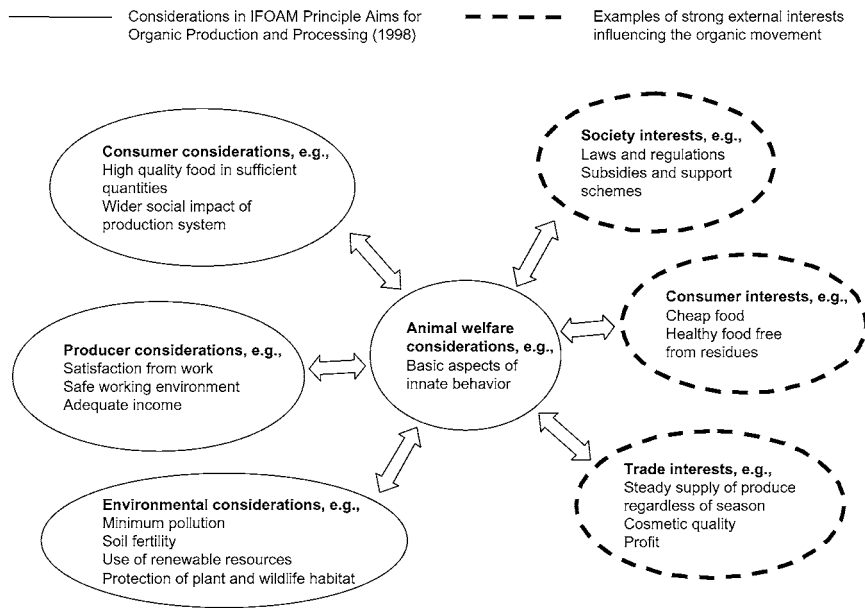


Figure 2. Animal welfare as one of many competing interests in organic farming.

Natural behavior is a key concept in organic agriculture. Rolston's homologous principle, if further developed, can be used as a guideline to concretize it. "Ecologically functional suffering" can be understood in an evolutionary perspective, where pain and anguish function as warning systems to the individual, helping it to avoid situations that may negatively affect its chances of surviving or reproducing. Suffering can never be deleted from the individual's spectrum of experiences. Rather it must be viewed as an important part of the functional feedback system that connects individual behavior and the surrounding world (Figure 3). A well-functioning feedback system allows the individual to successfully cope with different kinds of stress, including pain and anxiety. Organic agriculture must create production systems that provide such functional feedback systems (rather than put focus on minimizing suffering), and for the best and easiest results, they should mimic nature as much as possible. The homologous principle can be used when trying to solve the conflict between natural life and individual welfare. Thus, some risks for suffering must be accepted within the frames of "ecologically functional suffering" and a natural life. For example, some risks connected to an outdoor life for pigs are accepted. Interestingly, it seems as if the higher piglet mortality occurring during the first week in organic systems does

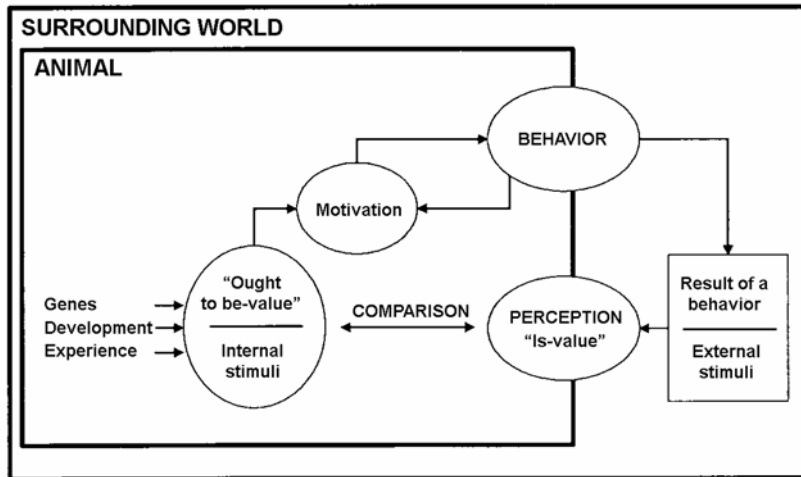


Figure 3. A model of how the surrounding world and behavior interacts through a feed-back system (modified after Algers, 1992a and Schrader, 2001). The perceived information from the surrounding world ("is-value") is compared to the animal's perception of how the situation ought to be ("ought to be-value"), and this causes a certain behavior.

not show in the number of weaned piglets per sow, suggesting that piglets surviving the first week are healthier during the following weeks compared to conventionally reared piglets (although the variation between herds is considerable) (Persson, personal comm.).

The systemic perspective preferred by organic agriculture opens up new possibilities of solving dilemmas. It demands that individual welfare must be put into a bigger perspective. In this perspective, for example, breeding becomes an important tool. The perspective demands that breeding goals not only include production traits but also traits related to health, welfare, and behavior. Thus the dilemma with horned cattle can be solved through the use of polled sires, since polled is genetically dominant, and the problem with high piglet mortality in free range systems could at least partly be solved if more weight is given to the sow's mothering abilities when selecting breeding stock (Algers, 1992b).

But also, higher system levels should be considered. Recognizing the interconnectedness between the ecosystem, the agro-ecological system, and the individual animal, one could even argue that the ecological system of which the animal is part must be healthy, since individual health and welfare link to system health: A functioning biosphere with healthy ecosystems is, at least in a longer perspective, necessary (although not

sufficient) for individual welfare.¹³ The concept of agroecosystem health in relation to animal health has been discussed by Faye et al. (1999):

Ecopathology may be considered as an enrichment of epidemiology by the concepts of systemic ecology. In that ecological context, the herd may be considered as an anthropobioscene, i.e., a specific community where microorganisms (which could be pathogens) and animals live together and in which their reciprocal relationships often exhibit a high level of organization. The farm, or physical space occupied by the herd could then be considered as an anthropo-biotope. Agroecosystem health studies further this process by examining the larger milieu in which these ecological units exist [...] with ecological studies in a much broader sense including concept from the agricultural, health, epidemiologic and social sciences.

However, to include all these levels in a conception of welfare would be to extend it far beyond its common use, and it would be almost impossible to make such a broad conception operational. One way to solve this problem without abandoning the desired wide scope is to consider welfare on different *systemic levels*. Thus, necessary flexibility and focus can be obtained and at the same time other levels need not be neglected. Accordingly, welfare on the individual level could be related to a telos-concept. On the next level, focus can be on the integrity of the individual and the species. At the farm level, management comes into focus, requiring, for example, breeding for healthier animals with good social abilities (e.g., mother instincts). For a complete assessment, individual welfare must be evaluated in relation to the whole agroecological system and to the ecosystem of which it is a part. Agroecosystem and ecosystem health or sustainability can be relevant features relating to animal welfare on these highest systemic levels. The lower the system level, the more weight should be given to the evaluation of individual welfare.

Christensen (1998: 29–32, 355–365) has pointed out that organic agriculture has developed as a response to the dilemmas faced by conventional agriculture, finding solutions transcending the context and creating new perspectives. The systemic approach can open up possibilities of finding alternatives that represent such a break with the current context. Christensen calls this a “second order change.” A first order change is, then, a change within the given context, meaning “more of the same,” e.g., more technology to solve problems caused by technology – e.g., when sows are crated in order to prevent their piglets from being crushed. A second order change is created through a qualitative or creative leap. In the sow example, a second order change could be the introduction of a system with a decomposing (and thus warm) deep litter bedding of chopped straw

¹³ For a discussion regarding health as a useful concept in relation to ecosystems, see, e.g., Karr and Chu, 1999.

where the floor conditions make piglets less exposed to crushing and at the same time allows natural sow behavior, without dependence on advanced technology.

When there is a conflict between the system and the individual, efforts should be made to create a “win-win” situation according to ecological principles, where the whole system and not only parts of it is considered. Compare, for example, the situation where the squirrel hides acorns in the fall. It is beneficial not only for the squirrel but also for the oak, birds and other rodents, and the entire oak forest ecosystem. Unfortunately, gains on higher system levels often are not rewarded within the current market economy system. In order to support this kind of solution, it may be necessary to use public support schemes and/or legislation. (The organic standards as well as the support schemes for organic agriculture in the EU and some other countries can partly be interpreted as examples of this.) Also, there is an urgent need for research directed towards development of this type of production system.

Using the “win-win” principle, the conflict between production costs and individual welfare can be solved by making animal welfare an integrated part of the production system. Welfare becomes a feature also of system management, not only of management of the individual animal. Farm animals then benefit from performing their natural behavior at the same time as the farmer and the agroecological system are benefited by their behavior. A good example is a production system where pigs are integrated into the crop rotation, utilizing their innate behavior to root for weeding and soil tillage when breaking leys or after crop harvest. At the same time, pigs will utilize feed residues from the harvest and fertilize the field (Karlsson et al., 1996; Andresen, 2000). Pig rooting can also be used in forestry, preparing the ground for seeding (Beinlich, 1998). In this way, welfare is not perceived as a cost in the system but as a gain. The fact that nose-rings are needed in some management systems reveals from this perspective an error in system design.

CONCLUSIONS

It is necessary to develop a conception of welfare in organic agriculture in order to be able to improve and further develop organic animal husbandry standards and practices. At present, the aim for sustainability is more emphasized in writings dealing with organic animal husbandry, leaving a limited possibility for developing animal welfare principles. Also, high and explicit welfare standards can work as good marketing arguments, as is already the case in Sweden, Denmark, and Germany, and

will increase credibility in relation to consumers. Further reasons are that welfare requirements may conflict with other core values, and in order to solve such conflicts the conception of welfare needs to be clearly outlined. It is possible and relevant to formulate a specific “organic” definition of animal welfare.

We have suggested that organic core values can be comprehended in two concepts: (1) aim for a holistic view, and (2) aim for sustainability. These motivate welfare only indirectly in as much as welfare is important for sustainability and the functioning of the whole agroecological system. In order to establish a philosophical basis for the extended welfare policy actually present in organic agriculture, we have suggested that a third core value lies within the organic world view: (3) respect for nature, based on the understanding of interdependence and deep respect for other living entities in nature expressed in bio- and ecocentric views. With the suggested core values as departure point we argue that:

- (1) The organic animal welfare concept should be a complex one, including multiple parameters, reflecting the holistic approach of organic agriculture. Parameters challenging the positivistic view of traditional science, such as subjective experiences, may also be considered.
- (2) Natural behavior (understood as species-specific behavior, feed, and environment) is a central feature, since it seems to provide the best preconditions for a good quality of life as well as for sustainability. This means that management and environment must offer a functional feedback system, in order to make the system individually and ecologically sustainable. A telos-concept related to “natural living,” e.g., defined as “the possibility of developing according to the animal’s encoded genetic nature” (Fraser et al., 1997), can be a useful departure point.
- (3) In the systemic view proposed by organic agriculture, it is relevant to discuss welfare in relation to different systemic levels. An integrity concept as suggested by Baars (1999) relates to both individual and species level. It offers a complex and operational definition of animal welfare that includes a wider scope of morally relevant features than only physical and mental states. On higher systemic levels, individual welfare could be related to herd or farm level, where focus is on breeding strategies and management systems, and to the health of the agroecosystem and the ecosystem.

We have also pointed to dilemmas faced by organic agriculture in relation to individual animal welfare. The credibility of organic agriculture requires that these dilemmas are given careful consideration. The systemic

view proponed by organic agriculture offers possibilities of finding solutions to these dilemmas. Organic agriculture, by origin, has been successful in developing creative “second order” changes, and this approach is needed also henceforth.

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REFERENCES

- Aanestad, J., E. Brendehaug, M. Gabrielsen, and M. Holm, *Begrepet økologisk landbruk [The concept of organic agriculture]*, Delinstilling 1, Resurss- og landbrukspolitisk utvalg i Norsk Økologisk Landbrukslag (1987).
- Algers, B., “Natürliches Verhalten – ein natürlicher Begriff” [“Natural Behavior – a Natural Concept”], *Berl. Münch. Tierärztliche Wochenschrift* 105 (1992a), 372–374.
- Algers, B., “Is a Good Mother just a Good Udder? Piglet Health in Relation to Sow Housing and Behaviour,” *Proceedings 8th Intl. Conference on Production Diseases in Farm Animals* (University of Berne, Switzerland, 1992b), 348–358.
- Alrøe, H. F., “Forskningsmetodik i økologisk jordbrug. Kvalitet og sammenhæng” [“Research Methodology in Organic Agriculture”], in H. F. Alrøe and E. S. Kristensen (eds.), *Forskningsmetodik i økologisk jordbrug [Research methodology in organic agriculture]*. Workshop on research methodology in organic agriculture, Danish Research Centre for Organic Farming (1998), pp. 7–11.
- Alrøe, H. F. and E. S. Kristensen, “Baeredygtighed og økologisk jordbrug” [“Sustainability and Organic Agriculture”], *Landbrugsøkonomisk Forum* 3 (1998), 5–14.
- Andersson, M., “Domestication Effects on Behaviour. Foraging, Parent-offspring Interactions and Antipredation in Pigs and Fowl,” *Acta Universitatis Agriculturae Sueciae, Veterinaria* 86 (2000), Doctoral thesis.
- Andresen, N., *The Foraging Pig – Resource Utilisation, Interaction, Performance and Behaviour of Pigs in Cropping Systems*. Doctoral thesis. Agraria 227, Acta Universitatis Agriculturae Sueciae, Uppsala (2000).
- Anon., *Udtalelse om økologisk husdyrproduktion* (Det dyreetiske råd, Justitsministeriet, Copenhagen, 1995).
- Anon., Council Regulation (EC) No 1804/1999 of 19 July 1999 supplementing Regulation (EEC) No 2092/91 on organic production of agricultural products and indications referring thereto on agricultural products and foodstuffs to include livestock production, Official Journal L 222, 24/08/1999 (1999), pp. 0001–0028.

- Baars, T., "Review of Animal Health and Welfare," in J. Isart and J. J. Llerena (eds.), *Organic Farming Research in the EU, towards 21st century. ENOF White Book* (Barcelona, 1999), pp. 65–74.
- Bäckström, L., *Environment and Animal Health in Piglet Production. A Field Study of Incidences and Correlations*, Acta Veterinaria Scandinavica 41 (1973), Supplement.
- Bawden, R., "On the Systems Dimension in FSR," *J. Farming Systems Res. and Educ.* 5(2) (1995), 1–18.
- Beinlich, B., "Schweine-Freilandhaltung als dynamischer Faktor," *Naturschutz und Landschaftsplanung. Zeitschrift für angewandte Ökologie* 8–9 (1998), 263–267.
- Beus, C. and R. Dunlap, "Conventional vs. Alternative Agriculture: The Paradigmatic Roots of the Debate," *Rural Sociology* 55(4) (1990), 590–616.
- Beus, C. and R. Dunlap, "Measuring Adherence to Alternative vs. Conventional Agricultural Paradigms: A Proposed Scale," *Rural Sociology* 56(3) (1991), 432–460.
- Beus, C., R. Dunlap, R. M. Jimmerson, and W. Lee Holmes, *Competing Paradigms: The Debate between Alternative and Conventional Agriculture*. Research Bulletin XB 1020, Washington State University (1991).
- Borgen, A., "Har holdningen til økologisk jordbrug konsekvenser for valget af forskningsmetoder?" *Landbruksøkonomisk Forum* 15(3) (1998), 51–56.
- Broom, D. M., "Animal Welfare: Concepts and Measurement," *J. Anim. Sci.* 69 (1991), 4167–4175.
- Broom, D., "Animal Welfare Defined in Terms of Attempts to Cope with the Environment," *Acta Agric. Scand., Sect. A. Animal Sci. (Suppl. 27)* (1996), 22–28.
- Callicott, J. B., "Animal Liberation: A Triangular Affair," *Environmental Ethics* 2 (1980), 311–338.
- Callicott, J. B., "Agroecology in Context," *Journal of Agricultural Ethics* 1 (1988a), 3–9.
- Callicott, J. B., "Animal Liberation and Environmental Ethics: Back together again," *Between the Species* 5 (1988b), 163–169.
- Callicott, J. B., *In Defense of the Land Ethic* (SUNY Press, Albany, 1989).
- Callicott, J. B., "The Metaphysical Transition in Farming: From Newtonian-mechanical to the Eltonian Ecology," *Journal of Agricultural Ethics* 3 (1990), 36–49.
- Checkland, P. B., *Systems Thinking: Systems Practice* (Wiley, New York, (1981).
- Christensen, J., *Alternativer – natur – landbrug* (Akademisk forlag, Viborg, 1998).
- Crews, T. E., C. L. Mohler, and A. G. Power, "Energetics and Ecosystem Integrity – the Defining Principles of Sustainable Agriculture," *American J. Alternative Agriculture* 6(3) (1991), 146–149.
- Daly, H. E., "Operationalizing Sustainable Development by Investing in Natural Capital," in A.-M. Jansson, M. Hammer, C. Folke, and R. Constanza (eds.), *Investing in Natural Capital – The Ecological Economics Approach to Sustainability* (Island Press, Washington, DC, 1994), pp. 22–37.
- Douglass, G. K., *Agricultural Sustainability in a Changing World Order* (Westview Press, Boulder, CO, 1984), pp. 3–29.
- Duncan, I. J. H., "Welfare Is to Do with What Animals Feel," *J. Agr. Env. Ethics* 6 (Suppl. 2) (1993), 8–14.
- Duncan, I. and D. Fraser, "Understanding Animal Welfare," in M. C. Appleby and B. O. Hughes (eds.), *Animal Welfare* (CAB International, Wallingford, 1997), pp. 19–31.
- Eriksen, J., S. O. Petersen, and S. G. Sommer, "Er udendørs sohold miljømæssig forsvarligt?" *Forskningsnytt om økologisk landbrug i Norden* (8) (1999), 20–21.
- Faye, B., D. Waltner-Toews, and J. McDermott, "From 'Ecopathology' to 'Agroecosystem Health'," *Preventive Veterinary Medicine* 39 (1999), 111–128.

- Fraser, D., "Animal Ethics and Animal Welfare Science: Bridging the Two Cultures," *Applied Animal Behaviour Science* 65 (1999), 171–189.
- Fraser, D., D. M. Weary, E. A. Pajor, and B. N. Milligan, "A Scientific Conception of Animal Welfare that Reflects Ethical Concerns," *Animal Welfare* 6 (1997), 187–205.
- Fölsch, D. W. and B. Hörning, "Farm Animal Ethology," in T. V. Østergaard (ed.), *Fundamentals of Organic Agriculture*. Copenhagen, Proceedings 11th IFOAM International Scientific Conference 1 (1996), pp. 125–139.
- Granstedt, A., H. Bovin, K.-Å. Brorsson, V. Lund, and Å. Rölin, *Ekologiskt lantbruk – fördjupning [Organic Agriculture – in Depth]* (Natur och Kultur/LTs förlag, Falköping, 1998).
- Grommers, F. J., "Consciousness Science and Conscience," in M. Dol, S. Kasanmoentalib, S. Lijmbach, E. Rivas, and R. van den Bos (eds.), *Animal Consciousness and Animal Ethics* (Van Gorcum, Aassen, 1997), pp. 198–207.
- Grommers, F. J., L. J. E. Rutgers, and J. M. Wijsmuller, "Weltzijn – intrinsieke waarde – integriteit. Ontwikkelingen in de herwaardering van het gedomesticeerde dier," ["Animal welfare – intrinsic value – integrity. Developments in the appreciation of the domestic animal,"] *Tijdschrift voor Diergeneeskunde* 120 (1995), 490–494.
- Haiger, A., "Ecological Animal Breeding: Dairy Cattle as an Example," in E. Boehncke and V. Molkenhain (eds.), *Alternatives in Animal Husbandry Proceedings* (University of Kassel, Witzenhausen, 1991), pp. 61–69.
- Hansson, I., C. Hamilton, K. Forslund, and T. Ekman, "En jämförelse av slaktresultat mellan KRAV-uppfödda och konventionellt uppfödda djur" ["A Comparison of Slaughter Results between KRAV-raised and Conventionally Raised Animals"], *Svensk Veterinärtidning* supplement 29 (1999), 17–24.
- Hargrove, E. C., "Preface. Animal Welfare Ethics 'versus' Environmental Ethics: The Problem of Sentient Life," in E. C. Hargrove (ed.), *The Animal Rights/Environmental Ethics Debate* (SUNY Press, Albany, 1992), pp. ix–xxiv.
- Holmberg, H.-E., *Konsumentundersökning om ekologisk produktion/KRAV [Consumer survey on organic production/KRAV]*, LUI ref. number 30-7866 published 99-12-21 and available at: <http://www.krav.se/arkiv/rapporter/luiund.pdf> (1999).
- Høgh-Jensen, H., "Systems Theory as a Scientific Approach towards Organic Farming," *Biological Agriculture and Horticulture* 16 (1998), 37–52.
- IFOAM, *IFOAM Basic Standards for Organic Production and Processing* (Tholey-Theley, Germany, 1998).
- Jensen, P., "Animal Welfare and Ecological Farming – Are They always Compatible?" *Proceedings NJF XXI congress* (Ås, Norway, 1999), p. 232.
- Kaltoft, P., *Naturetik som praksisbegreb. En undersøgelse af naturforståelse, praksis og viden i økologisk jordbrug*. Doctoral thesis. Department of Technology and Social Sciences, Technical University of Denmark, Skriftserie nr. 5 (1997).
- Karlsson, L., N. Andresen, and P. Cizuk, "Svinproduktion i odlingssystemet" ["Pig Production in the Cropping System"], *Forskningsnytt om økologisk landbrug i Norden* 1 (1996), pp. 12–13.
- Karr, J. R. and E. W. Chu, *Restoring Life in Running Waters – Better Biological Monitoring* (Island Press, Washington, DC, 1999), pp. 16–21.
- Kiley-Worthington, M., "Ecological, Ethological and Ethically Sound Environments for Animals: Toward Symbiosis," *Journal of Agricultural Ethics* 2 (1989), 323–347.
- KRAV, *KRAV-regler [KRAV standards]* (Uppsala, Sweden, 2000), 112 pp. (Can be downloaded in English from <http://www.krav.se/pl/sprak/english.htm>)
- Lampkin, N. H., *Organic Farming* (Farming Press, Ipswich, 1990).

- Lampkin, N. H. and S. Padel (eds.), *The Economics of Organic Farming: An International Perspective* (CAB International, Wallingford, 1994).
- Lawrence, A., C. Petherick, K. McLean, C. Gilbert, C. Chapman, and J. Russel, "Naloxone Prevents Interruption of Parturition and Increases Plasma Oxytocin Following Environmental Disturbance in Parturient Sows," *Physiol. Behav.* 52 (1992), 917–923.
- Lawrence, A., C. Petherick, K. McLean, L. Deans, J. Chirnside, A. Vaughan, E. Clutton, and E. Terlouw, "The Effect of Environment On Behaviour, Plasma Cortisol and Prolactin in Parturient Sows," *Appl. Anim. Behav. Sci.* 39 (1994), 3–4, 313–330.
- Lindholm, S., "Co-development of Ecological Agriculture and Environmental Ethics," in N. Low (ed.), *Proceedings, Environmental Justice* (Melbourne, Australia, 1997).
Published at: www.arbld.unimelb.edu.au/envjust
- Lund, V., "The Principles of Ecological Animal Husbandry," *Proceedings 10th IFOAM Conference* (Christchurch, New Zealand, Theme 5, Session 3, 1994).
- Mench, J. A., "Thirty Years after Brambell: Whither Animal Welfare Science?" *J. of applied animal welfare science* 1(2) (1998), 91–102.
- Merrill, M. C., "Eco-Agriculture: A Review of Its History and philosophy," *Biological Agriculture and Horticulture* 1 (1983), 181–210.
- Meyer-Abich, K.M., *Praktische Naturphilosophie. Erinnerungen an einen vergessenen Traum* (C. H. Beck, München, 1997).
- Ministry of Food, Agriculture, and Fisheries, *Action Plan II. Developments in Organic Farming*. English summary, Ministry of Food, Agriculture and Fisheries, Danish Directorate for Development, Copenhagen. Available at: http://www.dffe.dk/in_english/index.htm (1999).
- Næss, A., "Identification as a Source of Deep Ecological Attitudes," in M. Tobias (ed.), *Deep Ecology* (Avanti Books, San Diego, 1985).
- Næss, A., *Ecology, Community and Lifestyle* (Cambridge University Press, Cambridge, 1989).
- Niggli, U. and W. Lockeretz, "Development of Research in Organic Agriculture," in T.V. Østergaard (ed.), *Fundamentals of Organic Agriculture*, Proceedings Vol. 1, 11th IFOAM International Scientific Conference August 11–15, Copenhagen (1996), pp. 9–23.
- Odum, E. P., *Ecology and Our Endangered Life-support System* (Sinauer Associates Inc. Publishers, Massachusetts, 1993), pp. 29–30.
- Rasmussen, J., V. Langer, and L. Kristensen, "Økologisk jordbrug er anvendelsesorienteret," *KVL Mosaik* 6(51) (1997), 10–11.
- Roderick, S. and M. Hovi, *Animal Health and Welfare in Organic Livestock Systems: Identification of Constraints and Priorities*. Report to the Ministry of Agriculture, Fisheries and Food (MAFF), VEERU, Department of Agriculture, The University of Reading (1999).
- Röcklinsberg, H., 2001. *Das Seufzende Schwein. Zur Theorie und Praxis in deutschen Modellen zur Tierethik*. Dissertation, Erlangen: Harald Fischer Verlag. 451 pp.
- Rollin, B. E., "Animal Welfare, Science and Value," *Journal of Agricultural and Environmental Ethics* 6 (Suppl. 2) (1993), 44–50.
- Rolston, H. III., *Environmental Ethics. Duties to and Values in the Natural World* (Temple University Press, Philadelphia, 1988), 390 pp.
- Rutgers, B. and R. Heeger, "Inherent Worth and Respect for Animal Integrity," in M. Dol, M. Fentener van Vlissingen, S. Kasanmoentalib, T. Visser, and H. Zwart (eds.), *Recognizing the Intrinsic Value of Animals* (Van Gorcum, Aassen, 1995), pp. 41–51.

- Sandøe, P. and H. B. Simonsen, "Assessing Animal Welfare: Where Does Science end and Philosophy Begin?" *Animal Welfare* 1 (1992), 257–267.
- Schlitt, M., *Umweltethik. Philosophisch-ethische Reflexionen – Theologische Grundlagen – Kriterien* (Ferdinand Schöning, Paderborn, 1992).
- Schmid, O., *Comparison of National and International Livestock Standards*. Presentation, IFOAM Conference Copenhagen (unpublished) (1996).
- Schmid, O., "Comparison of European Organic Livestock Standards with National and International Standards – Problems of Common Standards Development and Future Areas of Interest," in M. Hovie and R. García Trujillo (eds.), *Diversity of Livestock Systems and Definition of Animal Welfare, Proceedings of the 2nd NAHWOA Workshop in Cordoba* (VEERU, University of Reading, Reading, 2000), pp. 63–91.
- Schrader, L., "The Behavior of Farm Animals and Its Significance for Housing Design," in M. Hovi and M. Bouilhol (eds.), *Human – Animal Relationship: Stockmanship and Housing in Organic Livestock Systems. Proceedings of the third NAHWOA Workshop, Clermont-Ferrand, 21–24 October 2000* (VEERU, University of Reading, Reading, 2001), pp. 52–61.
- Singer, P., *Animal Liberation*, 2nd edition (Avon Books, New York, 1990).
- Singer, P., *Practical Ethics*, 2nd edition (Cambridge University Press, Cambridge, 1993).
- Spedding, C., *An Introduction to Agricultural Systems*, 2nd ed. (Elsevier Applied Science, London, 1988).
- Staffeu, F. R., F. J. Grommers, and J. Vorstenbosch, "Animal Welfare: Evolution and Erosion of a Moral Concept," *Animal Welfare* 5 (1996), 225–234.
- Steiner, R., *Landwirtschaftlicher Kursus* (Section for Natural Science of the Antroposophic Society, Dornach, 1929).
- Stenmark, M., *Miljöetik och miljövard [Environmental ethics and environmental conservation]* (Studentlitteratur, Lund, 2000).
- Tannenbaum, J., "Ethics and Animal Welfare: The Inextricable Connection," *JAVMA* 198(8) (1991), 1360–1376.
- Taylor, P., "The Ethics of Respect for Nature," *Environmental Ethics* 3(3) (1981), 197–218.
- Taylor, P., *Respect for Nature. A Theory of Environmental Ethics* (Princeton University Press, Princeton, 1986).
- Thompson, P. B., "The Varieties of Sustainability in Livestock Farming," in Livestock Farming Systems. More than Food Production," in J. T. Sørensen (ed.), *Proc. of the 4th Int. Symposium on Livestock Farming Systems*, EAAP Publication No. 89 (Wageningen Press, Wageningen, 1997), pp. 5–15.
- Thompson, P. B. and A. Nardone, "Sustainable Livestock Production: Methodological and Ethical Challenges," *Livestock Production Science* 61 (1999), 111–119.
- Vaarst, M., S. M. Thamsborg, and E. S. Kristensen, "Animal Health and Welfare Aspects in Organic Dairy Production Systems," in J. Hermansen, V. Lund, and E. Thuen (eds.), *Ecological Animal Husbandry in the Nordic Countries, Proceedings from NJF-seminar No. 303, DARCOF Report No. 2/2000* (2000a), pp. 161–164.
- Vaarst, M., A. Roepstorff, A. Feenestra, P. Høgedal, V. Aa. Larsen, H. B. Lauritsen, and J. E. Hermansen, "Animal Health and Welfare Aspects in Organic Pig Production," in J. Hermansen, V. Lund, and E. Thuen (eds.), *Ecological Animal Husbandry in the Nordic Countries, Proceedings from NJF-seminar No. 303, DARCOF Report No. 2/2000* (2000b), pp. 177–178.
- Vartdal, B. and A. Blekesaune, *Sosiale sider ved økologisk jordbruk. Ein sosiologisk studie av omleggingsprosessen [Social aspects of organic farming. A sociological study of the conversion process]*, Rapport nr. 1/92 (Senter for Bygdeforskning, Trondheim, 1992).

- von Wachenfelt, H., "Grisar som vistas ute, påverkan på mark och miljö" ["Outdoor Pigs, Effects on Soil and Environment"], *Konferens i Ekologiskt Lantbruk* (Alnarp, Sweden, 1999). Proceedings published at www.cul.slu.se, pp. 151–154.
- Warren, M. A., "The Rights of the Non-human World," in R. Elliot and A. Gare (eds.), *Environmental Philosophy: A Collection of Readings* (University of Queensland Press, St. Lucia, 1983), pp. 109–134.
- Wemelsfelder, F. E. A., Hunter M. T. Mendl, and A. B. Lawrence, "The Spontaneous Qualitative Assessment of Behavioural Expressions in Pigs: First Explorations of a Novel Methodology for Integrative Animal Welfare Measurement," *Applied Animal Behaviour Science* 67 (2000), 193–215.
- Vestergaard, K. and L. Hansen, "Tethered versus Loose Sows: Ethological Observations and Measures of Productivity. I. Ethological observations during pregnancy and farrowing," *Ann. Rech. Vet.* 15 (1984), 245–256.
- WIRS (May), <http://www.wirs.aber.ac.uk/research/organic.shtml> (2000).
- Wolf, U., *Das Tier in der Moral* (Klostermann, Frankfurt am Main, 1990).
- Wolf, J.-C., *Tierethik: neue Perspektiven für Menschen und Tiere* (Paulusverlag, Freiburg, Switzerland, 1992).
- Woodward, L., D. Fleming, and H. Vogtman, "Reflections on the Past, Outlook for the Future," in T. V. Østergaard (ed.), *Fundamentals of Organic Agriculture, Proceedings 11th IFOAM Scientific Conference, Copenhagen*, 1 (1996), pp. 259–270.
- Worster, D., *De ekologiska ideernas historia [Nature's Economy: A History of Ecological Ideas]* (SNS Förlag, Stockholm, 1996).
- Wynen, E., "Research Implications of a Paradigm Shift in Agriculture: The Case of Organic Farming," in A. K. Dragun and K. M. Jakobsson (eds.), *Frontiers in Environmental Economics*, Report 119, Department of Economics, Swedish University of Agricultural Sciences, Uppsala (1998).

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THE ETHICAL CONTRACT AS A TOOL IN ORGANIC ANIMAL HUSBANDRY

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ABSTRACT. This article explores what an ethic for organic animal husbandry might look like, departing from the assumption that organic farming is substantially based in ecocentric ethics. We argue that farm animals are necessary functional partners in sustainable agroecosystems. This opens up additional ways to argue for their moral standing. We suggest an ethical contract to be used as a complementary to the ecocentric framework. We expound the content of the contract and end by suggesting how to apply this contract in practice. The contract enjoins us to share the wealth created in the agroecosystem (by our joint contributions) by enjoining us to care for the welfare and needs of the individual animal, and to protect them from exploitation (just as human co-workers should not be exploited). The contract makes promoting good animal welfare a necessary condition for benefiting farm animals. Animals for their part are guaranteed coverage under the contract so long as they continue to contribute to the system with products and services.

KEY WORDS: animal welfare, contract ethics, organic animal husbandry, organic farming, organic livestock production

INTRODUCTION

In 2000, the world market for organic food products netted an estimated US\$17.200 billions in retail sales. If the present demand trend is an accurate reflector, it is likely that we will see a big increase in organic agricultural production (International Trade Centre, 2002). The terms “organic agriculture” and “organic farming” denote farming systems performed according to the IFOAM¹ Basic Standards (IFOAM, 2000). These standards are incarnations of a vision or philosophy of agriculture, and they also provide the framework for national or regional certification bodies (whose requirements may be higher). They have been followed by national and international legislation on organic production. In 1999, the European Union adopted regulations for organic livestock production, (Anon., 1999), and in 2001, FAO adopted a Codex Alimentarius for organic animal husbandry (Schmid, 2002).

¹ IFOAM is the abbreviation for International Federation of Alternative Organic Movements.



However, the development and size of organic livestock production is lagging behind that of plant production, and the animal husbandry standards have developed more slowly. There are several plausible reasons for this, but one might be that the philosophical foundation for organic livestock production is less clear (Lund and Röcklinsberg, 2001; Alrøe et al., 2001; NAHWOA, 2002). In order for organic producers to further develop husbandry practices and meet the increasing demand for organic animal products, there is an urgent need to discuss and develop a philosophy of organic animal agriculture, especially with reference to animal welfare (NAHWOA, 2002). Animal welfare has always been an important issue in organic farming (Niggli and Lockeretz, 1996; Boehncke, 1997). Current organic standards state that a principle aim for organic farming is “to give all livestock conditions of life with due consideration for the basic aspects of their innate behaviour” (IFOAM, 2000, p. 1). As a general principle for animal husbandry, it is further stated “that all management techniques, including those where production levels and speed of growth are concerned, should be directed to the good health and welfare of the animals” (IFOAM, 2000, 5, p. 1). However, the rapid growth in the organic sector has led to increasing competition among different needs and interests within the movement, and animal welfare is but one of many such interests (Lund and Röcklinsberg, 2001). This situation is another reason why the development of a philosophical basis that is coherent with the organic ideals is urgently needed. In this paper, we will suggest and discuss a tentative ethical contract between humans and farm animals, used within an ecocentric framework, as a possible solution.

AIMS AND METHODS

The departure point for this paper is the IFOAM standards. Hence, our concerns in developing a philosophical basis for organic livestock production here is pragmatic in nature: (sustainable) agriculture must be accepted, since it is neither possible nor desirable for mankind to return to the hunter-gatherer stage and let current farmland and farm animals revert to wild nature. Another departure point is that organic animal agriculture is acceptable, if the animals can be granted a good life, considering both the individual animal and the sustainability of the agroecosystem. We will explore what an ethic for organic animal husbandry might look like, departing from the assumption that organic farming is substantially based in ecocentric ethics, and discussing what this means in relation to animal welfare. We will also see why some frequently used animal ethics theories do not work for organic farming, and look at some attempts made to bridge

the gap that is usually perceived to exist between ecocentric ethics and animal welfare ethics. We will then argue that from the perspective of organic farming, farm animals are necessary functional partners in the agroecosystem. We will demonstrate the interconnectedness and interdependence between humans and farm animals, and show that the establishment of a sustainable and productive agroecosystem can be in the interest of both parties. The change in animal status from mere production units to that of partners and co-workers also is related to their moral status and opens up additional ways to argue for their moral standing. We suggest the ethical contract as complementary to the ecocentric framework within which organic farming essentially works, in order to guarantee the animals a good life. Thus, even though the relation is one of unequal power, the ecocentric basis provides enough reciprocity to use the contract as a sensible form for regulating human usage of animals in a responsible way. Briefly, our argument below can be reconstructed as follows:

Premise 1: Organic farming is substantially based in ecocentric ethics.

Premise 2: Agriculture is viewed as an agroecosystem to which farm animals make indispensable contributions, increasing agroecosystem sustainability and productivity.

Premise 3: The creation of a well-functioning agroecosystem is in the interest of both humans and farm animals.

Premise 4: Since farm animals are important partners and co-workers in the sustainable agroecosystem, their moral standing should correspond to their status as agroecological partners.

Premise 5: The relation between the parties in the agroecosystem may be formalized in terms of a contract acknowledging a tacit agreement, stating “duties” and rights of both parties.

Conclusion: Within the ecocentric framework an ethical contract can enjoin us to share the created wealth and care for the welfare/needs of the individual animal, and guarantee that animals are not exploited (just as human co-workers should not be exploited). Animals for their part contribute to the system with products and services.

Following this line of thought we expound the agroecological contract for organic animal husbandry production. This will take the form of normative dicta (or stipulative prescriptions). We end by suggesting how to apply this contract in practice.

PREMISE 1: ORGANIC FARMING IS SUBSTANTIALLY BASED IN ECOCENTRIC ETHICS

From an ethical perspective, theories dealing with questions regarding human-animal and human-nature relations are often roughly divided into four main categories: anthropocentric, sentientistic, biocentric, and ecocentric views. In this article, the use of these terms is related to where focus for moral concern is (according to the proponents). We have defined these as follows: Anthropocentrism is the view that only humans should be the focus of direct moral concern. Sentientism is the view that all and only sentient beings have direct moral status. Biocentrism is the view that all living beings, and only these, have direct moral status, while ecocentrism is the view that in addition to all living beings species, ecosystems, and other relevant features in nature also have direct moral status. This definition does not relate to the question of what has intrinsic value. Something that may be considered as having intrinsic value may not be considered as commanding moral concern (Schlitt, 1992, pp. 52, 170). For example, one might conclude that a great piece of art such as the Mona Lisa has intrinsic value, but one would hardly attribute moral status to it or claim that it has a welfare of its own. Subsequently, an animal may be considered to be the focus of direct moral concern irrespective of discussions related to intrinsic value (Singer, 1993, pp. 105 ff; Wolf, 1990, pp. 69ff).

An initiated discussion of the different categories is provided by Stenmark (2002). He defines ecocentrism in two ways, depending on (at least partly) whether we accept deontological or consequentialist ethic. He also makes a difference between strong and weak ecocentrism, stating that strong ecocentrism is (p. 85):

the view that both ecological wholes (such as species, ecosystems, the land or the biotic community) and the individual members (such as human beings, animals or plants) making up these wholes have a value in themselves but as a rule the ecological wholes have a higher value than that of their individual members (including human beings).

Or

... the view that individual behavior or proposed environmental policies should primarily be judged according to how they affect the well-being of human generations, whether present or future, as well as the well-being of other living beings.

In weak ecocentrism, humans have a higher value than the system in which they live, or alternatively must be more considered than the system (pp. 90–91). This would be the position closest to the organic farming movement.

It can be questioned whether ecocentrism at all can deal with agriculture, since these theories generally expound a preservationist, “hands-

off” ethic that countenances the intrinsic worth of “untamed nature” (Leopold, 1949). Although agriculture is essentially a human enterprise fueled by self-interested stewardship and the need to attain some set optimal production level, organic farming is substantially based in ecocentric ethics (Alrøe et al., 2001; Lund and Röcklinsberg, 2001; Lindholm, 2001; Lund et al., 2002; Lund et al., accepted). It is consistent with the spirit of Leopold’s maxim in that it aims at a non-intrusive and ecologically well-adapted agriculture, i.e., strictly sustainable. Although it is not preservationist in its motivation, since it is after all committed to developing resources, organic agriculturalist not unlike Leopold are also committed to a “No . . . unless” attitude. The primary concern of organic farming is to develop “a viable and sustainable agroecosystem” (IFOAM, 2000, 3, p. 1). Organic agriculturalists “should see agriculture as both part of the larger human biotic community and as an ecosystem in itself” (Thompson, 1995, p. 119). There is clearly some tension between Leopold’s holism and some of the organic aims and practices. However, striving toward an optimal amount of productive transformation of land and livestock for human and animal consumption need not be antithetical to ecocentric ideals (see Thompson, 1995, for a fuller discussion on the relationship between productionism and environmentalism).

Organic Philosophy and Animal Welfare Issues

As mentioned above, Stenmark (2002) points out that the extension of moral standing in strong ecocentrism paradoxically entails that the moral legitimacy of the individual parts becomes depreciated (p. 81). When ecocentric theories are applied, values are assigned to ecological systems, biodiversity, and species, rather than to the individuals in the systems. This makes them less suitable to address animal welfare issues (Sagoff, 1984; Callicott, 1989; Larrère and Larrère, 2000). The ecocentric approach in organic farming is actually open for potential animal welfare problems, for example in relation to the restricted use of anthelmintics and antibiotics (Lund and Röcklinsberg, 2001). Appeals to established moral theories like utilitarian animal ethics and animal rights to anchor animal welfare concerns in organic production systems are also inadequate. The dominating paradigms among Anglo-Saxon animal ethicists have been sentientistic and egalitarian. Such approaches fail to recognize important values inherent in organic as well as traditional agriculture. They fail to appreciate the dynamic interconnectedness and interdependence between the various actors that make up a flourishing agroecological community (Thompson, 1993; Rollin, 1995). And although considering the suffering, welfare needs, and interests of individual animals (Singer, 1975, 1990),

the one-dimensional focus on consideration of interests or minimizing suffering is less suitable for farming. Slaughter is not prohibited *per se* in Singer's utilitarian view, but whether or not it is permissible depends on how one values the interests of the actors involved.² Singer makes a distinction between basic and other needs. Meeting the basic needs of sentient domestic animals is morally obligatory and is species neutral. However, it is very difficult to justify commercial farming from this position. In addition, a preference utilitarian or hedonistic approach does not work well with organic farming, which has a different understanding of pleasure, pain, and suffering (Lund, 2002). In the ecocentric framework, negative experiences are perceived as a natural part of life that can never be completely deleted from an individual animal's spectrum of experiences (Alrøe et al., 2001; Lund and Röcklinsberg, 2001; Lund et al., 2002). This doesn't mean that such experiences are not negative for the individual as they occur but rather that they are viewed as an important part of the functional feedback system connecting individual behavior and the surrounding world. Animal suffering should obviously be avoided in organic farming but, contrary to preference utilitarian and hedonistic theories, this is not the only aim: the animal should also be allowed a natural living. Preference utilitarian and hedonistic utilitarian theories have until recently failed to consider this.

Strong animal rights theories (e.g., Tom Regan's position; Regan, 1983) are also less suitable as a complementary philosophy for organic animal husbandry, since they aim for an egalitarianism that is unrealistic in animal agriculture (Fraser, 1999; Anthony, 2003). Unlike Singer's brand of utilitarianism, the strong animal rights position endeavors to abolish all forms of animal agriculture (Regan, 1983). Hence, by not permitting the use of animals by humans in any situation, the animal rights position is antithetical to animal agriculture of any kind.

Thus, preference utilitarianism and the strong animal rights position are inappropriate to guide organic farming. This is not to say that they do not offer important insights on how animals should be treated. The relationship between these theories and ecocentric ethics has been vigorously debated (see Hargrove, 1992) and several suggestions have been made on how to reconcile the views and how animal welfare considera-

² In a utilitarian view, the interest, e.g., of a human to consume meat must be weighed against the interests of the animal that is going to be slaughtered – maybe this animal has a fractured leg and faces a long and complicated convalescence, which may affect its interest in continuing life, or it could be argued that an animal has no concept of its death and thus does not get its interests violated if painlessly and unknowingly slaughtered.

tions can be argued from an ecocentric position. Most of this debate has concerned wildlife rather than farmed animals, but some philosophers have also considered the latter. The ecocentric philosopher J. B. Callicott first argued that animal liberation and environmental ethics have distinct and incompatible foundations (Callicott, 1980), but later changed his mind and introduced a “nearness principle” stating that humans have a moral right to put family before obligations to more remotely related fellow humans or species, at least if human interests do not pose a threat to the biotic community or the environment. Since farm animals are part of the human mixed community, human obligations also include them (Callicott, 1989).

Holmes Rolston is another ecocentric philosopher concerned with farm animals. He has argued that humans have a moral duty to avoid imposing unnecessary or pointless suffering on these animals. However, he does not give any reasoning for this (Rolston, 1988; Stenmark, 2002). There are also other ecocentric approaches that are open for far reaching animal welfare concerns, e.g., by the German philosopher Meyer-Abich (1997), and the Norwegian philosopher Næss (1985, 1989), who puts forward his deep-ecology thesis. (Deep ecology is usually considered a form of strong ecocentrism and it has, e.g., influenced the Norwegian organic movement.) It is argued that on a deep level, all living beings relate to one another, and the symbiosis between humans and animals on both a mystic and practical level urges humans to handle animals with great respect. These arguments may have a point but are for many people difficult to accept because of their metaphysical approach.

Thus, attempts have been made to include farm animal welfare concerns within the ecocentric framework, however, these are not very well developed. Callicott’s attempt is the most elaborate but still does not provide a strong moral position for farm animals or clear guidelines for daily husbandry practice. In the following, we will show that farm animals are not only part of our mixed community but they are also our partners and co-workers in bringing about a healthy and productive agro-ecosystem, which benefits both them and human communities. Envisioning farm animals as partners serves as a departure point for how we should start to think of our moral relatedness in agricultural systems.

PREMISE 2: AGRICULTURE IS VIEWED AS AN AGROECOSYSTEM

Central to organic farming is the view of agriculture as not primarily an economic enterprise performed by individuals who want to maximize

profit or other benefits, but as an activity that creates and maintains productive and sustainable agroecosystems. An agroecosystem can be characterized as communities of plants and animals interacting with their physical and chemical environments that have been modified by people to produce food, fibers, and other products for human consumption and processing (Altieri, 2002). The aim is not to subdue nature but to create systems that function in harmony with nature. Thus, the principle of organic farming is not to kill pests or to replace synthetic pest control with biological pest control, but to create systems in balance. This includes strengthening the resistance in crops and farm animals rather than killing the pests (hence the term “weed control” is for example used instead of “weed eradication”).

Agroecosystems based on annual crops function as ecosystems arrested in early succession (Soule and Piper, 1992, p. 114). While developing and maintaining agroecosystems for human subsistence, organic agriculturalists intend not to unnecessarily disrupt natural rhythms or constituents. By understanding ecological relationships and processes, the ecosystem is manipulated to improve sustainable production, while trying to minimize negative consequences for the environment, thus avoiding the need for gross amounts of external inputs (Altieri, 1995). As a result, agroecosystems are able to support more humans and farm animals than “wild” nature. According to Pimentel (1989, pp. 118–119) the ecotechnological principles that underlie a productive, sustainable agricultural system are following:

- 1) Adapting and designing the agricultural system to the environment of the region.
- 2) Optimizing the use of biological resources in the agroecosystem. This includes making effective use of biological pest control, green manures, cover crops, agricultural wastes, rotation, and other biological resources.
- 3) Developing strategies that induce minimal changes in the natural ecosystem to protect the environment and minimizing the use of fossil energy in manipulating the agroecosystem.

The goal in organic farming is to design a quilt of agroecosystems within a landscape unit, each mimicking the structure and function of natural ecosystems (Altieri, 2002). IFOAM states, “For a sustainable agroecosystem to function optimally, diversity in crop production and animal husbandry must be arranged in such a way that all the elements of the farming management interplay” (IFOAM, 2000, 3, p. 1). In this perspective, the farmer can be seen as taking on the role of system

manager, whose work is needed to maintain the system at the quasi-equilibrium of an early-successional community. As such, humans are also occupying the rung as top predators.

Although it is possible to create agroecosystems without farm animals, the incorporation of especially herbivores provides essential advantages, improving system stability and productivity (see below). Farm animals can also use marginal lands that otherwise could not be utilized for agricultural purposes. However, in order to create a sustainable agroecosystem the animal component must meet certain demands (Lund, 1998):

- 1) The selection of species and breeds must be adapted to the possible crop production and available resources on the farm and to local agro-climatic conditions.
- 2) The number of animals must be balanced in relation to the possible crop production and available resources on the farm or in the area.
- 3) Rearing systems must be designed to avoid negative impact on the environment (e.g., the use of substances like antibiotics and anthelmintics), and to minimize the use of fossil energy.

a) Farm Animals Make the Agroecosystem More Stable

To achieve the resilience of natural ecosystems, agriculture needs to use local ecosystems as models and take lessons from the interconnections among species and the interdependence of species and their physical environment (Soule and Piper, 1992, p. 124). However, what underlies the stability of ecosystems has been the subject of lengthy debates. One reason is that stability is scale dependent, and human time scales strongly influence what we perceive as stable. However, the concept of ecosystems as a quasi-equilibrium is a useful starting point when discussing agroecology. Species diversity is often cited as a key feature of ecosystem resilience (see Mitchell et al., 2000, pp. 145–146, for a review). It is argued that biodiversity stabilizes community and ecosystem processes (e.g., Tilman, 1996; Naeem and Shibin, 1997), and that resilience to a large extent can come about through higher species and genetic diversity, tight nutrient cycling, and the interdependence of species whose niches complement one another in space and time (e.g., Soule and Piper, 1992, p. 122). Whether or not species diversity is an impartial factor controlling resilience has been discussed. Increased biodiversity³ has been argued to enhance agroecosystem sustainability (Altieri, 1994; Gliessman, 1998). These studies

³ This also includes weeds. For example, it has been shown that barley crops with weeds are more resistant towards aphides than barley in monoculture (Ninkovic, 2002).

suggest that farm animal species have an important role in agroecological systems.

b) Farm Animals Make the Agroecosystem More Productive

Even though high production is not the only goal for organic farming, productivity is essential to any kind of farming. There are indications that productivity increases linearly with species diversity when measured in natural ecosystems and on a regional scale, while on a local scale the relation takes on a 'hump-shape' (Chase and Leibold, 2002). If these findings can be translated into agroecosystem conditions, the inclusion of some farm animal species increases system productivity. In grassland ecosystems, the hypothesis is that a few dominant species suffice to provide the functional diversity that is necessary to explain the level of primary production, although the specific effect of each species is not yet determined (Loreau et al., 2001). The optimal performance of most farming systems is dependent on the level of interactions between the various farm components. System-driving interactions are those where the products or outputs of one component are used in the production of another component, e.g., weeds used as cattle feed, animal manure used as crop fertilizer, etc. (Altieri, 1993, p. 9). Both in natural ecosystems and agroecosystems, animals fill niches that otherwise would not be utilized. Practical research has shown that organic agroecosystems including herbivores are more productive than those lacking such animals (Ivarsson et al., 2001).

Farm animals have an important role in processing biomass and recycling nutrients (Altieri, 1991). Herbivores have an important ecological niche, since they can process leguminous plants that are the backbone in organic crop production due to their ability to fix nitrogen. Leguminous plants should make up about one third of the organic crop rotation in order to supply enough nitrogen to the following crops. In practice, this means that organic animal production must be based on herbivores (that are fed as such). Monogastric animals such as pigs and poultry require high quality protein in their diets and compete with humans to the extent that they utilize protein sources suitable for direct human consumption. This means that they usually should be given the role of marginal animals in the agroecosystem, to be fed on, e.g., agricultural wastes. They are also justified in the system when they produce useful services, e.g., biological weed or pest control (e.g., Andresen, 2000).

PREMISE 3: THE CREATION OF A WELL-FUNCTIONING
AGROECOSYSTEM IS IN THE INTEREST OF BOTH HUMANS
AND FARM ANIMALS

While advantages to humans are quite obvious, farm animals also benefit from a well-functioning and productive agroecosystem. In addition to more secure access to fodder, this framework also (ideally) provides the farm animal with health care and protection from predators and climatic hardships. The bonding that takes place between individual humans and animals in the system adds a further dimension to the functional relationship. Thus, the creation of a viable agroecosystem (ideally) can be of mutual interest to both humans and farm animals. This may be indicated by the way this co-operation came about. Contrary to the strong anthropocentric view that domestication was imposed by humans on certain species, it has been suggested that it was a two-way process, i.e., some animal species entered domestication because of the advantages the agroecosystem provided them (Budiansky, 1992, 1994; Stricklin, 2001). It should be noted that this does not imply a cognitive process on the part of individual animals, but refers to an evolutionary strategy by a group of animals (see Stricklin, 2001, for a fuller discussion). In any case, the human-farm animal relation can be viewed as a form of symbiosis⁴ (Zeuner, 1963, ch. 2; Bökönyi, 1989; Rollin, 1995) or as incorporating strong symbiotic elements (Jarman et al., 1982, p. 59). This is not unique in nature. Mutualistic and commensal interactions are common amongst other vertebrate species (Boucher et al., 1982; Dickman, 1992). Zeuner (1963, pp. 37–40) points out that symbiotic relations seldom involve equal partners nor are all of them voluntary. But over time, selection favors the efficient, relatively stable, interspecific relationships, rather than the success of individual species (Jarman et al., 1982, p. 58). According to this view, domestication evolved through a form of behavioral co-evolution (even though domestication of the major species probably took place separately and at different times by different processes). Similar theories of development of mutual dependence and co-evolution since the inception of agriculture have been suggested between agricultural plants and humans (Anderson, 1956; Rindos, 1980; Mannion, 1999). Animal husbandry agriculture not only strongly influenced the domesticated animal populations but also the human societies into which they were assimilated (Clutton-Brock, 1981; Meadow, 1998), and it has even

⁴ Symbiosis may be defined as a group of relationships, between organisms of different species, in which both partners benefit in some way from the association, or in which one partner benefits while the other is not affected either favorably or adversely (Jarman et al., 1982).

been suggested that it influenced human identity (Hastorf, 1998). Clutton-Brock describes domestication as a cultural as well as a biological process (1989). The strong interdependence between humans and animals in early agrarian society is clearly reflected in human culture, e.g., the Norse myth of creation, where the first human-like creature is licked free from the ice by the primordial cow Audhumbla and then nourished by milk from her teats. In the organic perception of sustainable agroecosystems, this kind of interdependence still exists.

PREMISE 4: THE MORAL STANDING OF FARM ANIMALS SHOULD CORRESPOND TO THEIR STATUS AS PARTNERS IN THE AGROECOSYSTEM

Domesticated animals have been part of the human community for ten thousands of years. Farm animals have not only been a source of food and labor for humans but also the companions of farming people and, as such, are an important part of a flourishing farming community. In pre-industrial agriculture, both parties shared the same conditions of the agroecosystem. It was a relation based on harsh realities, making both parties better off when co-operating. It is likely that there was a close relation between human and animal in those systems (Ekesbo, 1987; Rollin, 1995). Mutually rewarding interspecies relations and bonding can take place between individual animals and their human caretakers, as demonstrated by animal scientists and psychologists (e.g., Seabrook, 1984; Hemsworth and Coleman, 1998) and pointed out by philosophers and animal ethicists (Midgley, 1983; Rollin, 1995; Röcklinsberg, 2001). The bonding allows humans to relate to the animals with compassion and care and the animals respond to this (as they do to bad treatment). Most likely this bonding has also served as an important incentive for humans to give the individual animal good care.

This long and close relationship between farm animals and humans is often used as evidence that human beings have certain moral responsibilities for the welfare of the animals (e.g., Midgley, 1983; Callicott, 1989; Campbell, 1994): Just as we should care about the humans around us, we should also consider the needs of the animals that are part of our mixed community. When we establish agro-ecosystems with domesticated animals, we accrue responsibilities towards the individual animal, simply due to the nature of this voluntary action. The animals become dependent upon us for their care (Burgess-Jackson, 1999; Varner, 2002). However, our common livelihood is created in co-operation, with necessary contributions from both parties. As discussed previously in this paper,

this is the essence of interdependence: humans cannot do without the farm animals, and they cannot do without us. This is the departure point of the contract.

PREMISE 5: THE RELATION BETWEEN THE PARTNERS IN
THE AGROECOSYSTEM MAY BE FORMALIZED IN TERMS
OF AN ETHICAL CONTRACT

Since farm animals are our partners in the agroecosystem, they should also be granted their fair share of the benefits generated within the system. We suggest the metaphor of an ethical contract as an appropriate means to regulate human-animal relations in organic farming. The contract serves to define responsibilities and duties as well as benefits and rights of both parties. The idea of a contract fits well with the organic practices of standards setting and certification, and a contract should be worked out in detail and put to practical use. It is needed because the ecocentrism in organic farming is not egalitarian but give humans certain priority – the relationship is between partners of unequal power. It is founded on the belief that animal agriculture is morally acceptable only if a mutually beneficial association between human beings and animals prevails. The contract elevates the status of farm animals from mere resource units to partners and obligates us to keep our commitment to them, since it makes human moral obligations explicit. Thus it helps advance the interests of farmed animals while reducing the special advantages human beings have versus the animals: If the symbiosis leans towards parasitism (which means that the scales are heavily tipped in our favor and we have failed to recognize and respect animals' natures, and their contributions to our ends), then we are morally failing in our obligations towards them (Röcklinsberg, 2001). Hence, the contract is essentially a help for us and about how best to acknowledge our relations with farm animals.

Objections Towards Using the Metaphor of a Contract

The organic approach, which recognizes the importance of farm animals and our interdependence, opens up for a stronger moral standing of farm animals than does the communitarian approach. The latter view is basically anthropocentric: some animals are given the favor of being included in the human world. Essentially, in the ecocentric view, this human world is put in perspective: humans are but one of many species in the ecosystem, and human interests do not have self-evident superiority over the interests

of other species.⁵ Ideally, in organic farming, farm animals are not given the casual favor of becoming a (more or less inferior) part of a mixed albeit totally human focused community. Instead they are recognized as important co-workers in the agroecosystem that ultimately supports us all.

The idea of using the metaphor of a contract may be questioned. An ethical contract is usually perceived as being made between fully responsible, rational agents. As such, it is not considered suitable to regulate human relations with animals. Other arguments used against a contractualist ethics (and for generally excluding animals from moral concern) are that animals cannot be expected to pay duties in return (i.e., there is no reciprocity), nor do they have a language (Schlitt, 1992). However, not all persons in the human social contract are rational agents with a language. Larrère and Larrère (2000) point out that even the human social contract remains implicit. Mary Midgley writes that an alternative interpretation of the contract is to let it stand for an ideal area of unspoken trust and agreement (Midgley, 1983, p. 84), and this approach will not rule out farm animals as contractors. There are other kinds of communication than verbal, just as or even more important than the spoken human language. It is the human duty to communicate with each individual animal. Humans as managers and partners have the responsibility to make the effort of understanding animal communication, interpreting animal signals, since it is impossible for animals to use verbal language (Röcklinsberg, 2001).

Certainly there is a problem in that the relation is not between partners of equal power – but at the same time this is why the contract is needed. The fiction of a contract of domestication can be applied between hierarchical societies, as suggested by Larrère and Larrère (2000). Although the relation is essentially one between unequal contributors, both humans and farm animals are equal in the sense that they are members of the agroecological community, and their interdependence will at a closer look turn out to be greater than commonly assumed. Larrère and Larrère also point out that animals can break the contract, which is shown by the feral animals. Another example of animals breaking the contract, or rather attempting to do so, when humans have not fulfilled their part of the contract, is animals that develop stereotypies, that is behavioral disturbances that can be interpreted as a mental escape from unbearable rearing conditions they cannot physically escape.

⁵ As previously mentioned, weak ecocentrism is the most suitable position for the organic farming movement.

Of course, one can ask if it is reasonable to suppose that cows allow their calves to be killed for food or that bulls agree to be castrated. Our view is that the agro-ecosystem is basically beneficial for the animals, providing feed, shelter, and care. Organic animal husbandry is aiming at also allowing them a natural life (including species-specific behavior, feed, and environment), thus reducing stress levels and allowing them positive experiences, not just reducing pain and suffering (Lund, 2002). Actually, the aim is to give the animals better conditions than they would have in nature. As for the cow-calf example: To have the cow focus on the killing is an anthropomorphic approach. Our departure point is that farm animals have no perception of their own death (see also the section on killing below). Thus, the issue from the perspective of the cow is rather the separation between the cow and the calf – when and how this should take place in order to minimize stress. Weaning and separation is a natural process, however, it is a general understanding among organic farmers that current practices are not satisfying with regard to animal welfare since it is too abrupt. Castration is a more difficult issue. The organic standards state that such invasive operations should be avoided. In certain situations, however, derogations may be made, for example when there is a risk that uncastrated bulls may harm each other or other animals or humans. Castration may, however, only take place if care is taken that the animal is not caused suffering. The aim of the contract is to make sure that the animals get their fair share of the benefits generated within the system. Thus, it seems plausible that the farm animals would agree to a contract granting substantial benefits.

The idea of a contract between humans and farmed animals can be found already among classical philosophers, and the idea has frequently reappeared during history. The Epicureans discussed an ethical contract but generally thought that animals should be excluded on the grounds that they cannot reason (Sorabji, 1993, pp. 161–163), while Lucretius in the last century B.C. argued for a contract between humans and animals. He also suggested that animals are eager to be domesticated, by way of protection (Sorabji, 1993, p. 162). Several Epicurean arguments reappeared in Thomas Hobbes contract theory in the 17th century (Hobbes, 1983), and they have also been entertained as a basis for obligations to animals by modern philosophers, e.g., Larrère and Larrère (2000) and Carruthers (1992), of whom the latter dismisses the idea.

Serres (1995) has suggested extending the contract metaphor even further: to make it a natural contract between humans and the planet Earth. Stone (1974) has argued that also features in nature should be considered

“persons” in legal contexts. These thoughts also fit the ecocentric view, however, in this article we limit our ambitions to deal with the vertebrate partners in the agroecosystem.

THE CONTENT OF THE CONTRACT

The ethical contract that we suggest implies that humans must face up to what it means to be part of a mutually beneficial partnership with the farm animals as our ecological co-workers. It begins with the view that sentient farm animals are agroecological partners with needs that matter to them, and thus should count as morally obligating.

We suggest that the contract be based on the following principles:

1. Humans as system managers have the duty to exert justice between humans and animals and beneficence to each individual animal;
2. Farm animals have a “duty” to contribute to the agroecosystem, but a principle of non-maleficence, including respect for species specific needs and behavior, puts limits to what humans can demand from them and to human actions towards them;
3. A precautionary principle in relation to ecosystem impact.

A prerequisite for these principles is an initial statement in the contract that farm animals are not merely agricultural commodities but partners in the agroecosystem, and as such they possess moral significance and consequently exert moral duties from humans. The contract recognizes that farm animals have a good of their own.

1. *Human Duties*

The human duty in relation to farm animals is that of the system-manager: to maintain a sustainable agroecosystem, and within this system guarantee care for the animals that form part of it as co-workers. This means that they should be granted a life *better off* than they would have had in nature. It is also a human obligation to share the wealth created in the agroecosystem with the system co-workers; that is, the animals’ physiological and ethological needs must be fulfilled even though this may imply some burdens to the human community, for example somewhat higher prices on animal produce. We should not use animals or eat them if we are not willing to pay for better management practices.

This means that:

- a) Animal welfare should be implemented based on the organic understanding of this conception, focusing on the animal’s possibility to

have a natural life in terms of species-specific behavior, feed, and environment (Alrøe et al., 2001; Lund and Röcklinsberg, 2001). Each animal should be given the possibility to develop according to its encoded genetic nature (see Fraser et al., 1997). This can be related to the duty to respect the species-specific balance of the creature. Technology must not be imposed on the animals but must be adapted to their physical and behavioral prerequisites. In order to ensure that these requirements are met, policy makers and standards committees should employ expertise such as ethologists and animal welfare scientists when the organic standards are developed and interpreted.

- b) The organic farmer should strive to create “positive health and welfare” for the farm animals. Not only should suffering be prevented but the aim should be to provide a high quality of life.⁶ This also makes a preventive approach to health and welfare problems necessary. Thus, not only should sick animals be given proper care but focus should be on disease prevention. This also avoids the ecocentric conflict between individual welfare and system health inherent, e.g., in antibiotic treatments (see Lund and Röcklinsberg, 2001, for a discussion). Health planning based on evidence-based and ongoing planning are important tools. The use of such health plans, as well as regular updating and reviewing of plans, should be compulsory in each organic herd (NAHWOA, 2002). Also, welfare aspects other than those directly related to health should be included.
- c) It is necessary to develop evaluation schemes to assess health and welfare on organic farms, in order to make the situation on each farm transparent for the farmer, the consumer, as well as the certification body. The evaluation should also include stockpersonship and human-animal interactions. It should not only be used for assessment and ranking but also as a tool for communication between farmer and advisor, veterinarian, or other resource persons, as well as government agents, animal advocates, and consumer oversight committees.
- d) In general, solutions to problems should be viewed from a systems level rather than on an individual level (Alrøe et al., 2001; Lund and Röcklinsberg, 2001). Thus, many welfare issues can be solved through changes, e.g., in breeding goals, farm structure, or consumer

⁶ One practical example of positive welfare concerns the nose ringing of pigs. Although it has not been unequivocally shown that this practice implies suffering on the pig (Studnitz, 2001), it should still not be allowed in organic systems since it prevents the pig from performing a basic behavior.

demands.⁷ In this way solutions can be found that promote both individual and system well-being (“win-win solutions”).

- e) The claim that the wealth created in the agroecosystem must be shared with our animal co-workers means that not only farmers should pay the cost of better animal rearing systems, but society as a whole (including consumers and societal institutions) must contribute, e.g., through research and advisory services aiming at improving animal welfare, or by paying more for animal products (which is already being done for organic products). The argument that animal welfare makes food too expensive must be dismissed with the argument that this is rather a problem of distribution of wealth between humans. The cost of animal welfare friendly production is usually lower than generally thought (Ekesbo and Lund, 1993, 1994), but if it implies costs, these must be accepted. The animals may not be denied their share as agroecological partners.

2. *Limitations to Human Action and Animal “Duties”*

The contract assigns livestock the tentative “duty” (as part of a reciprocal transaction) to contribute to the agroecosystem with services and products. However, there are limits to what can be asked from them and to what humans may do to these animals, and the aim of this principle is rather to spell out these limits: humans must respect the wholeness and completeness of the animal and its capacity to maintain itself independently in an environment suitable to the species. This relates to the principle of non-maleficence, i.e. not causing harm as a *prima facie* principle. (However, that the contract is applied within an ecocentric framework implies that killing of animals, i.e. slaughter, is permissible in order to create a well-functioning ecosystem, as discussed below.)

- a) Physical interferences, other than those for veterinary-medical reasons in order to promote animal health and welfare, cannot be accepted, since this violates the wholeness and completeness of the animal. This is true even if the procedure does not lead to actual suffering. (See Rutgers and Heeger [1995] for a discussion on animal integrity.)
- b) In agroecosystems, livestock breeding becomes the task of the system manager, who must understand the task in terms of *responsibility*, with

⁷ An example of when consumer education would be a good solution to welfare problems is the Danish organic egg production, which has been criticized for unacceptably high mortality rates (Anon., 1995). One of the reasons for this is that Danish consumers seem to believe that organic eggs must be brown. The organic farmers thus chose to have brown layers, in spite of that feather pecking and cannibalism was shown to be more frequent among these compared to white birds.

the goal to obtain good and healthy present and future generations of farm animals while respecting the wholeness and completeness of the animal. Breeding with the only aim of increasing animal production becomes a violation of animal integrity; health and welfare considerations must be included. If the goal is to improve health and welfare, techniques like artificial insemination could to some extent be justified but must be weighed compared to other factors, e.g., the need for animals to perform a certain behavior.

- c) Genetic engineering is not allowed according to organic standards (IFOAM, 2000). It means a direct violation of animal integrity, i.e., the wholeness and completeness of the animal and of the animal as a species. It can generally not be accepted.

3. *The Precautionary Principle*

The precautionary principle gives guidance on how to approach problems and direct future development. The Danish Research Centre for Organic Farming has suggested the precautionary principle as one of three basic normative principles for organic farming, as a means to guide decisions on, e.g., new research, use of new technologies, and development of organic standards. The principle states that action should be taken to prevent harm, even if there is no conclusive scientific evidence that this harm will occur (DARCOF, 2000). Thus, even if one could argue that genetic engineering is acceptable if performed in order to improve animal health and welfare, it would still be ruled out as unacceptable by this principle.

The precautionary principle can also be connected to three core values in organic agriculture suggested by Lund and Röcklinsberg (2001): aim for holistic view, aim for sustainability, and respect for nature. In the ecocentric framework, nature is perceived as providing good models for problem solving and human action (Rolston, 1988, pp. 230–232; Callicott, 1989, pp. 117–127). In agricultural contexts, it advises humans to cooperate with nature, and that any interference should be done with caution. This is commensurate with the IFOAM Basic Standards introduction (2000, p. 1), which states that organic farming systems are “directed towards enhancing natural life cycles rather than suppressing nature.”

THE PROBLEM OF KILLING ANIMALS

From the inflow of solar energy via photosynthesizing plants, the ecosystem every year produces a certain surplus of energy and organic

material. This surplus must be harvested and returned to the natural cycles, be it animals or plants, in order to maintain ecosystem balance. Death is part of natural cycles, and in nature, some animals (usually diseased or otherwise weak individuals) are “harvested” by predators as part of these cycles. An important function of the death that takes place in nature is keeping the population healthy and in balance with its trophic environment.

In ecocentric ethics, killing as such is not a moral problem, unless the animal belongs to a species threatened by extinction⁸ (Stenmark, 2002). Killing of animals can be seen as morally justified in organic farming, since it is a necessary part of a productive and well-functioning agroecosystem, executed by humans taking the role of top predator. The number of animals that can live on an organic farm is limited by the supporting capacity of the plant production on that farm (or on a group of cooperating farms).⁹ Combining respect for the individual animal with the organic perspective on sustainability, one can argue, that the animal is best respected when it can live its full biological lifespan, but the total number of animals cannot exceed the carrying capacity of the ecosystem (Röcklinsberg, 2001).

The winter feed available determines the number of mother animals the farm can carry, and “excess” offspring must be slaughtered in order to keep the agroecosystem in balance. Hence, the ecocentric framework overrules the principles of respecting integrity and non-maleficence, in order to protect agroecosystem sustainability. However, *as long as the animal is alive, contract principles are valid*. This includes that slaughter must be performed in a way minimizing animal stress and other suffering and without anticipation for the animal being killed. Transports to slaughterhouses should preferably be avoided. (Mobile slaughterhouses could be an alternative and should be developed [Benfalk et al., 2002].) Thus, killing should not be taken lightly, but humans should be conscientious systems managers (analogous to wildlife managers or conservationists) in this respect.

Hence, non-instrumental value may be overridden – the “right to life” is not absolute. Organic farming is about balancing obligations toward a variety of entities, and it may not be possible to satisfy certain vital

⁸ Thus, Callicott (1980), advocating an ecocentric view, states: “On the ethical question of what to eat, it [*ecocentrism*] answers, not vegetables instead of animals, but organically as opposed to mechanico-chemically produced food.”

⁹ This is describing the ideal situation, since current organic standards (IFOAM, 2000) accept that up to 50% of the feed can be bought in. However, the general principle is that “all feed shall come from the farm itself or be produced within the region” (IFOAM, 2000, 5.6).

needs through other ways, except by killing certain animals, under certain specified conditions, that is to say, our principles outlined above. Thus, it is not morally forbidden to kill animals in organic animal agriculture.

One of the implications of this view is that the human population should also be encouraged to find its equilibrium. Since humans are not preyed on (nor would like to be), it becomes a human responsibility to keep human population growth on a level where it does not threaten ecosystem stability. The problem of a continuously growing human population and family planning deserves its own discussion and due to its complexity it can't be included in the contract.

MAKING THE AGROECO-CONTRACT WORK

The agroeco-contract aims to regulate the human-animal relationship in practice, while the organic standards are designed to serve the interests of many and sometimes opposing interests, e.g., environmental, social, and animal welfare (Lund and Röcklinsberg, 2001; Alrøe et al., 2001). They have the dual function of providing guaranties to consumers that the production rules have been adhered to as well as giving guidance and advice to the producers on how organic principles are to be applied on the farm. Standards also form the basis for the contract between producer and certification bodies. If there are conflicting interests, animal welfare objectives may well be set aside when interpreting and applying the standards.

Making the agroeco-contract an independent structure from the standards would give it a more independent position and invite fewer compromises with other interests. The aim of the contract is that our duties to farm animals should not be compromised in spite of the ecocentric approach that underlies organic farming, or in competition with other interests. The contract should demand that advice is asked from animal welfare scientists and ethologists when organic standards are created, and special farm animal "representatives" should be appointed to serve on the standards committees. Their task would be to argue for the sake of the animals in the process when standards are constituted and interpreted. They should be given the right to veto suggested standards changes that are likely to violate principles outlined in the contract, and their responsibility would be to no other interests but animal welfare.

As for the farmers, a course should be offered to farmers intending to start or convert to organic livestock production, where basic principles for organic farming and organic animal production are elaborated, as well as

practical issues of importance for animal welfare during conversion and production. At the end of the course, farmers should sign an agroeco-contract, clearly spelling out their responsibilities and duties in relation to the animals in their custody.

However, in spite of the recent gains of animal welfare science, there are still many areas of animal behavior and needs not sufficiently researched as to make us know of what animals prefer. Money should be set aside to finance animal welfare research in issues of particular interest to organic farming systems, for example as a small fee on sold animal produce. Society should also take its responsibility here and contribute with research funding. It is the duty of all of us to give our fellow animal partners a fair share of the wealth generated by their contributions in the agroecosystem, implemented in terms of a good quality of life.

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REFERENCES

- Alrøe, H. F., M. Vaarst, and E. S. Kristensen, "Does Organic Farming Face Distinctive Livestock Welfare Issues? – A Conceptual Analysis," *Journal of Agricultural and Environmental Ethics* 14 (2001), 275–299.
- Altieri, M. A., "How Can We Best Use Biodiversity in Agroecosystems," *Outlook on Agriculture* 20 (1991), 15–23.
- Altieri, M. A., *Crop Protection Strategies for Subsistence Farmers* (Westview Press, Boulder, CO; IT Publications, London, 1993).
- Altieri, M. A., *Biodiversity and Pest Management in Agroecosystems* (Food Products Press, New York, 1994).
- Altieri, M. A., *Agroecology: The Science of Sustainable Agriculture* (Westview Press, Boulder, CO; IT Publications, London, 1995).
- Altieri, M. A., "Agroecology: Principles and Strategies for Designing Sustainable Farming Systems," in N. Uphoff (ed.), *Agroecological Innovations* (Earthscan Pub., London, 2002), pp. 40–46.
- Anderson, E., "Man as Maker of New Plants and Plant Communities," in W. A. Thomas Jr (ed.), *Man's Role in Changing the Face of the Earth* (University of Chicago Press, Chicago, IL, 1956), pp. 363–377.

- Andresen, N., *The Foraging Pig – Resource Utilisation, Interaction, Performance and Behaviour of Pigs in Cropping Systems*. PhD dissertation, Agraria 227, Acta Universitatis Agriculturae Sueciae, 2000.
- Anon., *Udtalelse om økologisk husdyrproduktion [Statement Regarding Organic Livestock Production]* (Det dyreetiske råd, Justitsministeriet, Copenhagen, 1995).
- Anon., “Council Regulation (EC) No 1804/1999 of 19 July 1999 supplementing Regulation (EEC) No 2092/91 on organic production of agricultural products and indications referring thereto on agricultural products and foodstuffs to include livestock production,” *Official Journal L* 222, 24/08/1999 (1999), pp. 0001–0028.
- Anthony, R., *Animals and Their Moral Standing: A Philosophical Examination of the Relationship Between Animal Cognition and Human Obligation*. PhD dissertation, Purdue University, 2003.
- Benfalk, C., M. Edström, Q. Geng, F. Gunnarsson, K. Lindgren, and Å. Nordberg, *Mobila slakterier för nötkreatur och svin [Mobile Slaughter Houses for Cattle and Pigs]*, JTI-rapport Lantbruk & Industri 300 (The Swedish Institute of Agricultural and Environmental Engineering, Uppsala, Sweden, 2002).
- Boehncke, E., “Preventive Strategies as a Health Resource for Organic Farming,” in J. Isart and J. J. Llerena (eds), *Resource Use in Organic Farming. Proceedings of the 3rd ENOF Workshop*, Ancona, Italy, June 5–6 (1997), pp. 25–35.
- Boucher, D. H., S. James, and K. Kesler, “The Ecology of Mutualism,” *Annual Review of Ecology and Systematics* 13 (1982), 31–47.
- Budiansky, S., *The Covenant of the Wild. Why Animals Chose Domestication* (W. Morrow, New York, 1992).
- Budiansky, S., “A Special Relationship: The Coevolution of Human Beings and Domesticated Animals,” *JAVMA* 204(3) (1994), 365–368.
- Burgess-Jackson, K., “Doing Right by our Animal Companions,” *Journal of Ethics* 2 (1998), 159–185.
- Bökönyi, S., “Definitions of Animal Domestication,” in J. Clutton-Brock (ed.), *The Walking Larder, Patterns of Domestication, Pastoralism and Predation* (Unwin Hyman, London/Boston, 1989), pp. 22–27.
- Callicott, J. B., “Animal Liberation: A Triangular Affair,” *Environmental Ethics* 2 (1980), 311–338.
- Callicott, J. B., “Animal Liberation and Environmental Ethics: Back Together Again,” in *In Defense of the Land Ethic* (State University of New York Press, Albany, 1989), pp. 49–59.
- Campbell, M., “Beyond the Terms of the Contract: Mothers and Farmers,” *Journal of Agricultural and Environmental Ethics* 7(2) (1994), 205–220.
- Chase, J. M. and M. A. Leibold, “Spatial Scale Dictates the Productivity-Diversity Relationship,” *Nature* 416 (2002), 427–429.
- Carruthers, P., *The Animals Issue* (Cambridge University Press, Cambridge, 1992).
- Clutton-Brock, J., *Domesticated Animals from Early Times* (Heinemann & British Museum, Natural History, London, 1981).
- Clutton-Brock, J., “Introduction to Domestication,” in J. Clutton-Brock (ed.), *The Walking Larder, Patterns of Domestication, Pastoralism and Predation* (Unwin Hyman, London/Boston, 1989), pp. 7–9.
- DARCOF, *Principles of Organic Farming. Discussion Document prepared for the DARCOF Users Committee* (Danish Research Centre for Organic Farming, Foulum,

- Denmark, 2000). [Available on-line at <http://www.darcof.dk> (Accessed on July 15, 2003).]
- Dickman, C., "Commensal and Mutualistic Interactions Among Terrestrial Vertebrates," *Trends in Ecology and Evolution* 7(6) (1992), 194–197.
- Ekesbo, I., "Animal Health Implications as a Result of Future Livestock and Husbandry Developments," in *Int. Symposium on Bioethics and applied Ethology*, Montreal, Canada (1987).
- Ekesbo, I. and V. Lund, *Svensk djurskyddslagstiftning i EG-perspektiv. Djurhälsomässiga och ekonomiska konsekvenser av svensk djurskyddslagstiftning i förhållande till EG-området* [Swedish Animal Welfare Legislation in a European Union Perspective. Consequences of the Swedish Welfare Legislation for animal health and Production Economy]. Attachment to Swedish Board of Agriculture Report (1993), p. 21.
- Ekesbo, I. and V. Lund, "Different Standards in Animal Welfare Legislation: Consequences for Animal Health and Production Economy," in S. Diesch (ed.), *Proceedings*, 8th Congress of International Society of Animal Hygiene, St. Paul, MN, USA, PA1-PA5. International Society for Animal Hygiene (1994).
- Fraser, D., D. M. Weary, E. A. Pajor, and B. N. Milligan, "A Scientific Conception of Animal Welfare that Reflects Ethical Concerns," *Animal Welfare* 6 (1997), 187–205.
- Fraser, D., "Animal Ethics and Animal Welfare Science: Bridging the Two Cultures," *Applied Animal Behaviour Science* 65 (1999), 171–189.
- Gliessman, S. R., *Agroecology: Ecological Processes in Sustainable Agriculture* (Ann Arbor Press, Ann Arbor, Michigan, 1998).
- Hargrove, E. C. (ed.), *The Animal Rights/Environmental Ethics Debate* (State University of New York Press, Albany, 1992).
- Hastorf, C. A., "The Cultural Life of Early Domestic Plant Use," *Antiquity* 72(278) (1998), 773–782.
- Hemsworth, P. H. and G. J. Coleman, *Human – Livestock Interactions. The Stockperson and the Productivity and Welfare of Intensively Farmed Animals* (CAB International, Bristol, 1998).
- Hobbes, T., *De Cive*, the English Version. (Clarendon Press, Oxford, 1983). First published (in Latin) in 1642.
- IFOAM, *IFOAM Basic Standards* (International Federation of Organic Movements, Tholey-Theley, Germany, 2000). (Also published at: www.ifoam.org/standard/basics.htm)
- International Trade Centre, statistics published at: <http://www.intracen.org/mds/sectors/organic/overview.pdf> (2002).
- Ivarsson, J., A. Gunnarsson, E. Hansson, H. Fogelfors, Ö. Folkesson, A. Lundkvist, and I.-L. Andersson, *Försök med ekologiska och konventionella odlingsformer [Field Trials with Organic and Conventional Cropping Methods] 1987–1998*, Swedish University of Agricultural Sciences, Meddelande från Södra jordbruksförsöks-distriktet 53/2001 (SLU, Alnarp, 2001).
- Jarman, M. R., G. M. Baily, and H. N. Jarman, *Early European Agriculture* (Cambridge University Press, Cambridge, 1982), pp. 58–59.
- Larrère, C. and R. Larrère, "Animal Rearing as a Contract?" *Journal of Agricultural and Environmental Ethics* 12 (2000), 51–58.
- Leopold, A., *A Sand County Almanac* (Oxford University Press, London, 1949).
- Loreau, M., S. Naeem, P. Inchausti, J. Bengtsson, J. P. Grime, A. Hector, D. U. Hooper, M. A. Huston, D. Raffaelli, B. Schmid, D. Tilman, and D. A. Wardle, "Biodiversity and

- Ecosystem Functioning: Current Knowledge and Future Challenges,” *Science* 294(26) (October 2001), 804–808.
- Lund, V., “Ekologisk djurhållning [Organic Animal Husbandry],” in A. Gransted, H. Bovin, K.-Å. Brorsson, V. Lund, and Å. Rölin (eds.), *Ekologiskt lantbruk – fördjupning [Organic Farming – Advanced Studies]* (Natur och kultur/LT, Stockholm, 1998), pp. 97–112.
- Lund, V., *Ethics and Animal Welfare – an Interdisciplinary Approach*, Acta Universitatis Agriculturae Sueciae, Veterinaria 137, PhD dissertation (2002).
- Lund, V. and H. Röcklinsberg, “Outlining a Conception of Animal Welfare for Organic Farming Systems,” *Journal of Agricultural and Environmental Ethics* 14(4) (2001), 391–424.
- Lund, V., S. Hemlin, and W. Lockeretz, “Organic Livestock Production as Viewed by Swedish Farmers and Organic Initiators,” *Agriculture and Human Values* 19(3) (2002), 255–268.
- Lund, V., S. Hemlin, and J. White, “Ethics and Natural Behavior – Swedish Organic Farmers’ View on Animal Issues,” *Journal of Agricultural and Environmental Ethics*, accepted for publication.
- Lindholm, S., *Helhet och mångfald. Det ekologiska lantbrukets bärande idéer i relation till miljöetisk teori [Entirety and Manifoldness. The Basic Ideas of Organic Farming in Relation to Environmental Ethics]*, Acta Universitatis Agriculturae Sueciae, Agraria 272. PhD dissertation, Uppsala, Sweden (2001).
- Mannion, A. M., “Domestication and the Origins of Agriculture: An Appraisal,” *Progress in Physical Geography* 23(1) (1999), 37–56.
- Meyer-Abich, K. M., *Praktische Naturphilosophie. Erinnerungen an einen vergessenen Traum* (C. H. Beck, München, 1997).
- Meadow, R. H., “Osteological Evidence for the Process of Animal Domestication,” in J. Clutton-Brock (ed.), *The Walking Larder, Patterns of Domestication, Pastoralism and Predation* (Unwin Hyman, London/Boston, 1989), pp. 81–90.
- Midgley, M., *Animals and Why They Matter* (University of Georgia Press, Athens, Georgia, 1983).
- Mitchell, R. J., M. H. D. Mauld, M. G. Le Duc, and R. H. Marrs, “Ecosystem Stability and Resilience: A Review of Their Relevance for the Conservation Management of Lowland Heaths,” *Perspectives in Plant Ecology, Evolution and Systematics* 3(2) (2000), 142–160.
- NAHWOA, 2002. *Final Recommendations and Comments*. Report to the European Union. Network for Animal Health and Welfare in Organic Agriculture, Final report from FAIR CT 4405. To be found at: <http://www.veeru.reading.ac.uk/organic/NAHWOAConclusionsFinal.pdf>
- Naeem, S. and L. Shibin, “Biodiversity Enhances Ecosystem Reliability,” *Nature* 390 (1997), 507–509.
- Næss, A., “Identification as a Source of Deep Ecological Attitudes,” in M. Tobias (ed.), *Deep Ecology* (Avanti Books, San Diego, 1985).
- Næss, A., *Ecology, Community and Lifestyle* (Cambridge University Press, Cambridge, 1989).
- Niggli, U. and W. Lockeretz, “Development of Research in Organic Agriculture,” in T. V. Østergaard, (ed.), *Fundamentals of Organic Agriculture. Proceedings*, Vol. 1, 11th IFOAM International Scientific Conference, 11–15 August, Copenhagen (1996), pp. 9–23.

- Ninkovic, V., *Plant Volatiles Mediate Tritrophic Interactions. Barley, Aphids and Ladybirds*. PhD dissertation, Uppsala (2002).
- Pimentel, D., "Agriculture and Ecotechnology," in W. J. Mitsch and S. E. Jørgensen (eds.), *Ecological Engineering: An Introduction to Ecotechnology* (Wiley, New York, 1989), pp. 103–125.
- Regan, T., *A Case for Animal Rights* (University of California Press, Los Angeles, Berkeley, 1983).
- Rindos, D., "Symbiosis, Instability and the Origins and Spread of Agriculture: A New Model," *Current Anthropology* 21(6) (1980), 751–772.
- Rollin, B., *Farm Animal Welfare* (Iowa State University Press, Ames, IO, 1995), pp. 3–26.
- Rolston, H. III., *Environmental Ethics. Duties to and Values in the Natural World* (Temple University Press, Philadelphia, 1988), 390 pp.
- Rutgers, B. and R. Heeger, "Inherent Worth and Respect for Animal Integrity," in M. Dol, M. Fentener van Vlissingen, S. Kasanmoentalib, T. Visser, and H. Zwart (eds.), *Recognizing the Intrinsic Value of Animals* (Van Gorcum, Aassen, 1995), pp. 41–51.
- Röcklinsberg, H., *Das seufzende Schwein. Zur Theorie und Praxis in Deutschen Modellen zur Tierethik*. PhD dissertation, Harald Fischer Verlag, Erlangen (2001).
- Sagoff, M., "Animal Liberation and Environmental Ethics: Bad Marriage, Quick Divorce," *Osgoode Hall Law Journal* 22 (1984), 297–307.
- Schlitt, M., *Umweltethik. Philosophisch-ethische Reflexionen – Theologische Grundlagen – Kriterien* (Ferdinand Schöningh, Paderborn, 1992).
- Schmid, O., "Comparison of EU Regulation 2092/91, Codex Alimentarius Guidelines for Organically Produced Food 1999/2001, and IFOAM Basic Standards 2000," in G. Rundgren and W. Lockeretz (eds.), *Reader, IFOAM Conference on Organic Guarantee Systems; International Harmonisation and Equivalence in Organic Agriculture*, Nuremberg, Germany, 17–19 February. IFOAM, Tholey-Theley, Germany (2002), pp. 12–18.
- Seabrook, M. F., "The psychological Interaction between the Stockman and His Animals and Its Influence on Performance of Pigs and Dairy Cows," *Veterinary Record* 115 (1984), 84–87.
- Serres, M., *The Natural Contract* (The University of Michigan Press, Ann Arbor, Michigan, 1995).
- Singer, P., *Animal Liberation* (Avon Books, New York, 1975).
- Singer, P., *Animal Liberation*, 2nd edn. (Avon Books, New York, 1990).
- Singer, P., *Practical Ethics*, 2nd edn. (Cambridge University Press, Cambridge, 1993).
- Sorabji, R., *Animal Minds and Human Morals* (Cornell University Press, Ithaca, New York, 1993).
- Soule, J. and J. K. Piper, *Farming in Nature's Image. An Ecological Approach to Agriculture* (Island Press, Washington DC/Covelo, California, 1992).
- Stenmark, M., *Environmental Ethics and Policy Making* (Ashgate, Aldershot, Burlington, VT, 2002).
- Stricklin, R., "The Evolution and Domestication of Social Behavior," in L. J. Keeling and H. W. Gonyou (eds.), *Social Behavior in Farm Animals* (Cabi Pub., London/New York, 2001).
- Stone, C. D., *Should Trees have Standing? Toward Legal Rights for Natural Objects* (W. Kaufmann, Los Altos, California, 1974).
- Studnitz, M., *Tryneringsnings betydning for udegående poltes adfærd og velfærd [The Effect of Nose Ringing on Behaviour and Welfare in Sows]*. PhD dissertation, Depart-

- ment of Animal Health and Welfare, The Royal Veterinary and Agricultural University, Copenhagen (2001).
- Thompson, P. B., "Animals in the Agrarian Ideal," *Journal of Agricultural and Environmental Ethics* 6(Supplement) (1993), 36–49.
- Thompson, P. B., *Spirit of the Soil: Agriculture and Environmental Ethics* (Routledge, London, 1995).
- Tilman, D., "Biodiversity: Populations versus Ecosystem Stability," *Ecology* 77(2) (1996), 350–363.
- Varner, G., "Pets, Companion Animals, and other Domestic Partners," in E. Bernatar (ed.), *Ethics for Everyday* (McGraw-Hill, New York, 2002), pp. 450–475.
- Wolf, U., *Das Tier in der Moral* (Frankfurt am Main Klostermann, 1990).
- Zeuner, F. E., *A History of Domesticated Animals* (Hutchinson, London, 1963), pp. 36–64.

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Research on animal health and welfare in organic farming—a literature review

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Abstract

Organic standards aim at good livestock health and welfare. A literature search on organic animal health and welfare was performed in October–November 2001 to investigate how well these aims compare with reality, and to see what areas have been researched. The search also made it apparent that national and historical differences in organic standards and in the way organic farming is understood must be considered when comparing results from different studies. The reasons for this are further discussed. Only 22 peer-reviewed papers were found in the search, mainly dealing with dairy cattle health and parasitology. Ten were comparative studies. In addition, two overviews were found. No papers focused on welfare issues other than health. The small number of papers published is not surprising in light of the development of organic farming and its philosophy. For example, organic researchers have been more interested in solving practical problems than publishing papers. However, this makes it impossible to draw general conclusions regarding the health and welfare of organic livestock. None of the published articles found indications that health and welfare are worse in organic than in conventional livestock farming, with the exception of parasite-related diseases. A cautious conclusion based on this material is that except for parasite-related diseases, health and welfare in organic herds are the same as or better than in conventional herds.

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1. Introduction

Organic farming is gaining increasing interest from farmers, politicians, and consumers worldwide and especially in Europe. Generally, organic farming aims at creating a sustainable agroecological system

based on local resources. Good animal health and welfare are important parts of such a system (Lund and Röcklinsberg, 2001). This is also recognized by the International Federation of Organic Agricultural Movements (IFOAM), the organization setting the basic standards for what can be labeled as organic (see Fig. 1). These standards are then elaborated into more detailed standards by national or local certification organizations. The EU adopted legislation for organic animal husbandry in 1999 (EC Regulation 1804/99; Anon., 1999).

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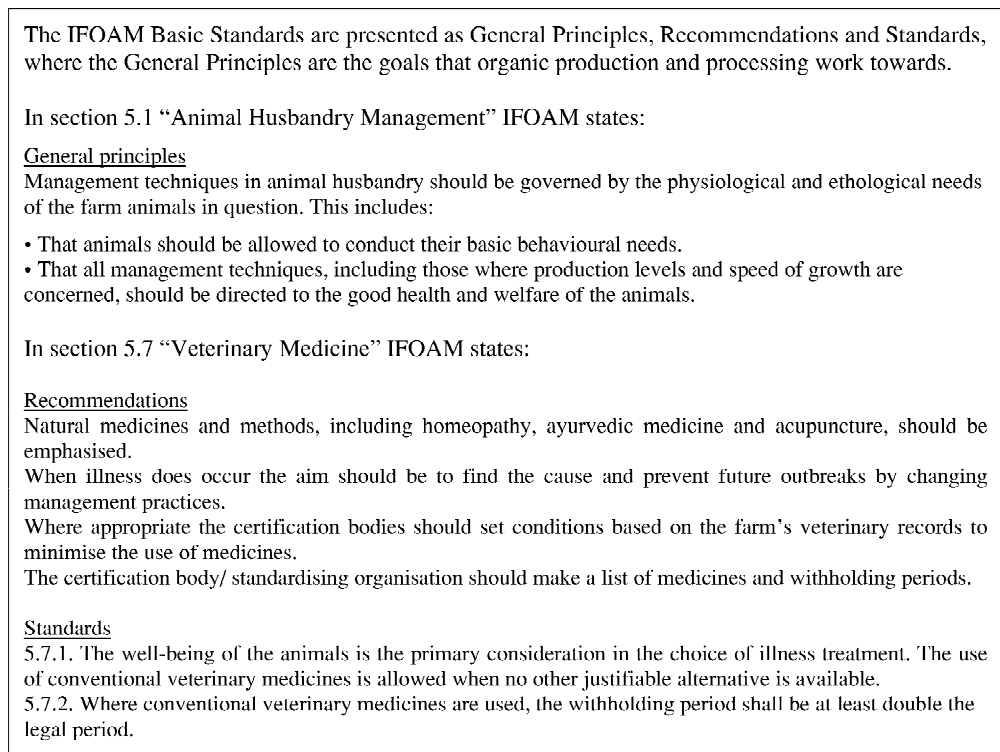


Fig. 1. IFOAM Basic Standards on animal husbandry management and veterinary medicine (IFOAM, 2000).

There was a genuine interest among the pioneers of organic farming in creating livestock systems that better fulfill animal needs than do the industrialized systems in conventional agriculture. Allowing animals their natural behavior has been a focus of these efforts. Animal welfare has also become a marketing argument for organic products, and in several countries consumers perceive organic farming products as more ‘animal friendly’ than conventional products (e.g. Holmberg, 1999; Danish Ministry of Food, Agriculture and Fisheries, 1999). The concepts of animal needs, natural behavior and animal welfare have been discussed in the context of organic farming in Lund and Röcklinsberg (2001); Algers (2001) and Alrøe et al. (2000, 2001).

On the other hand organic animal husbandry has been strongly criticized, e.g. by veterinarians, who have claimed that organic livestock often are not treated properly when sick because of longer withdrawal times prescribed by the organic standards and because alternative medicine (including methods not recognized by science) is preferred (Anon., 1998) (see Fig. 1).

Also, organic livestock production has been criticized because animals have been malnourished and more infected with parasites because of restrictions in administration of anthelmintics prescribed by national certification bodies (e.g. Anon., 1995; Vaarst et al., 2000). For example, the Swedish certification body KRAV states under the heading Health and medical treatment: ‘routine prophylactic treatment with drugs or chemical agents is prohibited’. As pointed out by Lund and Röcklinsberg (2001) there is a conflict in the basic organic ideology between the aim of good individual animal health and welfare versus environmental concerns and food safety. The question is how these conflicts have been solved in practice and what the health and welfare of organic livestock actually is like.

The aim of this paper is to review relevant scientific literature focusing on animal health and welfare in organic farming. We also discuss some background issues that may explain the current research situation and suggest some factors that should be considered when presenting or interpreting results from organic livestock research.

2. Methods

The literature review was performed in October–November 2001. The following databases were searched: Agricola, Agris, Biological Abstracts, CAB Abstracts and ISI databases. The search was limited to literature published since 1991 in English, German, French and the Scandinavian languages. All livestock species were included in the review. The following search words were used and matched with all categories of livestock (beef, dairy, pigs, etc.): (organic or ecological) and (agriculture or farming) and (welfare or disease or health). Only articles published in the peer-reviewed scientific press were included. Also, requests were sent to some key persons (in Denmark, Sweden, Norway, Germany and England), asking if they knew of articles accepted for publication recently. Some of these in turn circulated it within their research departments. Five articles were found that way. However, we have most probably not been able to capture all submitted articles.

3. Results

Only 22 papers were found. Of these, seven deal with parasitology and 13 with health in organic dairy production (other than parasitology); one analyzes slaughter data for cattle, pigs and sheep; one is a questionnaire study of health in organic poultry production. In addition there are two overview papers, one on parasitology and one giving a general overview of health and welfare in organic livestock

systems. No paper focused on aspects of welfare other than health. The earliest articles were published in 1996. All studies but one were performed in Europe (Table 1). Denmark and Sweden have the most published papers dealing with organic livestock farming.

Ten studies compared organic and conventional production. However, most were retrospective cohort studies with relatively small samples, and the analyses were not adjusted for time since conversion.

3.1. Papers on dairy production

Out of 13 articles dealing with dairy production, only five were comparative studies that also included conventional farms. Two of these were done in Norway and two in Denmark.

3.1.1. Comparative studies

One Norwegian study compared the frequencies of mastitis, ketosis and milk fever from 1994 to 1997, analyzing data from the Norwegian Dairy Herd Recording (Hardeng and Edge, 2001). All certified herds in 1994 with more than five cows were included, a total of 31 herds. Three conventional herds, matched on size and region, were randomly selected for each organic herd. Several interesting differences in management and feeding regime between organic and conventional herds also were noted. In conventional husbandry, 75% of the ration (based on energy) consisted of concentrates and silage, whereas in organic feeding these were only about 50% of the ration, while hay, pasture and root

Table 1
Published articles, countries of origin and topics

Country	No. of articles	Topics		
		Dairy	Parasites	Others
Denmark	8	5	3	
Sweden	8	2	4	1 Poultry health 1 Carcass quality
Norway	2	2		
Germany	2	1		1 Overview: animal health and welfare in organic livestock farming
Great Britain	2	2		
Switzerland	1	1		
New Zealand	1		1	
Total	24	13	8	3

crops also were important. In addition to summer grazing, most organic cows exercised outdoors for at least 30 min daily, a practice that is rare in conventional herds. Organic cows were significantly older (mean lactation number was 2.97 compared with 2.35), had a larger proportion of spring calving, and had a lower average yield [4784 compared to 6129 kg energy corrected milk (ECM) per cow per year]. Breed composition was more complex in organic herds, with indigenous breeds more common.

The study demonstrated comparatively better health performance in organic husbandry, particularly in relation to ketosis and mastitis, but also for milk fever (odds ratios were 0.33, 0.38 and 0.60, respectively). There was no marked difference in milk somatic cell count between the organic and conventional herds, which implies that the lower veterinary treatment did not lead to more chronic subclinical mastitis. As for milk fever, the lower maximum milk yield for organic cows explains some of the difference (4.6 kg/day less than in conventional herds).

The other Norwegian study used the same data source but focused on reproductive performance (Reksen et al., 1999). A total of 29 organic and 87 conventional herds were compared over 3 years, from 1994 to 1996. The herds were matched by size and geographical distribution.

Natural breeding was used more in the organic herds, accounting for 19–27% of pregnancies compared with 3–5% in the conventional herds. Annual replacement was 23% in the organic herds compared with 35% in the conventional herds. When adjustments were made for milk yield, breeding season, service and parity, the reproductive efficiency of the organic cows was significantly impaired during the winter compared with the conventional cows. This was because the cows' energy needs could not be met during winter with the feeding regimens used (a maximum of 20% concentrates was used).

The third comparative article is a Danish study of sole disorders in seven organic and six conventional herds with a total of 974 cows, performed from 1991 to 1993 (Vaarst et al., 1998). Herd was a strong risk factor, but no significant differences were found between housing systems or between organic and conventional herds.

Vaarst and Bennedsgaard (2001) discuss results

from three Danish studies that focus on mastitis and use of medication in organic and conventional herds. They report that no significant differences could be found with regard to either incidence of mastitis treatments or somatic cell counts in 27 organic and 57 conventional herds. There was a marked tendency for shorter treatment periods for mastitis on organic farms (1.9 days vs. 3.2 days), although the sample was small (five organic and seven conventional herds). They found no 'specifically organic' treatment patterns among the studied farms. Vaarst and Bennedsgaard stress the importance of co-operation between the farmer and the veterinarian and the need for the latter also to 'convert' his or her thinking to find solutions appropriate to the goals and intentions of the organic farmer as well as to organic farming in general.

A study of the composition of raw milk from sustainable production systems compared 31 organic herds in Sweden with the same number of similar, conventional herds (Toledo et al., 2002). Somatic cell counts were low in both types of herds. Small organic herds had significantly lower cell counts than small conventional herds ($P < 0.05$). Also urea levels were significantly lower on organic farms ($P < 0.001$ and $P < 0.01$ for small and big organic farms compared with similar conventional farms).

3.1.2. Other studies

One of the first published studies that included health in organic herds is a German investigation done in 1992, where 268 organic dairy farmers with at least 10 cows were interviewed regarding feeding and management practices (Krutzinna et al., 1996). A high percentage of these farms completed their conversion only shortly before the investigation. The average milk yield was 4941 kg per cow per year and the average age was 5.7 years, compared with the German average of 5.3 years. (No information was given regarding the average yield of conventional cows.) The longer the farm was run organically, the older the cows were. (Few other comparisons were made with conventional rearing conditions or yields.) The importance of various herd health problems as ranked by the farmers was the same as in conventional agriculture: in descending order, the main problems were mastitis, fertility disorder and hoof diseases. Diseases were treated with various

methods, including conventional medicine (53%). The authors judged that the only area where the organic cows seemed to be in better health was metabolic disorders (ketosis and milk fever).

Two British studies monitored the health situation on organic farms in England and Wales with the aim of determining overall health status. The first was a 2-year study from 1993 to 1995, where animal health records were collected from 11 dairy herds (Weller and Cooper, 1996). The farms were either in the process of converting or had recently converted. Herd size ranged from 42 to 303 cows. The majority of herds had an all-year calving pattern and were housed in either straw-bedded cubicles or covered yards. No major health problems were recorded on the farms. The main health problem was clinical mastitis. Several farms used alternative treatments, but on the majority of farms antibiotics were used to treat the more severe cases. The authors estimated the recorded number of cases of lameness and ketosis to be relatively low.

The second British study was performed in 1995–1998 and included ten organic farms that were converted between 1991 and 1996 (Weller and Bowling, 2000). Herd size and other herd conditions were similar to the previous study. Average milk yield ranged from 5000 to 6000 l. Clinical mastitis was found to be the major health problem. The study showed differences between farms in the incidence of specific health problems and also in how diseases were treated; 34.4% of all ailments were treated with alternative remedies. The authors judged the health problems to be similar to or less than on conventional farms.

A study of clinical mastitis in 14 Danish organic dairy herds was performed between 1991 and 1993 (Vaarst et al., 1993; Vaarst and Enevoldsen, 1997). The objective of the study was to obtain a comprehensive description of clinical mastitis cases. However, not much information was given about the farms and no comparisons with conventional herds were made in this study. The latter is also the case in a study performed in 1997 to estimate the prevalence and investigate the etiology of subclinical mastitis in Swiss organic dairy herds (Busato et al., 2000). A random and stratified sample of 152 farms was visited twice during the year. There were big differences among the farms, since some had converted

recently, mainly because government subsidies had been introduced, while others were pioneers sticking firm to organic principles. The average herd had 12.8 cows, which is equal to the Swiss average, but milk production was 16% lower. The authors conclude that there was a high prevalence of subclinical mastitis in these herds. There were especially high prevalences of contagious udder pathogens and high SCC in alpine dairies. Methods of prevention and therapy were mostly based on conventional procedures.

A Synthesis of Knowledge project on dairy cattle health and welfare was carried out in Denmark (Vaarst et al., 2001). Based on qualitative research interviews with veterinarians and agricultural advisors and on focus group interviews with newly converted organic farmers, an expert panel worked to find solutions to problem areas. Problems were related to adjustment to a new and unfamiliar practice, management in general, and inappropriate legislation for organic farming. Mastitis was mentioned as the most severe disease problem among dairy cows both before and after conversion. However, the biggest health and welfare problems were found among organic calves, particularly in the areas of group housing and grazing.

In Sweden, 26 organic dairy herds were studied for 1 year (Hamilton et al., 2002). Herds ranged in size from 12 to 64 cows and milk production from 3772 to 10 334 kg ECM per cow per year. Calves did not seem to be a big problem in these herds; they were in good condition in all but four herds, and young stock were in good shape and had good housing in all but six herds. No cows were found with symptoms of metabolic disorders. Body condition scores were adequate or good, except in two herds. Only sporadic cases of increased levels of acetone were found in the milk. Incidences of diseases treated by veterinarians were lower in these organic herds compared with the average in the local dairy association. The authors conclude that a good standard of health and welfare can be achieved in organic dairy herds.

3.2. *Papers on parasitology*

Seven studies deal with parasitological aspects of animal health. They cover several types of pro-

duction (poultry, sheep, sheep/beef and dairy). In addition there is an article giving an overview of the current situation and future prospects (Table 2).

3.2.1. Prevalence studies

Four studies looked at prevalence of parasites in organic herds (cattle, pigs, poultry and sheep).

Table 2
Overview of articles dealing with parasitological aspects of organic livestock production

Authors, year of publication	Country, year when study took place	Type of production	Description of study	Comparative study
Carstensen et al., 2002	Denmark 1999	Pigs	Prevalence of pig ectoparasites and sampling of parasite egg/larvae in pasture and pig feces in nine organic herds. Five visits per farm during March to October 1999	No
Dimander et al., 2000	Sweden 1997–98	Cattle	Grazing experiment over two seasons with young cattle on seminatural pasture lands Animals were infected with trichostrongylid larvae at turnout. Comparisons were made between groups that were either untreated and set-stocked, ivermectin bolus treated and set-stocked or untreated but moved in mid-July to ungrazed pasture	Yes
Höglund et al., 2001	Sweden 1997–98	Cattle	Status of internal parasitism on 15 organic cattle enterprises and evaluation of some management practices for parasite control Faecal samples and blood samples were analyzed Weight was recorded for first- and second-grazing season cattle	No
Lindqvist et al., 2001	Sweden 1997–99	Sheep	Prevalence of nematode infections. Fecal samples from 152 organic flocks: in each eight individuals were sampled according to a schedule	No
Niezen et al., 1996	New Zealand 1989–92	Sheep and cattle	On farm-study: control of parasites through integrated grazing management and breeding for resistance. Two studies are reported: A 3-year comparative study on a research farm in 'hill country' split into two identical units (organic and conventional). Extensive production A 2-year study on an organic research farm in the lowlands. Intensive production	Yes No
Permin et al., 1999	Denmark 1994–95	Hens	Prevalence of helminths 268 hens from 16 flocks/4 rearing systems studied during 1 year Examination of the trachea and gastrointestinal tract of each bird	Yes
Svensson et al., 2000	Sweden 1997	Dairy	Questionnaire study comparing methods of parasite control in organic and conventional herds 162 organic and 162 conventional farms (response rates: 84% and 72%)	Yes
Thamsborg et al., 1999	(Denmark)	Overview, all species	Literature study; discusses the possibilities for coping with parasites in organic rearing systems	

Results obtained by Höglund et al. (2001) indicate that dictyocaulosis is a problem in organic dairy herds in Sweden. Carstensen et al. (2002) found organic pigs had higher infection rates with helminth parasites compared to sows and pigs housed indoor in intensive systems (comparisons were made with a study by Roepstorff et al., 1998). Organic pigs were infected with *Ascaris suum* (28% of weaners, 33% of fatteners and 4% of sows), *Trichuris suis* (4% of weaners, 13% of fatteners, <1% of sows) and *Oesophagostomum* spp. (5% of weaners, 14% of fatteners, 20% of sows). No infections with *Hyostrogylus rubidus*, *Metastrongylus* spp. or *Strongyloides ransomi* were found in spite of fears that these species would increase as a result of the outdoor rearing. Results may reflect that a majority of herds had had outdoor pigs for only a few years. However, the prevalences were generally lower than those found in Danish organic farms surveyed in 1990 and 1991 (Roepstorff et al., 1992). The authors interpret this as due to better pasture rotation and improved hygiene in the housing of sows and piglets, in addition to better buildings in general. Single herd cases of exceptionally high infection levels could be explained by inexpedient management routines or by long time of recurrent use of the pasture for grazing pigs. No lice or scab were found on pigs.

Permin et al. (1999) compared the prevalence of gastrointestinal helminths among Danish poultry production systems. The study included broiler parent stock, commercial table egg production, and backyard chickens. The table egg production included three different systems: battery cage, deep-litter, and free range/organic. There was a higher risk of helminth infection in the free range/organic and backyard systems, but the prevalence also could be high in deep-litter systems. In the battery cage and broiler parent systems, helminths were rarely found.

Lindqvist et al. (2001) studied the prevalence of nematode infections in organically raised sheep in Sweden. They also studied management practices to relate them to parasite infections. A high proportion of flocks were infected with nematodes. Clinical outbreaks in lambs were highly dependent on egg output from the ewes. Even though infections of ewes could be considered moderate, the authors

point out the risk that the infections will cause the parasite population to build up, which would significantly affect lamb growth. Lambs turned out onto permanent pastures showed higher counts of fecal nematode eggs than lambs that had grazed on pastures that had not carried sheep the previous year, even if the ewes were treated with anthelmintics before turnout.

3.2.2. Research on management strategies

Niezen et al. (1996) reported on 3 years of practical experience with lamb and cattle production without anthelmintics on two New Zealand research farms. In both farms, the switch to organic production caused only slight production losses. Acceptable productivity could be achieved more easily in sheep than in cattle. The authors were cautiously optimistic regarding the possibilities for developing future production systems that can insure farmers reliable economic returns comparable to those from conventional production. They ask for an integrated effort from parasitologists, plant breeders, nutritionists and systems researchers to find alternatives to current chemical methods for parasite control.

A Swedish questionnaire study compared methods and the magnitude of parasitic infections in dairy production (Svensson et al., 2000). Organic farmers had a greater awareness of various worm control strategies. They combined two or more grazing management strategies significantly more often (on average 2.4 different strategies compared to 1.0 for conventional farmers) but still seemed to have greater problems with parasite infections than did conventional farmers. Of the conventional farmers, 58% reported that they treated their animals prophylactically, mainly with controlled-release intra-ruminal devices. The most common prophylactic procedure on organic farms was to turn calves out on pastures not grazed by any cattle in the current or previous grazing season. This method was used on 40% of the organic farms, but on only 3% of the conventional farms. However, Höglund et al. (2001) concluded from a study of 15 Swedish organic dairy herds that good management—such as usage of parasite safe pastures and supplementary feeding—may help control gastrointestinal parasites. Dimander et al. (2000) found that early season grazing by untreated young

cattle resulted in sufficient overwintered trichostongylidae larvae at the start of the following year to reduce live weight gain in young cattle grazing that year.

3.3. Other papers

3.3.1. Poultry

Berg (2001) sent out a qualitative questionnaire during spring 2000 to all Swedish organic egg producers. Of the 115 producers 49% returned the questionnaire. It was concluded that most of the health and welfare problems seen in conventional poultry systems with loose-housed or free-ranging birds can also be found in organic poultry farms. Organic poultry farmers are often enthusiastic, but sometimes lack basic knowledge. Thus there is a need for information about biosecurity, disease detection, and disease prevention.

3.3.2. Carcass quality

Hansson et al. (2000) compared organic and conventional carcass quality by analyzing all Swedish slaughterhouse statistics from 1997. Meat inspectors from the Swedish National Food Administration register pathological and other findings at a post-mortem inspection of all slaughtered animals. The study involved about 3.9 million conventionally reared pigs, 570 000 cattle and 190 000 sheep, and 3484 organically reared pigs, 4949 cattle and 4997 sheep. There was a significant difference at the postmortem inspection of growing-fattening pigs; 28% of the conventional and 17% of the organic pigs had one or more registered lesions. Ascariasis in the liver was the most common pathological finding in the organic pigs (4.1%). In cattle, 28% of the organic and 27% of the conventional animals had registered abnormalities. Parasitic afflictions were more prevalent in organic herds. Eosinophilic myositis also was significantly more prevalent in organically reared cattle. Cows and heifers from organic herds showed significantly lower incidences of abscesses, arthritis, mastitis, and liver diseases such as lipidosis. Pathological findings in sheep were low both for conventional (10%) and organic (9%) animals. The most common finding in the organic sheep was parasitic infections of the liver (1.7%).

3.3.3. Overviews

Two overviews were found, one dealing with parasites (Thamsborg et al., 1999) and one giving a general overview of animal health and welfare in organic farming systems (Sundrum, 2001). These are considered in the Discussion.

4. Discussion

4.1. Development of organic livestock research

The small number of peer-reviewed articles was disappointing and may seem surprising. It can nevertheless be explained in light of the philosophy and development of organic farming, and this information gives an important background to the current research situation. Four factors are discussed below as relevant in this context: (1) the origin of organic farming as a 'subcultural movement', (2) the focus on practical problem solving in the early research on organic farming, (3) the perceived difficulty in publishing 'organic' results in the scientific press, and (4) the lack of an explicit philosophical basis for the organic animal husbandry.

Organic farming started as a 'subcultural grass root movement' (Christensen, 1998). In the beginning, production methods were developed primarily by the farmers themselves or by a few private research institutions (Niggli and Lockeretz, 1996; Wynen, 1997). Universities have generally been slow to follow the organic trend (Lund, 1996; Wynen, 1998; Beus and Dunlap, 1990, 1991) and there has been reluctance among researchers to become involved in organic agriculture because of the difficulties in gaining recognition within the existing professional infrastructure (Wynen, 1997). This means that few 'career scientists' focused on organic farming. There is also an abundance of anecdotal evidence about the difficulties in receiving research money for organic farming projects in the early days of organic farming. Wynen (1998) describes the situation as a paradigm shift, where in the beginning only a few scientists take the step towards the new theory, and these are usually considered 'nonscientific'. The early organic researchers, on the other hand, were not interested in making up to the scientific system

of the time, and this entailed the use of alternative channels for publishing research results [Boehncke, personal communication].

The fact that almost two thirds of the articles in this study deal with parasitology probably reflects the concern among parasitologists regarding development of resistance in parasites controlled by chemical methods. Organic farming is one of the very few large-scale attempts to avoid the development of resistance.

Organic researchers have so far been more interested in solving acute and practical problems than publishing in the scientific press. Those early researchers who devoted themselves to organic farming generally felt an urgent need to find solutions to the many practical problems faced by organic livestock producers (Höök, 1997), rather than giving high priority to the slow and painstaking process of publishing scientific articles. Big studies including comparisons with conventional production systems have not been perceived as relevant by ‘organic’ researchers (Dlouhý and Nilsson, 1983). One researcher recently commented on the situation: “Why should we spend half of our meager ‘organic’ funding mapping the situation in conventional herds?” [Hovi, personal communication]. Rather, the feeling has been that organic farming should be developed in its own right (Wynen, 1998; Lockeretz and Anderson, 1993).

The early organic scientists claimed it was more difficult to publish articles dealing with organic farming in the established agricultural press (e.g. Youngberg, 1986; MacRae et al., 1989). This is in line with the theory of paradigm shift suggested by Wynen (1998). Two journals for publishing organic farming results¹ were started to counteract this resistance in the established scientific press.

In the early organic farming movement there was outspoken criticism against conventional ‘reductionistic’ science, which was rejected in favor of more ‘holistic’ methods to explore reality (e.g. Howard, 1943, pp. 185–186, 189; Hodges, 1982). This resulted in favoring other types of research methods, e.g. on-farm and qualitative studies and

participatory research, and this contributed to the difficulties of publishing results in established scientific journals. Perhaps it also can explain why so few of the articles found in this review are comparative and work with classical experimental or epidemiological designs or statistics.

Organic animal husbandry has developed slower than organic plant production. The organic movement has developed primarily from environmental concerns, with an early focus on soil fertility and human health. This has meant that it has been more difficult to agree on guidelines for organic livestock production. For example, the EU regulations on organic livestock production came 8 years later than the regulations for plant production (Anon., 1999). Much of the early organic research was done on farms and by farmers, and it was cheaper and easier to experiment with crops than to design livestock trials. As a result, organic livestock research has lagged far behind organic plant and soil management research. At the first IFOAM Scientific Conference, held in 1977, there was only one paper on animals in the entire proceedings volume (Besson and Vogtmann, 1978). The lack of an explicit philosophical basis for the organic animal husbandry has also contributed to hampering development (Lund and Röcklinsberg, 2001).

The situation for organic livestock farming has however changed radically during the past decade. Organic farming has become mainstream, and thus it challenges not only ‘odd thinking’ researchers, and in several European countries there now is governmental research funding earmarked for organic farming. The difference between the organic and conventional epistemological approach has diminished. For example, systems research and qualitative methods are now more widely accepted in ‘conventional’ research. This all means that scientific publication focusing on organic production can be expected to increase significantly in the coming years. As a matter of fact, 10 of the articles in this review were published in 2001 or 2002, and while working on this review we came across another three articles covering organic animal health issues that in November 2001 were submitted for scientific publication. (However, submitted articles were not included in this study.)

¹Biological Agriculture and Horticulture (UK) in 1982, and American Journal of Alternative Agriculture in 1986.

4.2. Evaluation of organic research

During the work with this article it became apparent that evaluation of organic livestock research requires particular considerations, e.g. when evaluating results from comparative studies, one must be cautious of to what extent these reach beyond systems differences and reveal real health differences. For example, treatment or culling criteria may differ between the systems, which may give misleading results in studies with this focus (Vaarst et al., 2001). Another example is systemic management differences that may affect the outcome, e.g. organic farmers must use milk and not milk powder as calf feed, which may affect tank cell count.

Also, to make a proper evaluation of organic research at all possible, certain general data need to be considered. We suggest that information regarding the following should always be provided with any results from organic systems (which is not generally the case in the articles in this literature search): conversion year, time since conversion, country where the study took place and the particular set of standards applied.

Knowing the conversion year of the studied farms is important for several reasons: (1) the organic standards are revised and changed regularly. (The IFOAM Basic Standards are revised every 2 years.)² Thus, it is important to know what practices were or were not allowed during the year(s) of the study, and to consider any implications for livestock health. (2) The general level of development of organic farming practices has changed over time. Especially for organic pigs and poultry, housing and management systems have developed significantly. (3) Organic feedstuffs have become significantly more available in the market, allowing other kinds of diets today. Thus, early results may not be representative of the current situation. (4) The average organic farmer may also have changed over time. Several studies indicate that the type of farmers choosing to be organic has changed from the early, idealistic pioneers who have a profound knowledge of organic 'ideology' (but perhaps have less experience as livestock producers), to farmers who convert mainly

because of current favorable economic conditions for organic farming in several countries (Vartdal and Blekesaune, 1992; Lund et al., 2002). If early pioneers were likely to choose other management solutions than the latecomers, this may systematically affect animal health and welfare.

The time since conversion, i.e. since the studied farm(s) converted to organic farming, must be taken into consideration when evaluating the results, since this influences the knowledge and experience of the organic farmer, which in turn may affect herd health. Also, there is the question of whether the effects of conversion on herd health would have sufficient time to become evident.

The country where the study took place is a key piece of information. In addition to differences that always must be considered when comparing results from different countries, such as climate, farm and herd structures, and economic conditions for livestock production, there also are differences specific to organic farming. The IFOAM Basic Standards are interpreted and applied by national certification bodies. Thus, there are differences among the national standards that may be crucial for animal health. For example, Sweden bans the routine use of anthelmintics, but the neighboring country of Norway does not. In sheep production, this creates a major difference regarding health problems. Another example is the withdrawal period after treatment with allopathic medication, which in Sweden is twice the withdrawal period laid down by the Swedish National Food Administration for respective substance (however, it is at least 2 months and for antibiotics and chemotherapeutics it is 6 months) (KRAV, 2001, 5.4.8–12). In contrast, in Denmark the withdrawal period required by the private certification organization under the Danish Association for Organic Farming (LØJ) is three times the withdrawal period laid down by the Danish Veterinary and Food Administration. This difference may well affect how farmers cope with diseases. The use of alternative treatments may differ between countries. For example, Swedish veterinarians are by law forbidden to use any kind of homeopathy, while in Denmark some homeopathic remedies can be sold only with a veterinary prescription.

The general development and understanding of organic farming also differ among different coun-

²From 2003 revision will take place every 3 years.

tries. Taking the example of Norway and Sweden again, Norwegian organic farmers have been more consistently idealistic, and in part have had a different understanding of organic farming than in Sweden, where tougher economic conditions for agriculture in general have forced organic farmers to become more pragmatic in order to survive. Thus Norwegian organic dairy farmers have used indigenous breeds and have fed less grain and concentrates, and thus have had much lower yields compared with Swedish herds, which may of course affect health records.

4.3. Discussion of papers

The organic philosophy and standards represent a different approach in animal husbandry, and thus open the possibility of a different spectrum of diseases in organic production. Diseases related to abnormal animal behavior (such as tail biting in pigs), extreme production levels, or feeding regimens not adapted to the biology of the animals are probably less likely to be found in organic production, whereas diseases related to outdoor and loose housing/free range production are likely to be more frequent. Also, the longer withdrawal times and greater restrictions on medicine use prescribed in the standards may also affect animal health and welfare, as may different feeding principles (e.g. the ban on synthetic amino acids and vitamins as feed additives). During conversion, problems may appear since the farmer must learn and adjust to new practices (Vaarst et al., 2001). However, it is important to separate expected effects from actual, documented effects. In a recent Danish study, the concern expressed by some veterinarians that clinical diseases are not treated in organic herds was not found in practice in the majority of Danish organic herds (Vaarst et al., 2001). In the current review, the small number of comparative studies makes it impossible to draw general conclusions regarding animal health in organic production systems. There were only eight comparative studies, and the number of farms included in many studies was small. Also, very few studies focus on pigs and poultry, where the biggest differences in housing and management are to be found compared with conventional farming. Also, in many papers insufficient information is

provided regarding conversion years, time since conversion and set of standards used, which also makes it more difficult to draw general conclusions from this material.

The comparatively large number of articles dealing with dairy production can be explained by the fact that this is the major type of organic livestock production. This is partly due to ruminants having a central function in organic farming, since they process the nitrogen-fixing leys necessary in organic crop rotations. But it also is because the differences between organic and conventional methods generally are smaller in dairy production than in pig and poultry production, making it relatively easy for dairy farmers to convert. Only five of the thirteen dairy studies were comparative, and of these the two Norwegian studies analyzed almost the same samples of cows (Hardeng and Edge, 2001; Reksen et al., 1999). A large proportion of these herds were still under conversion or had converted only recently, raising the question of how much the effects of organic management really showed in these herds. A further question is if the registered differences in treatments accurately mirror the difference in disease, or if systemic differences may be affecting the figures.

One comparative study found metabolic disorders (ketosis and milk fever) and mastitis to be less common in organic herds (Hardeng and Edge, 2001), and in one interview study the authors judged metabolic disorders to be the only area where organic cows were in better health (Krutzinna et al., 1996). The low feeding intensity on the Norwegian farms did significantly affect fertility in wintertime, but fertility can hardly be regarded as an indicator of welfare per se.

The two British studies recorded no major health problems in the examined herds (Weller and Cooper, 1996; Weller and Bowling, 2000). With the exception of a Norwegian study (Hardeng and Edge, 2001), mastitis was considered the major health problem in all studies that commented on it. One of the two studies that included dairy calves found that these constituted the biggest welfare problem in organic dairy production (Vaarst et al., 2001). Differences in farmers' awareness in different countries (e.g. depending on the advisory service) could explain some of the differences between the studies.

The parasitological studies revealed a higher prevalence of parasites in organic herds, as could be expected. This was true for pigs (Carstensen et al., 2002), hens (Permin et al., 1999), sheep (Lindqvist et al., 2001), and probably also dairy cattle (Svensson et al., 2000). Also, slaughter statistics show significantly more lesions from parasites in organic sheep, cattle and pig carcasses (Hansson et al., 2000). The animal welfare effects of these parasitic infestations are difficult to judge, however, at least for pigs and poultry [Thamsborg, personal communication]. But parasite infestation can be regarded as a risk factor for animal welfare even though no symptoms show, since a clinical outbreak may occur if, for example, the animal's general condition is impaired for other reasons.

Good management can bring down infections (Dimander et al., 2000; Höglund et al., 2001; Carstensen et al., 2002), and most authors are cautiously optimistic regarding future possibilities for coping with parasites in ways that are acceptable according to the organic standards (Niezen et al., 1996; Thamsborg et al., 1999). Thamsborg et al. (1999) conducted an extensive overview regarding the possibilities for developing methods for parasite control without using anthelmintics. They concluded that the prospects for controlling many nematode infections are good, but more research is needed under practical farming conditions. In a short-to-medium-term perspective, integrated control may combine grazing management with biological control using nematophagous microfungi and selected crops such as tanniferous plants.

A very cautious conclusion regarding animal health in organic systems based on this literature study is that parasite problems tend to be worse but that other health traits tend to be the same or better in organic farming compared with conventional. This is not surprising. As pointed out by Sundrum (2001), the organic standards provide several preconditions for good living conditions of farm animals and for practices aimed at improved welfare and health. However, parasite management is an area of conflicting interests: the aim of not using chemical treatments that may pollute the environment, cause resistance among parasites, and perhaps leave residues in the feed (a question of food safety and consumer confidence) conflicts with the animal wel-

fare aim. The same is true for the use of antibiotics. These conflicts may be solved in the long term, but until then organic farmers and certification organizations should keep a close watch on this problem to avoid serious welfare consequences. Sundrum (2001) suggests the establishment of quality assurance programs, especially since organic farming places stronger demands on the qualifications of the farm management, including the higher risk of failing. Good advisory service and education of farmers are also important (see also Berg, 2001; Vaarst et al., 2001).

Health can be regarded as an important aspect when evaluating welfare (Broom, 1996); however, it is not the only one. For example, Broom has stressed the animal's ability to adapt to and cope with its environment as crucial for animal welfare. The papers found in this review give little information regarding this aspect of welfare. Also, there are no published behavioral studies comparing organic and conventional farms, although natural behavior is central in the organic understanding of animal welfare (Lund and Röcklinsberg, 2001; Alrøe et al., 2001). Of course, there have been many studies of animal behavioral needs, the effects of indoor and outdoor conditions, etc., on conventional farms, but there is a need to study whether or not well-established organic farms offer a better possibility for the animals to fulfil their behavioral needs (including feed that is natural to the species) and still maintain good health.

5. Conclusions

This literature review on organic animal health and welfare yielded only 22 peer-reviewed articles, none of which had a specific focus on behavior or welfare aspects other than health. The small number may be explained in the light of the philosophy and history of organic farming, and scientific publication dealing with organic systems can be expected to increase significantly in the coming years. Information regarding conversion year, time since conversion, country where the study took place and the particular set of standards applied must be provided together with research results. The papers found were mainly dealing with dairy production and

parasitology. Only ten articles were comparative studies of organic and conventional herds. None of the published articles found indications that health is worse in organic than in conventional livestock farming, with the exception of parasite-related diseases. Rather, in other aspects the tendency is that health and welfare in organic herds are the same as or better than in conventional herds. However, there is still lack of substantial evidence to allow general conclusions regarding animal welfare in organic farming.

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References

- Algers, B., 2001. Naturligt beteende som riktlinje i djurhållningen (Natural behavior as a guideline in animal husbandry). In: *Ekologiskt lantbruk*. Conference 13–15 November, Uppsala, Sweden, pp. 124–127, (Also published at: www.cul.se/publik/index.html).
- Alrøe, H.F., Vaarst, M., Kristensen, E.S., 2000. Er husdyrvelferd i økologisk jordbrug noget særligt? (Is animal welfare in organic farming something special). In: Kristensen, E.S., Thamsborg, S.M. (Eds.), *Sundhed, Velfærd Og Medicin anvendelse Ved Omlægning Til Økologisk Mælkeproduktion*. Føjo Report No. 6. Danish Research Centre for Organic Farming, pp. 145–156.
- Alrøe, H.F., Vaarst, M., Kristensen, E.S., 2001. Does organic farming face distinctive livestock welfare issues?—a conceptual analysis. *J. Agr. Environ. Ethics* 14, 275–299.
- Anon., 1995. Udtalelse om økologisk husdyrproduktion. [Statement regarding organic livestock production.] Det dyreetiske råd, Ministry of Justice, Copenhagen.
- Anon., 1998. Editorial. *Dansk veterinærtidsskrift*, 81(9), 337.
- Anon., 1999. Council Regulation (EC) No. 1804/1999 of 19 July 1999 supplementing Regulation (EEC) No. 2092/91 on organic production of agricultural products and indications referring thereto on agricultural products and foodstuffs to include livestock production, Official J. L 222, 24/08/1999, 0001–0028.
- Berg, C., 2001. Health and welfare in organic poultry production. *Acta Vet. Scand.* 42 (4), 37–45.
- Besson, J.-M., Vogtmann, H. (Eds.), 1978. *Towards A Sustainable Agriculture*. Wirz, Aarau.
- Beus, C., Dunlap, R., 1990. Conventional vs. alternative agriculture: the paradigmatic roots of the debate. *Rural Sociol.* 55 (4), 590–616.
- Beus, C., Dunlap, R., 1991. Measuring adherence to alternative vs. conventional agricultural paradigms: a proposed scale. *Rural Sociol.* 56 (3), 432–460.
- Broom, D.M., 1996. Animal welfare defined in terms of attempts to cope with the environment. *Acta Ag. Scand.* 27 (Sect. A, Anim. Sci. Suppl.), 22–28.
- Busato, A., Trachsel, P., Schällibaum, M., Blum, J.W., 2000. Udder health and risk factors for subclinical mastitis in organic dairy farms in Switzerland. *Prev. Vet. Med.* 44, 205–220.
- Carstensen, L., Vaarst, M., Roepstorff, A., 2002. Helminth infections in Danish organic swine herds. *Vet. Parasit.* 106, 253–264.
- Christensen, J., 1998. *Alternativer–Natur–Landbrug (Alternatives–Nature–Agriculture)*. Akademisk Forlag, Viborg.
- Danish Ministry of Food, Agriculture and Fisheries, 1999. Action plan II. Developments in organic farming. English summary. Ministry of Food, Agriculture and Fisheries, Danish Directorate for Development, Copenhagen. Available at: http://www.dffe.dk/in_english/index.htm
- Dimander, S.O., Höglund, J., Spömdly, E., Waller, P.J., 2000. The impact of internal parasites on the productivity of young cattle organically reared on semi-natural pastures in Sweden. *Vet. Parasit.* 90, 271–284.
- Dlouhý, J., Nilsson, G. (Eds.), 1983. *Proceedings International Scientific Colloquium on Comparison between Farming Systems*, Uppsala, March 21–24, Report 63. Swedish University of Agricultural Sciences, Department for plant production.
- Hamilton, C., Hansson, I., Ekman, T., Emanuelson, U., Forslund, K., 2002. Health of cows, calves and young stock on 26 organic dairy herds in Sweden. *Vet. Rec.* 150, 503–508.
- Hansson, I., Hamilton, C., Ekman, T., Forslund, K., 2000. Carcass quality in certified organic production compared with conventional livestock production. *J. Vet. Med. B* 47, 111–120.
- Hardeng, F., Edge, V.L., 2001. Mastitis, ketosis, and milk fever in 31 organic and 93 conventional Norwegian dairy herds. *J. Dairy Sci.* 84, 2673–2679.
- Hodges, R.D., 1982. Agriculture and horticulture; the need for a more biological approach. *Biol. Agric. Hortic.* 1 (1), 1–13.
- Holmberg, H.-E., 1999. *Konsumentundersökning om ekologisk produktion/KRAV* [Consumer survey on organic production/KRAV]. LUI Ref. No. 30-7866, published 99-12-21 and available at: <http://www.krav.se/arkiv/rapporter/luiund.pdf>
- Howard, A., 1943. *An Agricultural Testament*. Oxford University Press, New York and London, Reprinted 1972, Rodale Press.
- Höglund, J., Svensson, C., Hessel, A., 2001. A field survey of the status of internal parasites in calves on organic dairy farms in southwestern Sweden. *Vet. Parasit.* 99, 113–128.
- Höök, K., 1997. *Ecological Agriculture and Horticulture*. Research in Seven European Countries. Report. Swedish Council for Forestry and Agricultural Research, Stockholm.
- IFOAM, 2000. *IFOAM Basic Standards*. International Federation of Organic Movements, Tholey-Theley, (Also published at: www.ifoam.org/standard/basics.htm).

- Krutzinna, C., Boehncke, E., Herrmann, H.-J., 1996. Organic milk production in Germany. *Biol. Agric. Hortic.* 13, 351–358.
- Lindqvist, Å., Ljungström, B., Nilsson, O., Waller, P.J., 2001. The dynamics, prevalence and impact of nematode parasite infections in organically raised sheep in Sweden. *Acta Vet. Scand.* 42 (3), 377–389.
- Lockeretz, W., Anderson, M.D., 1993. *Agricultural Research Alternatives*. University of Nebraska Press, Lincoln, NE and London.
- Lund, V., 1996. Svensk lantbruksforskning—i tiden? (Swedish agricultural research—moving with the times?). *Forskningsnytt om Ökologisk Landbruk i Norden* 3, 1–2.
- Lund, V., Röcklinsberg, H., 2001. Outlining a conception of animal welfare for organic farming systems. *J. Agr. Environ. Ethics* 14 (4), 391–424.
- Lund, V., Hemlin, S., Lockeretz, W., 2002. Organic livestock production as viewed by Swedish farmers and organic initiators. *Agric. Human Values* 19 (3), 255–268.
- MacRae, R.J., Hill, S.B., Henning, J., Mehuys, G.R., 1989. Agricultural science and sustainable agriculture: a review of the existing scientific barriers to sustainable food production and potential solutions. *Biol. Agr. Hortic.* 6, 173–219.
- Niezen, J.H., Charleston, W.A.G., Hodgson, J., Mackay, A.D., Leathwick, D.M., 1996. Controlling internal parasites in grazing ruminants without recourse to anthelmintics: Approaches, experiences and prospects. *Int. J. Parasitol.* 26 (8/9), 983–992.
- Niggli, U., Lockeretz, W., 1996. Development of research in organic agriculture. In: Østergaard, T. (Ed.), *Fundamentals of Organic Agriculture*. IFOAM, Tholey Theley, pp. 9–23.
- Permin, A., Bisgaard, M., Fransen, F., Pearman, M., Nansen, P., Kold, J., 1999. The prevalence of gastrointestinal helminths in different poultry production systems. *Br. Poultry Sci.* 40, 439–443.
- Reksen, O., Tverdal, A., Ropstad, E., 1999. A comparative study of reproductive performance in organic and conventional dairy husbandry. *J. Dairy Sci.* 82 (12), 2605–2610.
- Roepstorff, A., Jørgensen, R.J., Nansen, P., Henriksen, S.A., Pedersen, J.S., Andreasen, M., 1992. *Parasitter Hos Økologiske Svin*. Report Paper from a Project Financed by the Danish Ministry of Agriculture.
- Roepstorff, A., Nilsson, O., Oksanen, A., Gjerde, B., Richter, S.H., Örtenberg, E., Christensson, D., Martinsson, K.B., Bartlett, P.C., Nansen, P., Eriksen, L., Helle, O., Nikander, S., Larsen, K., 1998. Intestinal parasites in the Nordic countries: prevalence and geographical distribution. *Vet. Parasitol.* 2151, 1–11.
- Sundrum, A., 2001. Organic livestock farming. A critical review. *Livest. Prod. Sci.* 67 (3), 207–215.
- Svensson, C., Hessle, A., Höglund, J., 2000. Parasite control methods in organic and conventional dairy herds in Sweden. *Livest. Prod. Sci.* 66, 57–59.
- Thamsborg, S.M., Roepstorff, A., Larsen, M., 1999. Integrated and biological control of parasites in organic and conventional production systems. *Vet. Parasitol.* 84, 169–186.
- Toledo, P., Andrén, A., Björck, L., 2002. Composition of raw milk from sustainable production systems. *Int. Dairy J.* 12, 75–80.
- Vaarst, M., Bennedsgaard, T.W., 2001. Reduced medication in organic farming with emphasis on organic dairy production. *Acta Vet. Scand.* 42 (Suppl. 95), 51–57.
- Vaarst, M., Enevoldsen, C., 1997. Patterns of clinical mastitis manifestations in Danish organic dairy herds. *J. Dairy Res.* 64 (1), 23–37.
- Vaarst, M., Enevoldsen, C., Jakobsen, P., 1993. Reports on diseases in 14 organic farms in Denmark. *Acta Vet. Scand. Suppl.* 89, 143–145.
- Vaarst, M., Hindhede, J., Enevoldsen, C., 1998. Sole disorders in conventionally managed and organic dairy herds using different housing systems. *J. Dairy Res.* 65 (2), 175–186.
- Vaarst, M., Thamsborg, S.M., Kristensen, E.S., 2000. Animal health and welfare aspects in organic dairy production systems. In: Hermansen, J., Lund, V., Thuen, E. (Eds.), *Ecological Animal Husbandry in the Nordic Countries*. Proceedings NJF-seminar 303, pp. 161–164.
- Vaarst, M., Alban, L., Mogensen, L., Thamsborg, S.M., Kristensen, E.S., 2001. Health and welfare in danish dairy cattle in the transition to organic production: problems priorities and perspectives. *J. Agr. Environ. Ethics* 14 (4), 367–390.
- Vartdal, B., Blekesaune, A., 1992. *Sosiale sider ved økologisk jordbruk*. Ein sosiologisk studie av omleggingsprosessen, [Social aspects of organic farming. A sociological study of the conversion process], Senter for Bygdeforskning, Trondheim. Report no. 1/92.
- Weller, R.F., Cooper, A., 1996. Health status of dairy herds converting from conventional to organic dairy farming. *Vet. Rec.* 139, 141–142.
- Weller, R.F., Bowling, P.J., 2000. Health status of dairy herds in organic farming. *Vet. Rec.* 146, 80–81.
- Wynen, E., 1997. Research on Biological Farming Methods in Europe, Perspectives, Status and Requirements. *Biological Farming Research in Europe*. REU Technical Series 54. (Also published at: www.fao.org/regional/europe/Public-e.htm)
- Wynen, E., 1998. Research implications of a paradigm shift in agriculture: the case of organic farming. In: Dragun, A.K., Jakobsson, K.M. (Eds.), *Frontiers in Environmental Economics*. Report 119. Department of Economics, Swedish University of Agricultural Sciences, Uppsala.
- Youngberg, G., 1986. Why another journal? *Am. J. Altern. Agr.* 1 (1), 2.



IN THE FIELD

Organic livestock production as viewed by Swedish farmers and organic initiators

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Abstract. Eleven organic and two conventional Swedish livestock farmers and two initiators (non-farmers who took part in shaping early organic livestock production in Sweden) were interviewed, using a semi-structured method. Respondents were selected through purposive and heterogeneous sampling with regard to conversion year, type of production, and size of farm. Conversion of the animal husbandry took place between 1974 and 2000. All but two had positive attitudes towards organic livestock production and saw it as a way forward for Swedish livestock production, although especially the latecomers did not perceive it as the only alternative. There was a distinct difference in values between the pioneers, who converted their farms early, and those converting later. Pioneer farmers shared the values of the initiators. They expressed a more ecocentric view emphasizing a systemic approach, and displayed a more holistic approach to questions, interpreting them in larger frameworks. They also had a more ecocentric understanding of animal welfare. The later the conversion, the more important the economic reason for conversion appeared to be. Those converting later also tended to have a more superficial relationship to organic principles. However, the farmers also tended to be more influenced by organic values the longer they worked with organic farming.

Key words: Conversion, Ethics, Organic farming, Organic livestock production, Organic values, Qualitative interviews

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Introduction

The last decade has seen a rapid growth in the number of organic farms in Europe, for several reasons. During the 1990s, the organic food sector became one of the most dynamic growth sectors of the international food market, and organic production can be more profitable than conventional (e.g., Anon., 2001; Nordgren, 2001). In several countries, including Sweden, farmers receive subsidies for converting to organic production, producing organically, or both. Sweden is also one of several countries whose governments have stated goals for the proportion of land in organic farming. In 2000, about 11% of Swedish arable land was converted,

and the goal now is to have 20% of land and 10% of dairy cows, beef cattle, and sheep converted by 2005 (Andersson, 2001). The expected growth of the organic food market in Europe in 2000 was about 20–30% per year (Anon., 1999a). This has made new categories of farmers and traders interested in organic production, although they might not be as idealistic or embrace the same values as early organic farmers. Concerns have been raised regarding what this may imply for the future development of organic agriculture (e.g., Woodward et al., 1996; Frischknecht, 2000). The philosophy underlying the organic animal husbandry is not clearly spelled out (Lund and Röcklinsberg, 2001), which may allow changes in aims and policies.

During most of its history, farmers have driven the development of organic farming, but few studies have examined organic farmers' perception of organic agriculture. Most have not reflected organic farming's new status as an alternative of economic interest for farmers, nor have they focused on animal husbandry issues. This study examines values held by farmers with different types of livestock production and different conversion years, relating their values to the organic philosophy.

What is organic farming?

Organic farming has its roots in the late 19th and early 20th century, when several researchers and farmers tried to develop "biological" cropping methods to enhance soil productivity and improve human health without using chemicals (Niggli and Lockeretz, 1996). Farms based on such ideas started to develop in the 1930s. Towards the end of the 1960s a new interest in this type of agriculture was evoked by increasing environmental awareness and the desire for alternative livelihoods in harmony with nature. The organic movement began idealistically, emphasizing environmental protection, humane handling of farm animals, and social justice over making money (Christensen, 1998: 57–67). In 1972, the international umbrella organization International Federation of Organic Agriculture Movements (IFOAM) was founded. In 1980, the first "IFOAM Basic Standards of Organic Agriculture and Food Processing" were issued, and today, labeling of organic products is regulated by legislation and regulations. The European Union adopted legislation for organic plant production in 1991 (EC Regulation 2092/91) and for organic animal husbandry in 1999 (EC Regulation 1804/99). Sweden has two national certification bodies: KRAV, the main one, and Demeterförbundet, which certifies biodynamic production.

Aims

This study aims at examining the values and ethics expressed in their view of organic livestock production by a group of Swedish organic livestock producers and initiators, along with two conventional farmers, in particular whether those who became organic earlier differ from those who came later. Another aim is to investigate how their values correspond to those expressed in the organic standards (IFOAM, 2000; KRAV, 2001). This information will illuminate the previous and future development of organic farming and help to achieve the conversion goals set by the Swedish government.

The inquiry is exploratory, in that it aims to seek new insights into the farmers' situation and their world view. It also is descriptive, emphasizing qualitative aspects. The interview was chosen as the research tool since it provides a rich and nuanced description, leading to another kind of understanding less available with quantitative methods. If the farmer's choice of production system is related to important personal values, an approach that gives the respondent a possibility to reflect in his/her own words, such as the interview, is preferable to questionnaires. Some authors have seen organic farmers' values as something expressed in daily life rather than clearly conceived (Fostvedt, 1993; Østergaard, 1998: 235–242). However, the pioneers in this study seemed to have reflected over fundamental values more than did the others.

Theory and previous research

There have been several qualitative studies of Nordic organic farmers (Vartdal and Blekesaune, 1992; Fostvedt, 1993; Kaltoft, 1997; Østergaard, 1998; Hult and Andresen, in press; Lindholm, 2001), but none focused on livestock production. Vartdal and Blekesaune (1992) did a sociological study of farmers on 35 Norwegian farms, of which 11 had converted to organic farming, 7 were under conversion, and 17 were intending to convert. They characterized three "archetypes" among the farmers: the anthroposophist,¹ the "ecosoph," and the reformist (Table 1). A similar characterization was made in an anthropological study by Fostvedt (1993). Some farmers in that study were among those studied by Vartdal and Blekesaune. Kaltoft (1997) did a qualitative study involving six organic farmers and one researcher, focusing on their understanding of nature. As a result, she suggested three organic "knowledge paradigms" based on differing views of nature: the biodynamic paradigm, the dominant (although not unambiguous) understanding of nature within the Danish organic movement, and a third suggested as a synthesis of the biodynamic and the dominant paradigm. Østergaard (1998) studied six Norwegian organic farms over three years, focusing on the conversion process, the setting of goals, and their fulfillment through farm management decisions and actions. He found a wide range of motivations, from concern for the environment and nature, food quality, and resource management, to more personal motivations such as the desire for self-realization. He saw conversion as an ambiguous and complex interplay among many personal and social factors, and he pointed to the difficulties in analyzing cause and effect in this interplay (Østergaard, 1998:

69–80). Lindholm (2001) interviewed eight organic farmers and researchers in Sweden. She found that their engagement arose from an interest in environmental issues and an “affection” for nature, social engagement, and a desire for more control over one’s life. Hult and Andresen (in press) interviewed eight Swedish organic and three conventional farmers and their families to explore the underlying reasons for conversion to organic farming.

A large comparative study of organic and conventional farmers in the US Corn Belt in the mid 1970s examined farmers’ motivations, practices, and performance using questionnaires and personal interviews (Wernick and Lockeretz, 1977; Lockeretz and Wernick, 1980). The study found little evidence of organic farmers having the metaphysical or philosophical outlook often associated with organic farming. Rather, in most respects they were closer to conventional farmers than to the stereotypic organic farmer driven by ideological conviction over economic profit. 87% of the respondents had once farmed with conventional methods. In a follow-up questionnaire survey of the same farmers ten years later (Lockeretz and Madden, 1987), philosophical or religious considerations were mentioned less frequently as an advantage of organic farming. In contrast, some agronomic and management disadvantages of organic farming were mentioned more often. Twelve of the 96 respondents who were still farming no longer farmed organically.

On the other hand, in a study of organic and conventional fruit and vegetable growers in Massachusetts (Lockeretz, 1995), the two groups differed in several ways. The organic farmers had entered farming later in life and were older and better educated, and they were strongly committed to organic methods. However, in a follow-up study (Lockeretz, 1997), these personal characteristics were not related to either the characteristics of their farms or their perceptions of the problems and disadvantages of organic methods.

Animal welfare has been a concern of organic farmers from the start (Niggli and Lockeretz, 1996), although environmental concerns are emphasized more. Animal welfare also is important for organic consumers in Scandinavia. Swedish and Danish consumers believe that animal welfare is better in organic than in conventional farming (Anon., 1999b; Holmberg, 1999). A recent Swedish report stated that there is a big potential to increase organic market shares through information and marketing that includes animal welfare and ethics (Szatek, 2001). The report showed that consumers have very high expectations regarding animal welfare in organic farming, including allowing livestock their natural behavior, which is central to the organic interpretation of animal welfare (Lund and Röcklinsberg, 2001).

Methods

Sampling strategy

Respondents were selected through purposive, heterogeneous sampling with regard to:

1. Conversion year
2. Type of production
3. Size of farm

These variables were chosen since they might introduce relevant differences within the sample.

1. Conditions for conversion have changed over time. For example, at first there were no subsidies, and organic farmers often met negative reactions from neighbors and society (Vartdal and Blekesaune, 1992: 59–68; Christensen, 1998: 67). Government subsidies for conversion were introduced in Sweden in 1989, and in 1995, EU support became available for Swedish organic farmers. In the mid 1990s, growing consumer demand made the food industry and several large retail chains support organic production.

2. The challenges vary with production type. Thus, organic production generally differs from conventional by less for ruminants than for monogastric livestock, where substantial development of organic systems is still needed.

3. The problems faced by large farms may be different from those facing small farms, and farm size might influence farmer’s worldview or vice versa.

Advisory officers for organic livestock production in three different counties were asked for a list of farmers “with an interest in discussing animal husbandry issues.” From these lists eleven organic and two conventional livestock farmers (or couples) were selected. These two “potentially organic” farmers had considered converting but decided not to. One was now converting crop production and quitting livestock production, while the other continued with conventional production. Also, two “initiators” (one advisor and one researcher, both hobby farmers) were selected to track what the early visions were like. They participated when the Swedish organic movement first developed a policy for animal husbandry in the 1980s.

Respondents were first contacted by telephone. Two declined and were replaced by two new, matching respondents.

Type of interview, interview guide, and data analysis

Focused, semi-structured interviews were used (Robson, 1993). Interviews (in person, except one by telephone) were done in 2000, except one in March 2001. The interviews lasted between 1-1/2 and

Table 1. Characterization of organic farmers (based on Vartdal and Blekesaune, 1992)

Archetype	Anthroposoph	Ecosoph	Reformist
Type of farming	Biodynamic farming	Organic farming	Organic farming
Basic ideas	Based on anthroposophy, which assigns a special stewardship mission to humans	Environmentally concerned Inter- and intragenerational social justice is important Holistic view	Environmentally concerned
Orientation	Global	Global	Local
Conditions	Cannot imagine farming any other way	Cannot imagine farming any other way	Will continue organic farming only if it pays economically
Social status	Pioneer	Pioneer	Follower

2-1/4 hours. Farmers could choose to be interviewed with their spouses, and four did so. If not specially mentioned, couples are treated as one respondent in the following account. An interview guide was used, covering the following general areas:

- Farm structure and production
- Personal background and relation to farming
- The conversion process and how it was experienced
- The respondent's views on:
 - Principles of organic livestock production
 - Organic compared with conventional livestock production
 - KRAV and EU livestock standards
 - New technology
 - Artificial insemination and genetic technology.

Respondents could partly direct the conversation according to their interests, so that in certain interviews some areas were discussed more thoroughly than others. Interviews were tape recorded and transcribed verbatim. Interviews were analyzed qualitatively, using a two-dimensional, conceptually clustered matrix (Robson, 1993: 390–393) into which interview data were transferred so that they could be analyzed according to themes. Quotations from interviews are used to illustrate a typical attitude or comment from the respondents.

Description of the sample

Farms

Farms varied from 6 to 1000 ha of arable land and pastures, with a median of 144 ha. (Swedish organic farms on the average are larger than conventional farms.) All had at least one of the following types of livestock: dairy; beef; ewes; pigs; laying hens. Except for pig farms, the herds were larger than the Swedish average for that type. Only one farm was

rented, and all but two were basically traditional family farms.

Conversion of livestock production took place from 1974 until 2000. Four respondents started as farmers in the early 1970s; the last started in 1997. Six were conventional longer than they were organic, whereas three were organic from the start and one converted after one year of farming.

Respondents' background and family. The respondents were from 33 to 53 years old. All but one grew up on a farm, and of the farmers, all but two were now farming the family's farm. All but one were married or formerly married and had children.

Males dominated the interviews. In only one case did both spouses participate equally actively during the entire interview, although on four farms both husband and wife worked full-time on the farm. Only one of those farming alone was a woman. Both initiators were males. In the analysis, gender is not considered separately. In the following text all respondents are described as males to preserve anonymity.

Education and job experience. The sample was fairly well-educated, although this is probably also true for the average Swedish farmer. (Surprisingly, we could not find statistics on this.) Only four farmers had no basic agricultural education, while ten (on nine farms, i.e., both spouses on one farm) held agricultural college degrees. Six of these also had advanced agricultural college education. Seven respondents (on six farms) had a five-week distant learning university course in organic agriculture, where they had the opportunity to reflect on the philosophy of organic farming. Seven respondents had vocational education outside agriculture, one of which held a university degree. Eight respondents had less than three years' work experience other than farm work, and only one had spent most of his working life outside agriculture.

Most were active in various farming organizations, conventional or organic. Three respondents (on two

farms) were on the boards of national interest organizations for organic farming, and one was on the KRAV standards committee.

The “pioneers”

In what follows, the three farmers converting to organic farming before 1990 plus the advisor and researcher will collectively be called the “pioneers.” The reason is that they display attitudes towards organic farming similar to those of the organic farming pioneers in the 1970s and early 1980s, as described by Christensen (1998: 57–74). Two of these farmers and the advisor were active in the development of the Swedish organic movement.

Results

General attitude

Farmers answered consistently, except one farmer who sometimes seemed to answer according to what he thought was “correct,” i.e., a social desirability response (Neale and Liebert, 1980: 49).

All respondents but one were positive towards organic farming. The exception was a farmer who was critical in his comments throughout, although when asked, he stated that he liked organic farming. (This farmer was running a conventional farm in parallel.) Also, one of the conventional farmers, although favorably inclined towards organic farming, did not think that organic animal production was better than conventional, especially regarding pigs.

All farmers but one were more enthusiastic about organic farming now compared to when deciding to convert. Several said it was “more exciting every year,” and that they would continue to apply most of the organic standards even if they stopped having their production certified. This was confirmed by one of the conventional farmers:

I would say that quite a few of the people who converted to organic production also have gradually been converted in their thinking. Those who didn’t . . . well, those who originally did it for the money have sort of realized that maybe it wasn’t such a dumb idea. (Dairy farmer)

The farmers’ answers generally were related to their specific type of production. Two pioneer farmers were exceptions in that they were very well-reasoned and had a broad understanding not only of what they were doing and why, but also of agriculture’s general role in society and nature.

Table 2. Reasons for conversion.

Reason	Number of respondents mentioning this reason
Environmental concerns	9
Economic reasons	6
More independence from agribusiness and big companies	6
Market demands	3
Animal welfare	2
Old traditions and traditional values	2
The only conceivable alternative	2
Peace and social progress	1
Organic farming is more future-oriented and optimistic	1

Reasons for conversion

Two of the pioneer farmers said that they could not imagine doing any other type of farming, while with one exception, those converting late expressed a pragmatic rather than an ideological conviction:

I don’t have any deep ideological conviction that this is absolutely the right thing to do. Rather, I am convinced that economically it’s the right thing today. It may not be right forever, but for now it’s good, and I believe it’s the right way to go. (Pig farmer)

The reasons for conversion mentioned by the respondents are shown in Table 2.

Environmental concerns and economic reasons

Only two farmers (both of whom were pioneers) did not mention profitability or the market when explaining their reasons for conversion. However, all but two said they had an interest in environmental issues,² and one said that his interest was a result of working with organic agriculture. Several were members of the Swedish Society for Nature Conservation. But the prospect of better profitability was really what made them move to organic farming. A typical comment was:

Not that I have been actively involved [in environmental issues] . . . but I still think it’s important. So I don’t want to say that we have converted only because of . . . I guess it is a combination of economics and, well, an interest in environmental issues. (Dairy farmer)

The effect of economic rewards is also shown by the increase in conversion of farms when subsidies were introduced.

Organic farming as a new road forward for agriculture

Most respondents were critical of conventional agriculture, but for differing reasons. They saw organic farming as a viable (but not necessarily the only) alternative for agriculture. Many pointed out that profitability in conventional agriculture has not increased despite improved technology and increased use of external inputs:

I usually say I was born on the sprayer, and I really haven't seen the weeds disappear. We just have some different species now. And [...] all these inputs that we've introduced into farming, they haven't really made the farmer's economic situation any better. (Dairy farmer)

One farmer put it frankly: "I don't want to be a tractor driver for Nestlé." Several saw organic farming as an opportunity to sell high quality products to selective consumers at higher prices, and several described it as very inspiring to do something new. They also felt that organic farming was more exciting since it relies more on mastering biology than on technology.

It was a kind of spark, and more things are happening now. It's a new world, with different things to test and to try to come up with. You get to run things yourself and make them work. Before you just had to look things up in tables: if the plants have this many leaves you have to spray with this or that, and you have to put on such-and-such amount of artificial fertilizer to get this big a yield. Yes, it really was damn easy to be a conventional farmer. But back then you were so dependent on chemicals . . . well, those who produce the fertilizers and the pesticides, they're the ones who really run the show and decide how we should produce. [...] In a way, conversion gave a new meaning to what you do. Not just going for the biggest possible yield. (Sheep farmer)

All were convinced that the future of agriculture lies in consumers' hands. Those converting late mentioned consumers' demands as a factor in their decision, and stressed that it was more satisfying to produce something that was in demand.

Organic farming as a way to preserve old traditions and traditional values

The view that organic farming is a way to preserve traditional values was partly supported. To one beef farmer, a main reason for conversion was to develop further the traditional cropping methods he had learned from his grandfather. The connection to old-time farming was also mentioned as something positive in two other interviews, and two additional respondents saw organic farming as a way for small farms to survive.

Animal welfare reasons

One pig producer said his main reason for conversion was that organic farming means better animal welfare. One egg producer said his reason was a combination of animal welfare and environmental concerns.

Influence of others, and personality

Four respondents mentioned relatives as a source of inspiration. Two of them had brothers who were or had been farming organically (including the respondent who mentioned economic reasons as his only motive for conversion).

Several respondents described themselves as headstrong or said they liked facing challenges and raising questions. Not surprisingly, this was especially true for those converting early. The first organic farmers had to be strong believers, since they met strong resistance to their new ideas. But the situation has changed, which was commented on by most respondents:

Today it's all right to be an organic farmer, and many of those who [...] thought it was crazy now are organic. (Sheep farmer)

Today organic is sort of trendy. If you look at all the people who are wildly organic today and think back to what they stood for 20 years ago. . . . Well, you can't really believe that people have changed their attitudes that much, but as a cynic you can believe it was the money that did it . . . (Pioneer)

One farmer was very pleased to recall how the local bank manager had laughed at him when he asked for a loan, but later tried to persuade him to become a customer since he was doing so well economically. The last farmer to convert felt that the authorities and the banks supported that decision, and thought his neighbors were curious rather than critical. But out in the countryside many farmers still were critical:

They think we're nuts. They laugh at us and think that gosh . . . yes. Well . . . I suppose I can be excused

because I'm a woman, so I can keep doing whatever I like. (Pig farmer)

Reasons for not converting

One respondent had chosen not to convert to organic farming, although he felt it "basically must be the right way of farming," for the following reasons:

- Practical circumstances (crops were produced in a partnership where the other owner was not interested in converting).
- No economic gains (conversion required investments and a decrease in herd size).
- Increased bureaucracy (organic certification would add to the already big burden of paperwork imposed by the EU regulations).

The other conventional farmer was converting his crop production but not the livestock, for the following reasons:

- Too much work in relation to economic gains.
- Practical circumstances (soils were not suitable for outdoor pig production).
- Lack of a belief in the organic livestock concept.

This farmer had been very active in the Farmers' Coop organizations and worked hard marketing conventional Swedish pig production, where substantial work was done to improve animal welfare, especially for sows. He could not see that welfare would be improved by rearing pigs outdoors.³ He also conceded that he would feel he was betraying former beliefs if he converted to organic methods. This was pointed out by another respondent as a reason that farmers don't convert:

I think a lot of it is that they feel as though they're being attacked, that they have been wrong all these years. (Dairy farmer)

One organic pig farmer tackled this problem by seeing organic farming as "adding a further dimension" to welfare, and he saw it as an interesting new way of developing his farming business.

Principles of organic livestock production

Asked about the basic principles of organic livestock production, most focused either on natural behavior or naturalness (e.g., "working with nature and not against it" or "producing as naturally as possible") or environmental concerns (e.g., "using local resources and recirculating nutrients," "feed as

well as animals should be produced on the farm," "no foreign substances or poisons should be used") (Table 3). Eight respondents mentioned ethics or animal welfare aspects. One of these (a dairy farmer and latecomer) stated that the farm animal has a certain intrinsic value in organic farming. The farmer who converted for animal welfare reasons saw the main principle as respect for the individual animal:

I think the main point is to respect each individual. You must have respect, because if you are going to raise animals like this to eat them, you have to respect each individual's right to have as good a life as you can possibly provide. I think that is important.

This was also expressed by one of the pioneers (although not as a principle), pointing out that the organic standards make factory farming impossible:

It happens a bit more often in organic farming that we see animals such as hens and pigs as individuals. That they are living beings, they are individuals, they have a soul, they have a zest for life. (Egg producer)

Interestingly, five respondents mentioned the human-animal relationship, and three of these (one pioneer farmer and both initiators) talked about the joy of having a relationship to the animals:

There's this thing about the joy of animal husbandry. To take care of this positive interaction between a farmer who can rear the animals in such a way that he can see that they thrive, well, that means the farmer thrives, too. It doesn't have to be any more complicated than that. (The researcher)

Two mentioned decent economic gains as a principle, and they both related this to animal welfare. Of these one was a pioneer farmer arguing that organic farming must be perceived as a realistic alternative in order to provide a good life to the maximum number of farm animals. The other was a dairy farmer who thought that small farmers had to be able to make a living, since cows were treated better on small holdings.

One pioneer stated that the most important principle was not to have too many principles: "There must be room for freedom, otherwise there won't be any development either." (*Beef farmer*) Pioneers also showed this attitude in other contexts.

The most articulate answer came from the advisor. He recalled a seminar in the early 1980s where principles for organic animal husbandry were stated:

Table 3. Basic principles of organic animal husbandry according to respondents.

Principle	Number of respondents	Number of respondents mentioning principle first
Natural behavior and/or naturalness	12	5
Environmental concerns	11	5
Ethics, animal welfare	8	2
Human-animal relationship	4	0
Economic profit	2	1
Don't know	1	1
As few principles as possible	1	1

- 1) Organic animal husbandry is part of a recycling, resource-efficient system that produces food, quality of life, and other benefits.
- 2) The species' ecological characteristics explain and justify its place in the system.
- 3) The distribution of different species should be based on what is best as far as [the ecosystem's] functioning and resource use.
- 4) Animal health and product quality are indicators of how well the system is working.
- 5) The human role in the system should be humble while still exerting control.

Interestingly, none of these principles mentions animal welfare directly. Also, the advisor did not talk much about animal welfare as such but rather as a spin-off from a well-functioning agroecological system.

One pioneer farmer and the initiators mentioned that since farm animals live in captivity they must be treated well, and two added that their quality of life must be at least as good as if they were living in the wild.

A certain amount of suffering is part of life, – you shouldn't dread it, this physical suffering. But if you shut the animals in and prevent them from fulfilling their natural needs and subject them to psychological suffering, to me that's worse. [...] We don't have the right to subject living beings to more suffering than is natural, I would say. (The researcher)

To one pioneer farmer it was not self-evident that animals should be included in the agroecological system, but if they are, organic farming should work to improve their conditions:

While questioning whether animal husbandry should exist at all, we must continue to take steps to make production more natural, ethical, and proper, so that when we ask the animals, as it were, whether they've had a good life when we finally end it for them, they should say yes, it has been OK – I don't regret that I was born.

Organic vs. conventional livestock production

More than half the farmers felt there was no big difference between organic and conventional livestock production. Surprisingly, these farmers represented all types of production, including pigs and poultry, where differences usually are considered big. The main perceived difference depended largely on the type of farm and corresponded to the hardest requirement to meet. One latecomer said that the biggest difference was organic farmers' optimism and belief in the future. The researcher commented that more efficient resource use is what should be emphasized as distinguishing organic from conventional production, rather than questions of animal welfare.

Ten respondents agreed that animal welfare aims ought to be higher in organic than conventional farming. Four of these saw organic farming as a forerunner, setting the direction for conventional farming. The pioneers thought it self-evident that welfare aspirations should be higher in organic systems. One commented:

I think we can be forerunners. [...] I find it difficult to accept having a conventional animal worse off than an organic one, but at the same time, with my thoughts, ideas and values, very often that's automatically how it is. (Dairy farmer)

One dairy farmer (a latecomer) considered higher welfare aims necessary as marketing arguments. The conventional farmers both first said that animal welfare was emphasized a bit more in organic than in conventional agriculture. They then questioned whether rearing animals outdoors implies better welfare, finally saying that there ought to be no difference in welfare aspirations. Three latecomers also felt that there neither were nor should be any differences in welfare aspirations. One egg producer saw it as an economic question:

You shouldn't lag behind. But then again, there really must be limits, because everything becomes so much more expensive.

Perception of the certifying organization and organic standards

Respondents varied in how they felt about the Swedish certifying organization, KRAV. Five were critical, including two pioneers who had participated when the first Swedish organic standards were created. They felt KRAV was now too distant from the farmers and was developing in the wrong direction: organic production was becoming too similar to conventional. The other three were dissatisfied with KRAV's contacts with farmers: it was too bureaucratic and getting straight answers was difficult. They also criticized the standards for being "armchair products" that were changed too often, making it difficult to plan. Two farmers complained that KRAV was unsuccessful in marketing its trademark and what it stands for.⁴ In contrast, six respondents had positive impressions of KRAV (this included a member of the KRAV standards committee and one of the conventional farmers), and three of these mentioned that KRAV had done a good job marketing the trademark.

Well, I must say that KRAV has tightened up a lot. Things were a bit flaky at first – there was something of a romanticized "back-to-the-country" feeling in the whole organization. And there were a lot of small organic farmers who didn't live from farming. But for those of us who have to make a living from it, it can't be so cutesy all the time. (Dairy farmer)

Asked their opinion of the EU regulations that came into force in August 2000, seven didn't know much about them (including the two conventional farmers), five were negative, and two could see both positive and negative aspects in them. The pioneers tended to be negative, with one emphasizing that this legislation disempowered the organic movement. Several respondents were concerned that the Swedish view on organic farming is different from the EU's:

I really think the EU standards see organic farming as some kind of small niche, some kind of specialty production. The way I see it, we should be able to develop organic farming into a model for all future farming. That means that you have to think a lot about how to use feeds and other resources. You can't just focus on consumers' worries about harmful products. (The researcher)

Artificial insemination and genetic modification

The IFOAM Basic standards recommend that "reproduction techniques should be natural" (IFOAM,

2000), although artificial insemination (AI) is allowed. Embryo transfer and use of genetically engineered species or breeds are not allowed (paragraphs 5.4.2–3, 5.4.5). The organic movement has strongly repudiated genetic engineering, mainly because of environmental risks. In both issues the pioneers differed from the others; they were more well-reasoned and against genetic modification, especially in agriculture, and were the only ones who had thought of AI in terms of natural animal behavior. The pioneer dairy farmer had previously used a bull but turned to AI for practical reasons. He recognized this as a dilemma that violated the animal's right to natural behavior. The other respondents had never thought of AI as a problem. It has a long tradition in Sweden, where the first AI association was founded in 1943. In 2001 AI was used on 75–80% of all Swedish dairy cows (K. Johansson, pers. comm.) and 80% of all pigs (N. Lundeheim, pers. comm.). In beef production AI is mostly used as a complement to natural mating, and for sheep in less than 1% of matings. A typical comment was:

To me it's so natural to use AI that I've never even thought about not using it. I really must say that would be going too far. (Dairy farmer)

Two respondents approved of genetic engineering, provided it would be under strict societal control. Before converting, one had worked on this the issue for the Swedish Farmers' Association. The two conventional farmers also were basically positive:

I really don't know what to think. But you can't say no to everything [. . .] and I guess it must be used. But in my opinion you can't ban genetic technology entirely. That's what I think. (Dairy farmer)

It makes me damn mad that Monsanto can increase its power and that kind of thing . . . but I think that's another issue. (Pig farmer)

The others objected to genetic modification, mostly because of the risks. Two thought it would not benefit farmers, only that farmers would have to produce more to get the same return. When confronted with the concept of "integrity" in relation to gene modification, respondents generally saw the concept as awkward or fuzzy. Three emphasized that livestock production itself violates animal integrity. However, the pioneers (with one exception) argued that the integrity or dignity of the animal or plant should not be violated.

New technology

In the early days of organic farming, the use of advanced and expensive technology was a hot issue.

This is still mirrored in the standards, e.g., in a recommendation regarding breeding: "Breeding should not include methods that make the farming system dependent on high technological and capital intensive methods" (IFOAM, 2000). This discussion seems to have diminished as organic farming became more mainstream. Most respondents approved of new technology, although one farmer thought that advanced technologies such as milking robots were contrary to the old-fashioned idyll consumers expected to find on an organic farm. Also, the pioneers emphasized that technology must not be a goal *per se* – it should only be used when it reinforces the overall goals of organic farming. Who controls the technology also was mentioned as important.

Discussion

Respondents

Although the sample was constructed to illustrate Swedish organic farmers varying by conversion year, type of production, and size of farm, it was not a random sample. Hence, selected farmers are not statistically representative of the population and our findings cannot be generalized. However, the results are a foundation for a forthcoming questionnaire study.

The sample probably is more active in farmers' interest organizations than the average farmer, in part because we asked for persons with opinions. Two of the pioneers mentioned the environmental movement in the 1970s as important for their choice of organic farming, but the sample did not include any "green city dwellers" who had turned to organic farming for ideological reasons. Those who remain probably can cope with the often bigger challenges in organic farming.

Pioneers and latecomers

The only distinct subgroup was the pioneers, and pioneer farmers and the initiators answered coherently, which might be expected since both groups participated in the early organic movement. The pioneer farmers differed markedly from the other farmers in consistently placing questions in a larger framework. As an example, the question "What do you see as the biggest difference between conventional and organic livestock production?" was generally answered with examples from the respondent's own production. The pioneer dairy farmer started the same way, stating that the biggest difference was the large amount of concentrates fed to cows in conventional dairy production, which does not fit the cow's physiology. But he then added a global perspective, pointing to the land use

issue in developing countries, where export of animal feed is given priority over local food production. One reason for this holistic approach is probably that the pioneers were well educated: only one did not have a university education. But the pioneers' approach also fits the organic idea of the functional relation between parts and wholes and demands that agricultural issues be placed in larger perspectives: ecological as well as social, local as well as global, and paying respect to the past as well as to the future (Christensen, 1998: 419; Lund and Röcklinsberg, 2001).

The categorization of Vartdal and Blekesaune (1992) works well here, except that no biodynamic farmer was included.⁵ The ecosophes correspond to the pioneers here. Thus two pioneer farmers and the "initiators" were typical ecosophes. The third pioneer farmer was a bit more of a reformist since he was less globally oriented and thought more in economic terms. Those converting late generally fit the reformist pattern, although one latecoming couple could be considered ecosophes. They quickly adopted organic ideas and both had become active as board members in the organic movement. However, their departure point was animal welfare rather than environmental concerns.

Reasons for conversion

Although the respondents had various reasons for converting to organic farming, they expressed a basic interest in environmental issues and a disappointment with conventional agriculture. However, personality traits like independence and a search for challenge also may have played a role (Gleitman et al., 1999). Other studies reached similar findings (Østergaard, 1998; Hult and Andresen, in press; Lindholm, 2001). Also, practical circumstances must be right for a decision to be made, and personal beliefs were backed up by external influences. The decision often was triggered by an acute reason. (These mechanisms are discussed in depth by Østergaard, 1998: 69–80.) Similarly, several bad years for Swedish pig production in the late 1990s, for example, forced pig farmers to consider alternatives, while the meat industry was announcing a demand for organic products. Economic incentives have also functioned as "triggers," and seem to have been decisive for all farmers except the pioneers. Even so, throughout they had relatives working with organic farming or in related areas. There is a tendency for economic incentives to be more important the later the conversion took place. The last farmers to convert also were the least idealistic. Type and size farm seemed less important; the latest converters included the biggest and the smallest farm and had

both monogastric and ruminant livestock. This is in accordance with other studies (Svensson, 1991: 28–29; Østergaard, 1998). Some early studies did not find economics to be an important reason for conversion (e.g., Wernick and Lockeretz, 1977).

However, since organic livestock production often can offer a more profitable alternative (especially in dairy and beef production), this means that if Swedish farmers acted solely to make the most profit, many more would have converted. Changes in beliefs and attitudes are needed in order to change behavior, and it is well-known in psychological research that a change in attitude demands great efforts (Fishbein and Ajzen, 1975). An important hindrance may be solidarity with conventional farming, whereas organic farming is seen as foreign and threatening. “The biggest resistance is inside people’s heads,” one dairy farmer observed.

Relations to the surrounding world

The farming community

Earlier studies (e.g., Wernick and Lockeretz, 1977; Vartdal and Blekesaune, 1992; Christensen, 1998) found that to be an organic farmer was not socially accepted in the farming community, and this study shows that this still is partly the case. Today, resistance comes from other farmers in the district while banks, authorities, or the food industry may be supportive. The more farms that convert, the easier it will be for new ones to follow. The conversion of large farms is important (which was the experience of the largest farmer in the study), and the role of the leaders is apparent: several farmers pointed out that a major increase in acceptance came when the president of the Swedish Farmers’ Association converted his farm to organic in 1999 (“for economic reasons”). Thus, one important step towards realizing the Parliament’s stipulated goal for conversion would be for leaders in the farming community to demonstrate their clear support for organic farming.

Consumers

Several of the farmers mentioned consumers’ demands as a reason for conversion, as in the study by Hult and Andresen (in press). Coming from a market that had been protected until 1990, Swedish farmers have learned well that consumers’ demands govern agricultural production. Respondents rarely used the term “market,” which also includes other important actors. Interestingly, the organic movement has always stressed working with the consumer,⁶ but on an equal basis, recognizing that both parties live from the same land and have a common interest in how food is

produced. One probable reason for the success of Swedish organic farmers is their efforts to establish consumer confidence and to sell directly to consumers. In the interviews, one pioneer farmer stressed the importance of conveying the organic ideology to consumers, whereas one of the late converters emphasized the opposite. However, the most market-oriented (and least ideological) farmer also considered such work very important and saw organic standards as an important tool for communicating with consumers. He concluded that standards must be strict in order to retain consumer confidence. Thus the entrance of new, market-oriented organic farmers does not necessarily mean that the interest in close consumer contact and strict standards will decrease.

The certifying organization

Pioneers were generally critical towards KRAV and the EU regulations, possibly reflecting the preference for decentralization in the early organic movement (Lindholm, 2001; Merrigan, 2000). Among the other respondents, beef and dairy farmers seemed more pleased with KRAV than pig and poultry producers, who have the biggest problems meeting the standards. KRAV seems to be having problems handling this.

Several farmers criticized the standards because they did not fit their idea of good husbandry. KRAV faces the dilemma of having to satisfy sometimes unrealistic consumer expectations while promoting a biologically sound alternative that makes sense to practitioners. There also may be conflicts among different areas within the standards, e.g., animal welfare, environmental concerns, and social justice. Except for the pioneers, the farmers had difficulty in analyzing such conflicts fully. It is important for the certifying organization to be very explicit in such issues and to make clear what values its decisions are based on. This requires ethical issues in organic livestock production to be further analyzed and clarified.

Animal welfare and agreement with organic principles

The importance of animal welfare in organic farming is reflected in this study, where ten of thirteen organic respondents thought that welfare aims should be higher in organic farming. All respondents, not just the pioneers, focused on natural behavior. Three saw organic farming primarily as an alternative to “chemical” crop production, and to them livestock conversion was more of a way to increase returns. Only one farm converted primarily for animal welfare reasons. However, Swedish animal welfare legislation is among the strictest in the world, with very

demanding requirements,⁷ including that animals must be allowed their natural behavior. This makes the differences between organic and conventional agriculture less than in most other countries, so that fewer than half the farmers thought there was a big difference between conventional and organic production regarding animal welfare. There is no major conflict between how consumers (Szatek, 2001) and respondents generally understand animal welfare in organic farming. However, several respondents pointed out that consumers needed to be educated so that their expectations corresponded to real animal welfare needs.

Although the superficial understanding of animal welfare was similar between pioneers and the other respondents, there was an important difference. None of the pioneers focused on traditional animal welfare issues or animal welfare as such, but displayed a holistic/systemic approach, talking about the animals' role in the agroecological system and the human-animal relationship. They seemed to assume that if animals in a well-functioning agroecological system are allowed their natural behavior, welfare will be one of many resulting benefits. This differs from the classical utilitarian-based animal welfare ethics that focus on suffering, reflecting the ecocentric view displayed by the pioneers. The idea that the animals' quality of life must be at least as good as if they were living in the wild was expressed in the early Swedish organic movement (Lund, 1996). It is similar to the "homologous principle" for handling of farm animals, stated by the ecocentric philosopher Rolston (1988: 61):

Do not cause inordinate suffering, beyond those orders of nature from which the animals were taken. [...] Culturally imposed suffering must be comparable to ecologically functional suffering.

Still, there also were clear anthropocentric elements in the pioneers' comments, giving priority to human interests.

Genetic engineering was the one issue where the respondents differed from the "official" organic view. They were much less critical, and some even favored its use in organic farming. The pioneers were closest to the official view, and they could also agree with arguments based on violation of the animal's integrity or dignity. None of the respondents felt that organic farming should have a special view regarding other new technology, although some of the pioneer farmers stated that it must support the overall goals of organic farming. This agrees with a Danish study that found wide acceptance of machine technology (DARCOF, 2000).

Except regarding genetic engineering, most respondents and especially the pioneers, agreed with the principles for animal husbandry stated by IFOAM and KRAV, which focus on natural behavior and environmental concerns. There was a tendency for those converting later to have a more superficial relationship to these principles. However, the farmers also appreciated the organic goals and integrated the "organic" way of thinking more with their own the longer they worked with organic farming. Thus, the process worked in two directions: newcomers were less idealistic and would probably influence the organic movement in that direction, but as time went by they appeared to be more influenced by organic values.

The farmers' enthusiasm for organic farming was striking throughout the interviews, with one exception. Several talked about how organic farming was much more exciting and interesting. Similarly, Østergaard (1998) and Michelsen (1997) mention self-realization as an important motivation for conversion, and Hult and Andresen (in press) talk about an increased "professional pride" among organic farmers. Thus, even among those farmers mentioning economics as the prime reason for conversion, the majority said they would continue with several organic practices even if they were to leave KRAV. This supports the impression that they had adopted at least some organic values.

Conclusions

There was a distinct difference in values between the pioneers who converted their farms the earliest and those converting later. There was a general tendency that the later that conversion took place, the more superficial was the farmer's relationship to organic principles but also that farmers were increasingly influenced by organic values the longer they worked with organic farming. Genetic engineering was one area where the farmers were much less critical compared to the official organic policy.

There were no major conflicts among the farmers', IFOAM's, and consumers' ideas of organic animal welfare. However there were differences in their understanding of what is important for welfare in practice. If organic farming is to expand further, such conflicts must be made clear. Why one solution is chosen above another must be explained by IFOAM and the certifying organizations to both consumers and farmers. This means that the underlying values in organic farming need to be clarified and made explicit.

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Notes

1. Anthroposophy is a "path of knowledge" and a spiritual and philosophical movement founded by Rudolf Steiner in 1913. Steiner's thinking included agriculture (Steiner, 1929) and has resulted in biodynamic farming, which has been part of the organic farming movement since its start.
2. The interest in environmental issues is widely shared among Swedish family farmers. The Swedish Farmers' Association slogan "On our way towards the world's cleanest agriculture" is one example.
3. Earlier, KRAV required pigs to be reared outdoors. In current standards (KRAV, 2001) pigs may be reared indoors during the cold season if climatic conditions are similar to outdoors.
4. In a recent consumer survey KRAV was the most widely recognized quality and environmental trademark for food in Sweden: 93% of the respondents had heard of it (Szatek, 2001) However, their knowledge of what organic production actually signifies was quite low.
5. In 2000 there were only 115 biodynamic farms in Sweden (L.-B. Carlsson, Swedish Board of Agriculture, pers. comm.).
6. One example of where this is stated is the Nordic Platform, a consensus policy document issued by the Nordic IFOAM group in 1989 where one of eight goals for organic farming is: "To create good and close relations between farmers and consumers." The Nordic Platform has influenced the development of organic farming in the Nordic countries (Lindholm, 2001).
7. The Swedish animal welfare legislation lays down detailed regulations, e.g., regarding minimum box/laying areas for all species, that cows must be grazing in summer, pigs must not be tethered but have access to straw or other suitable bedding material, etc. There is also a relatively strict control of the abundance by the law.

References

- Andersson, R. (2001). *Ekologiska jordbruksprodukter och livsmedel – Aktionsplan 2005* [Organic Agricultural Products and Food – Action Plan 2005]. Jönköping, Sweden: Swedish Board of Agriculture, Report No. 2001: 11.
- Anon. (1999a). *Product and Market Development, Organic Food and Beverages: World Supply*. Geneva, Switzerland: International Trade Centre.
- Anon. (1999b). *Action Plan II. Developments in Organic Farming, English Summary*. Copenhagen, Denmark: Ministry of Food, Agriculture and Fisheries, Danish Directorate for Development (also to be found at http://www.dffe.dk/in_english/index.htm).
- Anon. (2001). *Ekologisk produktion av nöt- och lammkött* [Organic Production of Beef and Mutton]. Jönköping, Sweden: Swedish Board of Agriculture, Jordbruksinformation nr 5.
- Christensen, J. (1998). *Alternativer – natur – landbrug* [Alternatives – Nature – Agriculture]. Viborg, Denmark: Akademisk forlag.
- DARCOF (2000). *Principles of Organic Farming. Discussion document prepared for the DARCOF Users Committee, November 2000*. Tjele, Denmark: Danish Research Centre for Organic Farming (also to be found at <http://www.foejo.dk>).
- Fishbein, M. and I. Ajzen (1975). *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research*. Reading, Massachusetts: Addison-Wesley.
- Fostvedt, I. (1993). *Profesjonalitet, liv og visjoner* [Professionalism, Life and Visions]. Tingvoll, Norway: Norwegian Centre for Organic Farming, Rapport 14 fra 30-bruksprosjektet.
- Frischknecht, E. (2000). "Organic farming must not lose the holistic approach of its pioneers." In T. Alföldi, W. Lockeretz, and U. Niggli (eds.), *Proceedings of the 13th International IFOAM Scientific Conference*, Basel, August 28–31 (p. 732). Zürich, Switzerland: Hochschulverlag AG an der ETH.
- Gleitman, H., A. J. Fridlund, and D. Reisberg (1999). *Psychology*, 5th edn. New York: W. W. Norton & Company.
- Holmberg, H.-E. (1999). *Konsumentundersökning om ekologisk produktion/KRAV* [Consumer Survey on Organic Production/KRAV]. Stockholm, Sweden: Lantbrukets utredningsinstitut, LUI ref. number 30-7866. Published at <http://www.krav.se/arkiv/rapporter/luiund.pdf>
- Hult, E. and C. N. Andresen (in press). *Varför ekologiskt lantbruk?* [Why Organic Farming?]. Uppsala, Sweden: SLU Kontakt, Report.
- IFOAM (2000). *IFOAM Basic Standards*. Tholey-Theley, Germany: International Federation of Organic Movements (also published at www.ifoam.org/standard/basics.htm).
- Kaltoft, P. (1997). *Naturetik som praksisbegrep. En undersøgelse af naturforståelse, praksis og viden i økologisk jordbrug* [Nature Ethics as a Practical Concept. A survey Regarding the Understanding of Nature, Practice and Knowledge in Organic Farming]. Copenhagen, Denmark: Department of Technology and Social Sciences, Technical University of Denmark, Skriftserie No. 5, PhD thesis.
- KRAV (2001). *KRAV standards 2001*. Uppsala, Sweden: KRAV (also published at www.krav.se/sprak/english.htm).
- Lindholm, S. (2001). *Helhet och mångfald. Det ekologiska lantbrukets bärande idéer i relation till miljöetisk teori* [Entirety and Manifoldness. The Basic Ideas of Organic Farming in Relation to Environmental Ethics]. Uppsala, Sweden: Acta Universitatis Agriculturae Sueciae, Agraria 272. Doctoral thesis.
- Lockeretz, W. (1995). "Organic farming in Massachusetts: An alternative approach to agriculture in an urbanized state." *J. Soil and Water Cons.* 50(6): 663–667.
- Lockeretz, W. (1997). "Diversity of personal and enterprise

- characteristics among organic growers in the northeastern United States." *Biological Agriculture and Horticulture* 14: 13–24.
- Lockeretz, W. and P. Madden (1987). "Midwestern organic farming: A ten year follow-up." *American Journal of Alternative Agriculture* 2(2): 57–63.
- Lockeretz, W. and S. Wernick (1980). "Commercial organic farming in the corn belt in comparison to conventional practice." *Rural Soc.* 45: 708–722.
- Lund, V. (1996). *Etik och ekonomi i ekologisk djurhållning* [Ethics and Economics in Organic Farming]. Ekologiskt lantbruk no 20 (pp. 102–107). Swedish University of Agriculture.
- Lund, V. and H. Röcklinsberg (2001). "Outlining a conception animal welfare for organic farming systems." *Journal of Agricultural and Environmental Ethics* 14(4): 391–424.
- Merrigan, K. A. (2000). *Negotiating Identity within the Sustainable Agriculture Advocacy Coalition*. PhD-thesis, Cambridge: MIT.
- Michelsen, J. (1997). "De økologiske landmænd vægter verdierne [Organic Farmers Embrace the Organic Values]." *Månedsmagasinet Økologisk Jordbrug* 147: 12.
- Neale, J. M. and R. M. Liebert (1980). *Science and Behavior, an Introduction to Methods of Research*. Engelwood Cliffs, New Jersey: Prentice Hall, 294 pp.
- Niggli, U. and W. Lockeretz (1996). "Development of research in organic agriculture." In T. V. Østergaard (ed.), *Fundamentals of Organic Agriculture*, Proceedings, Vol. 1, 11th IFOAM International Scientific Conference, Copenhagen, August 11–15 (pp. 9–23). Tholey-Theley, Germany: IFOAM.
- Nordgren, P. (2001). *Ekonomisk värdering av tillväxtstrategier för mjölkföretag* [Economic Evaluation of Growth Strategies for Dairy Farms]. Skara, Sweden: Agroväst, 23 pp. Published at <http://www.agrovast.se/>
- Robson, C. (1993). *Real World Research*. Oxford: Blackwell Publishers.
- Rolston, H. III. (1988). *Environmental Ethics. Duties to and Values in the Natural World*. Philadelphia: Temple University Press.
- Steiner, R. (1929). *Landwirtschaftlicher Kursus*. Dornach, Switzerland: Section for Natural Science of the Anthroposophic Society.
- Svensson, I. (1991). *Statligt stöd till alternativ odling 1989* [Public Support for Organic Farming in 1989]. Uppsala, Sweden: Forsknings- och försöksnämnden för Alternativ odling, SLU, Alternativ odling nr. 7.
- Szatek, A. (2001). *Vägen till marknaden. Kvantitativ undersökning bland allmänheten. Slutrapport* [The Road to the Market. Quantitative Survey among the Public. Final Report]. Stockholm, Sweden: LUI Marknadsinformation AB, Internal report for Swedish Farmers' Association (LRF).
- Vartdal, B. and A. Blekesaune (1992). *Sosiale sider ved økologisk jordbruk. Ein sosiologisk studie av omleggingsprosessen* [Social Aspects of Organic Farming. A Sociological Study of the Conversion Process]. Trondheim: Senter for Bygdeforskning, rapport no. 1/92.
- Wernick, S. and W. Lockeretz (1977). "Motivations and practices of organic farmers." *Compost Science* 18(6): 20–24.
- Woodward, L., D. Fleming, and H. Vogtman (1996). "Reflections on the past, outlook for the future." In T. V. Østergaard (ed.), *Fundamentals of Organic Agriculture*, Proceedings Vol. 1, 11th IFOAM International Scientific Conference, Copenhagen, August 11–15 (pp. 259–270). Tholey-Theley, Germany: IFOAM.
- Østergaard, E. (1998). *Ett skritt tilbake og to frem. En fenomenologisk studie av bønder i omstilling til økologisk landbruk* [One Step Back and Two Forward. A Phenomenological Study of Farmers Converting to Organic farming] Doctor Scientiarum Theses: 25. Ås, Norway: Department of Horticultural and Crop Sciences, Agricultural University of Norway, 274 pp.

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VONNE LUND, SVEN HEMLIN, and JAMES WHITE

NATURAL BEHAVIOR, ANIMAL RIGHTS, OR MAKING MONEY –
A STUDY OF SWEDISH ORGANIC FARMERS' VIEW OF ANIMAL
ISSUES

(Accepted in revised form November 15, 2003)

ABSTRACT. A questionnaire study was performed among Swedish organic livestock farmers to determine their view of animal welfare and other ethical issues in animal production. The questionnaire was sent to 56.5% of the target group and the response rate was 75.6%. A principal components analysis (exploratory factor analysis) was performed to get a more manageable data set. A matrix of intercorrelations between all pairs of factors was computed. The factors were then entered into a series of multiple regression models to explain five dependent variables. Respondents were well educated and had long experience of farming. 81% were full-time farmers. They generally had a very positive attitude towards organic animal husbandry. They considered allowing animals their natural behavior a central aim, which is in accordance with organic philosophy. Farmers tended to be less approving of concepts like animal rights, dignity, and intrinsic value. When analyzing correlations between the factors, two groups of farmers emerged that were only partially correlated, representing different attitudes and behavioral dispositions. These may be interpreted as two subpopulations of organic livestock farmers in Sweden: those who saw organic farming as a lifestyle ("pioneer attitude") and entrepreneurs, who considered making money and new challenges more important. Their view of animal welfare differed. While the pioneers considered natural behavior a key issue, this was less important to the entrepreneurs, who also had a more approving attitude towards invasive operations such as castration and were more critical of the organic standards.

KEY WORDS: animal ethics, attitude, natural behavior, organic animal husbandry, organic farming, organic livestock production, questionnaire study

INTRODUCTION

Organic farming¹ has developed from a predominantly Western sub-cultural grass root movement (Christensen, 1998) into a worldwide phenomenon of economic significance, regulated by national and international standards and legislation (e.g., IFOAM Basic Standards [IFOAM, 2002], EC Regulation 2092/91 [Council Regulation, 1991] and 1804/99 [Council Regulation, 1999] and the FAO/WHO Codex Alimentarius

¹ In this paper "organic farming" denotes farming systems that comply with the Basic Standards issued by the International Federation of Organic Agriculture Movements (IFOAM).



standards [FAO, 2001]). Organic farming is subsidized by the European Union and by governments in several countries. One of these countries is Sweden, where the Parliament has set the goal to have 20% of arable land and 10% of the dairy, beef, and sheep production converted to organic farming by 2005 (Andersson, 2001). In 2001, about 13.5% of the arable land was converted, 5% of dairy cows, 7% of beef cows and ewes, 3% of layers, and 1% of sows (P. Fredriksson, KRAV, pers. comm.) and by 2002 15.8% of land was converted (L.-B. Carlsson, Swedish Board of Agriculture, pers. comm.). The Swedish market for organic produce has quadrupled since 1995 and is now estimated to about 3 billion SEK (about 350 million US\$ or 320 million Euros) (Jelkebring et al., 2002). Sweden is an interesting example because here organic farming has left the pioneer stage and to a large extent has become part of the agricultural establishment (Lund et al., 2002).

Although organic farming systems without farm animals are conceivable, livestock, and especially herbivores, make major contributions to system productivity and the economic value of the production (Lund et al., 2004; Altieri, 1994; Gliessman, 1998). In spite of this, conversion of livestock has generally been much slower than conversion of plant production. This may have several explanations. Livestock conversion may be more difficult, especially in the case of monogastric animals like pigs and poultry, where organic and conventional production differ significantly. An additional reason may be that the underlying philosophy for organic livestock production is not clearly spelled out (Lund and Röcklinsberg, 2001; NAHWOA, 2002). Only biodynamic farming² has so far fully included livestock in a philosophical framework where their moral standing has been elaborated. This absence of explicit goals and principles hampers the development of the organic standards as well as the practical animal husbandry systems (Anon., 2002).

The lack of an explicit philosophy is also likely to have other implications. Today, as organic farming is growing worldwide, new actors with values and priorities other than those of the organic pioneers are likely to influence the movement. This may set the stage for policy changes. One such area of concern is animal welfare. The latest revision of the IFOAM Basic Standards (in 2002) partly changed the focus of the stated principles for organic animal husbandry, from explicit animal welfare concerns towards greater emphasis on environmental concerns. This paper intends to shed light on the values and views held by organic farmers in relation

² Biodynamic farming is a special direction of organic farming that is based on the published lectures of Rudolf Steiner (1929).

to animal welfare and other animal ethics issues, using Sweden as an example.

BACKGROUND

Animal welfare has always been important to the organic movement (Niggli and Lockeretz, 1996; Boehncke, 1997) and concerns are expressed in the “General principle” for organic animal management:

Organic animal husbandry is based on the harmonious relationship between land, plants, and livestock, respect for the physiological and behavioral needs of livestock, and the feeding of good-quality organically grown feedstuffs (IFOAM, 2002, 5:1).

These principles are further developed in the organic standards as far-reaching requirements regarding feeding, breeding, health care, space requirements, etc. Demands are generally higher than the national animal welfare legislation (also in Sweden [Lund and Algers, 2003]). In several countries animal welfare has become a marketing argument for organic animal products. Consumers in many European countries believe organic livestock experience better welfare than animals in conventional farming (Danish Ministry of Food, Agriculture and Fisheries, 1999; Holmberg, 1999; Harper and Henson, 2001). In spite of this, the question has been raised whether organic farming really should be “an animal welfare assurance scheme” (FAWC, 2001). Organic farming was initiated and developed mainly among farmers (Niggli and Lockeretz, 1996; Wynen, 1998), and farmers and their organizations still have a big influence. However, in spite of its growing importance only few studies have examined what attitudes organic farmers have towards organic farming in general, and even fewer their attitudes to livestock production. This is important to know in order to predict the development of organic livestock production but also for the organic movement to outline future strategies and standards.

There are several qualitative studies published of Nordic organic farmers (Vartdal and Blekesaune, 1992; Fostvedt, 1993; Kaltoft, 1997; Østergaard, 1998; Lindholm, 2001; see Lund et al., 2002, for a review), but only one focusing on livestock production (Lund et al., 2002). There are also several quantitative studies of organic farmers published, and some studies that combine questionnaires with personal interviews, but neither of these deal with livestock production. However, most of them display differences in attitudes among conventional and organic farmers. This article presents the results from a quantitative study of Swedish organic farmers with livestock production and their view of animal welfare and animal ethics. This study was preceded by a qualitative in-depth interview

study on the same topic (Lund et al., 2002). The purpose of the interview study was to gain insights and knowledge that is less available with quantitative methods but also to find interesting issues to explore further in the quantitative study. When discussing animal welfare all respondents in the study focused on allowing animals their natural behavior. Especially those converting early avoided discussing traditional animal welfare issues but took a systemic approach, seeing animal welfare as coming from a well-functioning agroecosystem. The results also indicated that there were differences in values between those converting early and those converting later, the newcomers having a more superficial relationship to organic principles.

AIM

The aim of this paper is to investigate and analyze values and attitudes held by Swedish organic livestock farmers regarding livestock production with special focus on animal welfare and ethics.

MATERIAL AND METHODS

Respondents

A questionnaire comprising 60 statements was sent to Swedish organic farmers with certified livestock production. Address lists of organic farmers with animal husbandry were obtained from the Swedish certification organization KRAV.³ From these lists farmers were randomly selected, except for pig and poultry farmers, who were so few that questionnaires were mailed to all of them to be able to analyze answers from different types of farmers separately. This made the pig- and poultry farmers somewhat over-represented in the sample, yielding 7% of the answers but making up 4 and 5% of the target population. In total, 575 questionnaires were sent out in April 2001 to 56.5% of all Swedish organic livestock farmers at that time. After 5 weeks, a reminder including a new copy of the questionnaire was sent out to farmers that had not answered. A second reminder was later made by telephone. Four hundred and thirty-five answers were returned but two questionnaires were omitted because they were incomplete, yielding a response rate of 75.6%. During the reminder call the farmers were asked why the questionnaire had not been returned, and the most frequent answer was lack of time.

³ KRAV certifies all organic farmers in Sweden, about 3,330 farmers in 2001.

Questionnaire

Respondents were asked to circle one number for each statement on a response scale from one to seven where 1 indicated “Strongly disagree,” 7 “Fully agree” and 4 “Neither.” Questionnaire language was Swedish (statements quoted in this article have been translated into English by the first author).

The statements were dealing with different aspects of organic livestock production with special emphasis on value issues and animal welfare. The first part of the questionnaire covered pertinent background variables. Statements 11–13 made the farmer compare him/herself with the average Swedish farmer concerning interest in environmental issues, animal welfare, and philosophical issues. Statements 14–21 considered reasons for conversion. The following statements 22–60 dealt with environmental concerns, the use of new technology including genetic engineering, animal dignity, intrinsic value and natural behavior, the Swedish organic certification body (KRAV), and the EU regulations for organic animal husbandry, as well as the farmer’s general attitude towards organic livestock production. Statements were selected partly based on an earlier interview study (Lund et al., 2002).

Statistical Analysis

Descriptive statistics were obtained for each variable. In order to get a more manageable data set, a principal components analysis (PCA; exploratory factor analysis) was performed (e.g., Kerlinger and Pedhazur, 1973). This analysis finds commonalities or high shared variance between all variables. Variables that load on a factor are then treated as a single coherent cluster in the following analysis. These clusters are assumed to represent underlying, more basic, conceptual variables (Williams, 1979). A matrix of intercorrelations between all pairs of variables was subsequently computed. The factors were then entered into a series of multiple regression models (Weinberg and Abramowitz, 2002) to explain five dependent variables. The procedures by which these dependent variables (factors) were constructed and the importance of them to the study are discussed below. Cronbach alpha values were computed to test the reliability of each index variable (Bohrsted and Knoke, 1994). High alpha value indicates high reliability, that is, the factor is conceptually homogeneous or has high internal consistency. Factors were selected based on alpha values and total variance explained. They were basically theoretically constructed and then tested in principal component analysis and adjusted so that each statement did not load less than 0.40 on each factor. The factor scores were computed as mean ratings of unstandardized raw data, so the levels could

be compared between factors. Factors that were conceptually rational and had an alpha value higher than 0.6 were accepted. One factor (no. 3, *Ethics*) was transformed into a dichotomous factor due to skewed distribution of answers with 51% of cases in one category. As a result, it was analyzed as a binary or dummy coded variable. Although logistic regression is a more appropriate technique for binary dependent variables, the current analyses present the multiple linear coefficients for the sake of comparison with the other analyses in this paper. Significance levels for the linear coefficients and the logistic coefficients did not differ significantly.

RESULTS

Sample Description

Responding farmers were born between 1924 and 1979 and the average year of birth was 1954 (SD 9.4 years). About 80% of the respondents were males. Respondents started farming between 1947 and 2001, with an average of 19 years of farming. 19% were part time farmers. Most farms were family owned.

Only 19.5% of the respondents did not have any work experience outside farming, while 60% had more than three years work experience other than farming. Corresponding figures for accounted spouses were 6 and 79% respectively. Only among 3% of all couples both partners lacked work experience outside farming. However, most farmers had a farming background. 64% of all respondents were raised on a farm, and among 82% of the couples at least one of the partners were raised on a farm.

Farmers were well educated. 63% (farmer or spouse) had basic agricultural education (upper secondary school, “*gymnasium*”), and of these 12% also had university education in agriculture or veterinary science. Twenty-nine percent of the respondents and 23% of the spouses had some kind of university education. They described themselves as more interested in environmental issues than the average Swedish farmer and somewhat more interested in animal welfare issues.

Livestock on the studied farms was converted to organic production between 1973 and 2001. (Before KRAV introduced livestock standards in 1987, livestock could be certified as biodynamic.) The largest number of farms was converted in 1995, when subsidies for organic production were introduced in Sweden.

Farms were classified according to their main type of production. 44% had beef and/or sheep production, 41% were dairy farms, 7.6% had pig production, and 7.4% had laying hens.

Reasons for Conversion and General Attitude to Organic Farming

When asked about reasons for converting to organic livestock production, animal welfare was ranked as number four among seven suggested reasons. The most important reason was that organic livestock production represents a more holistic approach to farming, followed by that it is more future oriented and more environmentally friendly (all comparisons were made to conventional farming). The alternative “It seemed to be more profitable” was ranked as the least important reason.

Farmers were generally very positive towards organic livestock production. Compared to conventional production they found it more interesting to work with ($M = 5.86$; $SD = 1.16$; $IQR^4 = 2$), and they saw fewer ethical problems in organic livestock production (5.55 ; 1.25 ; 2). Most farmers had positive expectations when they started (5.45 ; 1.27 ; 1), and did not agree that conversion had been difficult (2.66 ; 1.69 ; 3). But even so, 90% had become more positive towards organic livestock production after practicing it for a while (5.40 ; 1.42 ; 2), and only 3.5% were disappointed (and half of these would still continue organic production). Only 0.7% had negative expectations and were still negative towards organic production. An overwhelming majority stated they wanted to continue organic if they were to continue livestock production (6.34 ; 1.05 ; 1). However, this may also partly be explained as a consolidation process in behavioral decision making, that is that farmers back up decisions once made with arguments (Svenson, 1999).

Factor Creation

Seven factors were extracted with PCA and these are described in Table I. Three of these were related to attitudes (factor 1–3), two were more related to behavioral dispositions (factor 5–6), and one included both attitudes and behavioral dispositions (factor 4). One reflected respondent identity (factor 7). An additional factor, dealing with genetic modification, was extracted but had to be discarded due to methodological problems (ambiguous construction of statements). The factors were interpreted as follows (the word in brackets is used in the text to refer to the factor):

1. *Organic animal husbandry is great* (“Organics”) – a positive attitude to organic animal husbandry (in comparison with conventional). The most statements loaded on this factor.

⁴ The interquartile range (IQR) is the difference between the third and first quartiles, that is the range of the middle 50% of the data.

2. *Profit and challenge are important* (“Entrepreneur”) – the attitude of an entrepreneur who gives priority to economical benefits and likes challenges.
3. *Animal ethics is important* – agreeing that animals should have certain rights and a dignified life, and that they have intrinsic value (“Ethics”).
4. *Natural behavior is important* (“Behavior”) – the attitude that animals should be able to perform their natural behavior, as well as a behavioral disposition of respondents to choose management alternatives allowing animals to do this in practice.
5. *Invasive techniques are acceptable* (“InvaTech”) – the attitude that animals are primarily a means of production and the behavioral disposition of respondent to choose invasive techniques like castration and embryo transfer if this means a more rational production.
6. *Critical towards organic standards* (“Standards”) – the view that the organic standards (both on national and EU level) are not sufficiently based in the practical production or adapted to how animals function.
7. *Identity* (“Identity”) – corresponding to how the respondent perceives him/herself in comparison to the average Swedish farmer in the areas of environmental awareness, interest in animal welfare, and philosophical issues. It indicates a big interest in environmental issues and a big, although comparatively smaller, interest in animal welfare issues as well as being a driving force in the conversion of the farm to organic farming.

Each factor was constructed by summing all statements loading on that factor into a single index variable, i.e., the factor used in the subsequent multiple regression analysis (e.g., *Organics*, *Ethics*, *Identity*). A factor thus represents a single underlying dimension.

Measures

The selected dependent variables correspond to factors extracted by PCA in the factor analysis. Factor 1 (*Organics*) is theoretically interesting in relation to the theme of this study since it can show how the general attitude towards organic farming correlates to other variables considered in this study.

Factor 3 (*Ethics*) and 4 (*Behavior*) represent particular aspects of the animal welfare concept (animal ethics and natural behavior). Both are central in the animal welfare discussion and especially the latter appears in the organic ideology (Lund and Röcklinsberg, 2001; Alrøe et al., 2001).

Factor 6 (*Standards*) is of interest in order to analyze if the organic farmers have confidence in the certifying organizations and agree with the organic standards in relation to animal welfare and behavior.

TABLE I
Factor descriptions and correlations among factors

Factor	Attitude/behavioral disposition corresponding to factor	Number of statements included in factor	Cronbach's alpha value	% of variance explained	Correlations among factors						
					1.	2.	3.	4.	5.	6.	
1.	Organic animal husbandry is great (<i>Organics</i>)	7	0.82	49	-						
2.	Profit and challenge are important (<i>Entrepreneur</i>)	3	0.68	62	-0.108*	-					
3.	Animal rights and intrinsic value are important (<i>Ethics</i>)	3	0.67	68	0.266***	-0.120*	-				
4.	Natural behavior is important (<i>Behavior</i>)	5	0.67	44	0.352***	-0.197***	0.275***	-			
5.	Invasive techniques are acceptable (<i>InvaTech</i>)	5	0.66	43	-0.189***	0.349***	-0.187***	-0.281***	-		
6.	Critical towards organic standards (<i>Standards</i>)	3	0.79	71	-0.180***	0.093	-0.130**	-0.255***	0.069	-	
7.	Identity (<i>Identity</i>)	5	0.66	46	0.462***	-0.183***	0.146**	0.239***	-0.151**	-0.138**	-

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

Also factors 2 (*Entrepreneur*) and 5 (*InvaTech*) provide information about attitudes that are important in relation to the theme of the study.

Factor 7 (*Identity*) provides interesting information primarily in relation to *Organics*, but also to the other studied factors.

Correlations among Factors

Correlations among factors are shown in Table I. With two exceptions all factors were significantly correlated (the exceptions were that *Standards* did not correlate to *InvaTech* nor to *Entrepreneur*). All correlations were weak except three that were moderate⁵ (those between *Organics* and *Behavior*, *Organics* and *Identity*, and *InvaTech* and *Entrepreneur*).

Factors fell into two groups that were negatively correlated to each other, while correlations within each group were positive. One group comprised of *Organics*, *Ethics*, *Behavior*, and *Identity*. Thus, there tended to be a positive correlation among having a positive view of organic animal husbandry and the attitudes that animal ethics and natural behavior is important, and persons who scored high on identity also tended to have these attitudes.

The other group comprised *Entrepreneur*, *InvaTech*, and *Standards*. Thus, there were positive correlations among the entrepreneurial attitude, the view that invasive techniques are acceptable, and a critical attitude towards the organic standards. However, there was no correlation between a negative attitude towards standards and the entrepreneurial attitude or the attitude that invasive techniques are acceptable.

Within each group, all correlations were significant on the 0.001 level, except that *Ethics* and *Identity* were correlated on the 0.01 level. Correlations between the two groups were generally lower than those within each group (*Entrepreneur* correlated to both *Organics* and *Ethics* only on the 0.05 level. *Identity* correlated to *InvaTech* and *Standards* on the 0.01 level, and the same significance level was found between *Ethics* and *Standards*).

Explaining Variance

Factor 1, “*Organic farming is important.*” In the final model, *Identity* turned out to be the variable best predicting a positive attitude towards organic animal husbandry (Table II). Second best predictor was *Behavior*. Allowing the animal to behave naturally is a central feature of organic animal husbandry, so it is not surprising that this variable predicted a

⁵ The classification weak, moderate, and strong is used according to Cohen (1988), $r = \pm 0.50$ is considered strong; $r = \pm 0.30$ is considered moderate; $r = \pm 0.10$ is considered weak.

positive attitude. Female gender turned out to be a significant factor when entered into the model. Also *Behavior* was significant. Conversion year was important in the first models. However, it dropped out of the model when *Identity* was entered.

Factor 3, "Animal ethics is important." The variable with the largest effect in the final model was *Behavior* (Table III), which may indicate that a significant number of organic livestock farmers interpret animal ethics in terms of natural behavior. A positive attitude towards organic farming (*Organics*) was also predicting the attitude that animal ethics is important (*Ethics*), indicating that organic livestock farmers may value their animals not only as means of production but believe they have a value of their own. There was a negative correlation to *InvaTech*, showing that farmers with this attitude tended not to approve of invasive techniques such as castration. It thus seems as if farmers tended to act in accordance with their attitude, although this relation was weaker. There was a significant negative correlation between being raised on a farm and *Ethics* ($p < 0.01$).

Factor 4, "Natural behavior is important." The final regression model for this factor shows that farmers with a positive attitude towards organic animal husbandry also to some extent approved of the central role natural animal behavior is assigned in organic livestock production (Table IV). Similarly, farmers that disliked the organic standards more or less disagreed that natural behavior is important. *Ethics* tended to predict *Behavior* ($p = 0.001$), which is not unexpected. There was a weak but significant tendency that the more educated a farmer was in agriculture, the less s/he believed natural behavior to be important. There was also a significant tendency that the earlier the farmer converted, the more importance s/he gave to the concept of natural behavior. Dairy farmers tended to see natural behavior as less important ($p < 0.01$) while the opposite appeared to be true for egg producers ($p < 0.05$).

Factor 6, "Critical towards organic standards." *Behavior* was the attitude variable having the largest effect on the final model (Table V). According to the Swedish certification organization KRAV the aim of organic animal husbandry is "to promote good animal health and allow animals to behave naturally and have a dignified life" (KRAV, 2002, introduction). Farmers who cared about natural behavior seemed to be of the opinion that the standards have succeeded in implementing KRAV's aim, at least the part relating to natural behavior. Interestingly, being a full-time farmer predicted *Standards*, as did *Entrepreneur*, although the latter correlation

TABLE II
Standardized regression coefficients (beta values) in regression models for factor 1 “Organic farming is important” (Organics)

Variables	Models					
	1	2	3	4	5	6
“Natural behavior is important” (<i>Behavior</i>)	0.352***	0.326***	0.345***	0.308***	0.296***	0.242***
Conversion year		-0.126*	-0.130**	-0.134**	-0.136**	-0.067
Gender			0.150**	0.132**	0.125*	0.093*
“Animal ethics is important” (<i>Ethics</i>)				0.124*	0.119*	0.094
Identity (<i>Identity</i>)						0.382***
R ²	0.124	0.139	0.181	0.194	0.201	0.323
R ² _{adj}	0.122	0.134	0.173	0.184	0.189	0.312

TABLE III

Standardized regression coefficients in regression models for factor 3, "Animal ethics is important" (Ethics)

Variables	Models			
	1	2	3	4
Raised on a farm	-0.173***	-0.177***	-0.161**	-0.166**
"Organic animal husbandry is great" (<i>Organics</i>)		0.260***	0.237***	0.144**
"Invasive techniques are acceptable" (<i>InvaTech</i>)			-0.130*	-0.114*
"Natural behavior is important" (<i>Behavior</i>)				0.200***
R ²	0.30	0.100	0.118	0.153
R ² _{adj}	0.28	0.096	0.111	0.143

was weaker. There was also a weak but significant ($p < 0.05$) correlation between the number of years the respondent had been farming and *Standards*. Thus, the longer the respondent had been a farmer, the less critical the attitude.

Factor 7, "Identity." Table VI shows that *Organics* was the most important predictor of *Identity* (and conversely *Identity* was the best predictor of *Organics*, Table II). It turned out that *Identity* had features reminding of the pioneers in the interview study performed by Lund et al. (2002). The pioneers described in that study converted to organic farming early, were generally well educated, and saw organic farming as the only conceivable way of farming. Likewise, conversion year and university education were significant predictors in the final model. *Entrepreneur* was a significant negative predictor when first entered into the model, which might be expected, but just barely dropped out ($p = 0.051$) when the variable "University education" was entered.

DISCUSSION

Farmer Background

The sample in this study had long experience of farming, and 81% were full-time farmers. Although 80% of respondents were males, female gender appeared as a significant predictor (although very weak) of positive

TABLE IV
Standardized regression coefficients in regression models for factor 4, "Natural behavior is important" (Behavior)

Variables	Models						
	1	2	3	4	5	6	7
Agricultural education	-0.170**	-0.158**	-0.155**	-0.133**	-0.116*	-0.108*	-0.110*
Conversion year		-0.193***	-0.188***	-0.176***	-0.113*	-0.123*	-0.132**
Egg producer			0.133**	-0.116*	0.098*	0.084	0.097*
Dairy farmer				-0.150**	-0.168**	-0.160***	-0.149**
"Organic animal husbandry is great" (<i>Organics</i>)					0.316***	0.270***	0.243***
"Animal ethics is important" (<i>Ethics</i>)						0.183***	0.163***
Critical towards standards							-0.174***
R ²	0.029	0.067	0.084	0.106	0.203	0.232	0.265
R ² _{adj}	0.026	0.062	0.077	0.096	0.191	0.219	0.250

TABLE V

Standardized regression coefficients in regression models for factor 6, the attitude “Critical towards organic standards” (Standards)

Variables	Models				
	1	2	3	4	5
Full-time farmer	0.195***	0.192***	0.171**	0.156**	0.147**
“Natural behavior is important” (<i>Behavior</i>)		-0.241***	-0.221***	-0.230***	-0.199***
Conversion was difficult			0.148**	0.138**	0.138**
Year starting as a farmer				-0.104*	-0.114*
Profit and challenge are important (<i>Entrepreneur</i>)					0.112*
R ²	0.038	0.108	0.126	0.136	0.142
R ² _{adj}	0.036	0.103	0.118	0.126	0.129

TABLE VI

Standardized regression coefficients in regression models for factor 7 (Identity)

Variables	Models				
	1	2	3	4	5
Conversion year	-0.225***	-0.173**	-0.169**	-0.107*	-0.135**
Profit and challenge are important (<i>Entrepreneur</i>)		-0.135**	-0.099	-0.084	
University education			0.243***	0.232***	0.246***
“Organic animal husbandry is great” (<i>Organics</i>)				0.417***	0.421***
R ²	0.050	0.062	0.121	0.299	0.296
R ² _{adj}	0.048	0.057	0.114	0.291	0.291

attitude to organic farming (*Organics*). This may reflect higher levels of environmental concern and pro-environmental behavior among women (Davidson and Freudenberg, 1996). The high level of education and experience of work outside of agriculture could indicate that a large proportion of the sample was not “genuine” farmers but environmentalists who had turned to organic farming. However, this picture was contradicted by the fact that the majority had a farming background and was raised on a farm.

A majority of the respondents were positive towards organic farming and an overwhelming majority wanted to continue organic production. However, this response may also partly be explained by human decision making processes (Svenson, 1999).

Natural Behavior as a Key Issue for Organic Farming

Although the roots of organic farming can be traced back to the late 19th and early 20th century, the organic movement of today took off in the early 1970s as part of the protest movements that swept the Western world at the time (Christensen, 1998; Conford, 2001). Organic animal husbandry developed largely in response to the intensive animal farming confined systems that appeared from the 1960s and onward. To the pioneers of organic farming, developing systems that allow animals to behave naturally became a key issue and it was included as an aim in the first IFOAM standards (IFOAM, 1980). The view that natural behavior is important is also grounded in the philosophy of organic farming (Alrøe et al., 2001; Lund and Röcklinsberg, 2001). In this study, a majority of Swedish organic livestock farmers appeared to agree with the aim of allowing animals a natural life. The statement "Livestock should be given the possibility to live according to its natural behavior only when this advances human interests" scored low (that is, farmers disagreed). On the contrary, respondents strongly agreed that livestock should be given this possibility even when causing the farmer more work or less profit (although the scoring for the latter statement was slightly lower than for the "more work"-alternative).

There was a significant correlation between the view that natural behavior is important and the positive view about organic farming. Thus, *Behavior* was the second best predictor of *Organics* (after *Identity*), while *Organics* was the best predictor of *Behavior*. However, the regression analyses showed a negative correlation between *Entrepreneur* and *Behavior*, indicating that organic farmers who thought new challenges and making money is important, tended to consider natural behavior as less important. Generally, these farmers are likely to have converted their farms later, as the economic incentives for conversion have increased more recently (as an effect of Sweden entering the European Union in 1995, and as a result of increasing market demands for organic products). This shows in our study, where conversion year not only predicted *Organics* but also *Behavior*. That is, the earlier the farmer converted, the more likely is a positive attitude towards organic farming and the attitude that natural behavior is important. Thus, the latecomers do not fully share the pioneers' view on animal welfare.

It is difficult to explain why “Raised on a farm” came out as a negative predictor for *Ethics*. Possibly people with a rural background feel less comfortable with ideas like “having a value of its own” or “lead a life in dignity” in relation to farm animals. However, these concepts have been much used in the Swedish debate about farm animal welfare and ethics, and the Swedish Farmers’ Federation and its members have been active in this debate (e.g., Swedish Farmers’ Federation, 2002).

Interestingly, different types of farmers differed in how they rated the importance of natural behavior. Egg producers were more supportive of the idea that natural behavior is important than dairy producers (although this correlation was weak). This may be related to the fact that animals have less possibility to behave naturally in conventional egg production than in conventional dairy production. Also, organic dairy production can be more profitable than conventional production (Nordgren, 2001) and usually does not require major changes in buildings and management compared to conventional production. Thus, economic incentives rather than conviction of the organic ideals (including the importance of natural behavior) may have played a role for the decision to convert to organic dairy production. On the contrary, organic egg production is very different from conventional production and it is focusing on allowing hens a natural behavior. It can be expected that a major reason for egg producers to “go organic” is their belief that natural behavior is important for animal welfare. A qualitative questionnaire study of Swedish organic egg producers showed that these are often enthusiastic about the organic way of producing but sometimes lack basic production knowledge (Berg, 2001).

Another interesting finding was that agricultural education appeared as a negative predictor to *Behavior*. This may be explained by the fact that ethology was introduced in Swedish agricultural education only after most respondents received their education. There is also the possibility that other aspects of the animal welfare concept are emphasized in agricultural education, i.e., that biological functioning and health aspects are seen as more essential for welfare rather than natural behavior (for a discussion about these concepts see Duncan and Fraser, 1997; in organic farming: Lund and Röcklinsberg, 2001).

Ideals or Making Money?

The two groups of factors that emerged in the correlation analysis (Table III) make sense conceptually. The first group, consisting of *Organics*, *Ethics*, *Behavior*, and *Identity*, signified attitudes that agree with appreciation of organic farming and the pioneer understanding of animal husbandry. The other group, consisting of *Entrepreneur*, *InvaTech*, and

Standards, signified attitudes less typical for organic enthusiasts. Entrepreneurs tended to accept invasive techniques and were critical of the organic standards. This suggests that the entrepreneurial attitude does not go well with the pioneer attitude. Furthermore, it suggests that the pioneers converted because of ideological conviction rather than economic benefits. Correlations between the two groups were weak, indicating that these groups represent to a large degree different attitudes and behavioral dispositions. This may be interpreted as if there are two rather separate groups of organic livestock farmers in Sweden, farmers with pioneer attitudes and entrepreneurial farmers.

Animal Rights vs. Natural Behavior

Theoretically, *Behavior* and *Ethics* represent two different approaches to animal welfare; the attitude that natural behavior is important and the attitude that animal rights, dignity, and the intrinsic value of animals are important. Indeed, *Behavior* and *Ethics* loaded on two different factors. These two approaches represent emphasis on different aspects of the animal welfare concept (Duncan and Fraser, 1997). This study also showed that *Behavior* and *Ethics* were positively correlated.

However, *Behavior* and *Ethics* were not equally important to the organic farmers. Whereas conversion year and *Organics* predicted *Behavior*, *Ethics* was not predicted by conversion year and *Organics* came out as a less important predictor for *Ethics* compared with *Behavior*. Also, *Ethics* did not predict *Identity*, which describes an organic pioneer attitude (as discussed by Lund et al., 2002). Apparently, concepts like animal dignity and intrinsic value (i.e., *Ethics*), which always have been embraced by animal rights movements, are not to the same extent inherent in the organic movement. While the preference of organic farming is to use a systems approach, the typical approach within the animal rights movements is to focus on individuals. Thus, the pioneers in the earlier interview study did not speak about animal welfare in terms of animal rights but rather saw animal welfare as a spin-off effect from a well functioning agro-ecosystem (Lund et al., 2002). In the current study, the main reason given for conversion was the holistic approach to farming taken in organic farming while "Animal welfare" was only ranked as number four among the listed reasons.

That the idea of allowing animals a natural behavior is more important to organic farming than the animal rights approach is further supported by how "*Behavior*" and "*Ethics*" related to "*InvaTech*." The belief that invasive techniques are not acceptable has been strongly argued by the animal rights movements while the organic attitude towards these issues

has been more pragmatic. Although the IFOAM Basic Standards state for example that mutilations are prohibited (IFOAM Basic Standards, 2002, 5.5), national certification bodies may allow exemptions from this principle, and usually do so, in the national standards. In this study, *InvaTech* was significantly correlated to *Ethics* but not to *Behavior*, that is, a negative view of the use of invasive techniques was connected to the animal rights approach while it was not strongly related to the attitude that natural behavior is important, typical of those identifying with organic farming.

View of the Organic Standards

In the factor analysis, *Behavior* was negatively correlated to *Standards*, indicating that farmers who were convinced of the importance of allowing animals to behave naturally were also less likely to consider the organic standards as not sufficiently based in the practical production or not adapted to how animals function. The regression analysis (Table V) suggests that the harshest critics of the organic standards were full-time farmers and farmers who had categorized conversion as difficult. While the latter may not be surprising, the negative attitude among full-time farmers may be a concern for the certifying organization. The correlation between *Standards* and *Entrepreneur* in the final model, although weak, may indicate that persons who primarily saw organic farming as an enterprise also saw the organic standards as a hindrance. However, the earlier interview study (Lund et al., 2002) displayed a more nuanced picture. The person showing the most entrepreneurial attitude in that study was also in favor of strict standards, as he saw these as conclusive for the image and marketing of organic products. (This was the only significant impact of *Entrepreneur* in any of the final regression models).

CONCLUSIONS

Swedish organic livestock farmers generally had a very positive attitude towards organic animal husbandry. The studied sample was well educated and had long experience of farming. Most respondents were full-time farmers. They tended to consider allowing animals a natural behavior an important aim, which is in line with organic philosophy. The earlier the farmer converted to organic farming, the more likely was s/he to regard natural behavior as important. Farmers did not to the same extent approve of statements dealing with dignity, intrinsic value of animals, and animal rights that are frequently used by animal rights movements. Thus, although animal welfare is an explicit aim in organic farming, it appears to be understood primarily in terms of natural behavior.

When analyzing the correlations between the factors, two groups emerged, representing different attitudes and behavioral dispositions. This appears to show that there are two rather separate subgroups of organic livestock farmers in Sweden, on the one hand farmers who considered organic farming more of a lifestyle (a “pioneer attitude”) and on the other hand entrepreneurial farmers, who consider making money and new challenges more important. Their attitude towards animal welfare differed. While the pioneers considered allowing animals a natural behavior a key issue, this was less true for the entrepreneurs who also were more approving of invasive operations such as embryo transfer and castration and more critical towards the organic standards. Also being a full-time farmer was predicting the attitude that organic standards are not grounded in the practical production, something that may be a concern for the certification organizations.

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REFERENCES

- Alrøe, H. F., M. Vaarst, and E. S. Kristensen, “Does Organic Farming Face Distinctive Livestock Welfare Issues? – A Conceptual Analysis,” *Journal of Agricultural and Environmental Ethics* 14 (2001), 275–299.
- Altieri, M. A., *Biodiversity and Pest Management in Agroecosystems* (Food Products Press, New York, 1994).
- Andersson, R., *Ekologiska jordbruksprodukter och livsmedel – Aktionsplan 2005 [Organic Agricultural Products and Food – Action Plan 2005]*, Swedish Board of Agriculture, Report No. 2001: 11 (Jönköping, Sweden, 2001).
- Anon., *Animal Welfare on Organic Farms. Farm Animal Welfare – Current Research and Future Directions* (European Commission, ISBN 92-894-3817-7, 2002), 16–17.
- Berg, C., “Health and Welfare in Organic Poultry Production,” *Acta Veterinaria Scandinavica* 42(4, Suppl. 95) (2001), 37–45.
- Boehncke, E., “Preventive Strategies as a Health Resource for Organic Farming,” in J. Isart and J. J. Llerena (eds.), *Resource use in Organic Farming. Proceedings of the 3rd ENOF Workshop* (Ancona, Italy, June 5–6 1997), 25–35.
- Bohrnstedt, G. W. and D. Knoke, *Statistics for Social Data Analysis*, 3rd edn. (Peacock Publishers, Inc., Itasca, IL, 1994), 266–268.

- Christensen, J., *Alternativer – natur – landbrug* (Akademisk Forlag, Viborg, 1998).
- Cohen, J., *Statistical Power Analysis for the Behavioral Sciences*, 2nd edn. (Lawrence Erlbaum Associates, Hillsdale, NJ, 1988).
- Conford, P., *The Origins of the Organic Movement* (Floris Books, Edinburgh, Great Britain, 2001).
- Council Regulation, “Council Regulation (EEC) No. 2092/91 of 24 June 1991 on Organic Production of Agricultural Products and Indications Referring Thereto on Agricultural Products and Foodstuffs,” *Official Journal L 198* (22/07/1991), 1–15.
- Council Regulation, “Council Regulation (EC) No. 1804/1999 of 19 July 1999 Supplementing Regulation (EEC) No. 2092/91 on Organic Production of Agricultural Products and Indications Referring Thereto on Agricultural Products and Foodstuffs to Include Livestock Production,” *Official Journal L 222* (24/08/1999), 1–28.
- Danish Ministry of Food, Agriculture and Fisheries, “Action Plan II. Developments in Organic Farming,” English Summary (Ministry of Food, Agriculture and Fisheries, Danish Directorate for Development, Copenhagen, 1999) [available at: http://www.dffe.dk/in_english/index.htm].
- Davidson, D. J. and W. R. Freudenberg, “Gender and Environmental Risk Concerns. A Review and Analysis of Available Research,” *Environment and Behavior* 28(3) (1996), 302–339.
- Duncan, I. J. H. and D. Fraser, “Understanding Animal Welfare,” in M. C. Appleby and B. O. Hughes (eds.), *Animal Welfare* (Wallingford: CAB International, 1997), 19–31.
- FAWC, *Interim Report on the Animal Welfare Implications of Farm Assurance Schemes* (FAWC, London, 2001), 45.
- FAO, *Guidelines for the Production, Processing, Labeling and Marketing of Organically Produced Foods*, GL 32 – 1999, Rev. 1 – 2001 (FAO, Rome, 2001).
- Fostvedt, I., *Profesjonalitet, liv og visjoner* [*Professionalism, Life and Visions*], Norwegian Centre for Organic Farming, Rapport 14 fra 30-bruksprosjektet (Tingvoll, Norway, 1993).
- Gliessman, S. R., *Agroecology: Ecological Processes in Sustainable Agriculture* (Ann Arbor Press, Ann Arbor, Michigan, 1998).
- Harper, G. C. and S. J. Henson, *Consumer Concerns about Animal Welfare and the Impact on Food Choice – The Final Report*, EU FAIR CT98 3678 (University of Reading, Reading, UK, 2001).
- Holmberg, H.-E., *Konsumentundersökning om ekologisk produktion/KRAV* [*Consumer Survey on Organic Production/KRAV*], LUI ref. number 30-7866 published 99-12-21 (1999) (available at: <http://www.krav.se/arkiv/rapporter/luiund.pdf>).
- IFOAM, *IFOAM Basic Standards for Organic Production and Processing* (International Federation of Organic Movements, Tholey-Theley, Germany, 2002) (<http://www.ifoam.org/standard/norms/ibs.pdf>).
- IFOAM, *IFOAM Recommendations for International Standards of Biological Agriculture, with Restricted Validity to 2 Years* (September 1980) (copy received from Otto Schmidt in the IFOAM Standards Committee).
- Jelkebring, K., M. Alarik, Å. Odelros, E. Hagström, and L. Larsson, *Växande marknad. Det aktuella marknadsläget för ekologiska livsmedel* [*Growing Market. The Current Market Situation for Organic Foods*] (Ekologiska lantbrukarna, handout, June 2002) (available at: <http://www.ekolantbruk.se/PDFer/vaxandemarknad.pdf>).
- Kaltoft, P., *Naturetik som praksisbegrep. En undersøgelse af naturforståelse, praksis og viden i økologisk jordbrug*, Skriftserie No. 5. PhD thesis, Department of Technology and Social Sciences, Technical University of Denmark, Copenhagen, Denmark (1997).

- Kerlinger, F. N. and E. J. Pedhazur, *Multiple Regression in Behavioral Research* (Holt, Rinehard & Winston, New York, 1973).
- Lindholm, S., *Helhet och mångfald. Det ekologiska lantbrukets bärande idéer i relation till miljöetisk teori [Entirety and Manifoldness. The Basic Ideas of Organic Farming in Relation to Environmental Ethics]*. Ph.D. dissertation, Acta Universitatis Agriculturae Sueciae, Agraria 272, Uppsala, Sweden (2001).
- Lund, V. and B. Algers, "Djurhälsa och djurvälstånd i ekologisk djurhållning [Animal Health and Welfare in Organic Animal Husbandry]," in B. Johansson (ed.), *Är eko reko? Om ekologiskt lantbruk i Sverige* (Formas Fokuserar 1, Formas, Stockholm, 2003), 63–72.
- Lund, V. and H. Röcklinsberg, "Outlining a Conception of Animal Welfare for Organic Farming Systems," *Journal of Agricultural and Environmental Ethics* 14 (2001), 391–424.
- Lund, V., S. Hemlin, and W. Lockeretz, "Organic Livestock Production as Viewed by Swedish Farmers and Organic Initiators," *Agriculture and Human Values* 19(3) (2002), 255–268.
- Lund, V., R. Anthony, and H. Röcklinsberg, "The Ethical Contract as a Tool in Organic Animal Husbandry," *Journal of Agricultural and Environmental Ethics* 17(1) (2004), 23–49.
- NAHWOA, *Final Recommendations and Comments*, Report to the European Union. *Network for Animal Health and Welfare in Organic Agriculture*, Final report from FAIR CT 4405 (2002). To be found at: <http://www.veeru.reading.ac.uk/organic/NAHWOA-ConclusionsFinal.pdf>
- Niggli, U. and W. Lockeretz, "Development of Research in Organic Agriculture," in T. V. Østergaard (ed.), *Fundamentals of Organic Agriculture, Proceedings Vol. 1. 11th IFOAM International Scientific Conference August 11–15* (Copenhagen, Denmark, 1996), 9–23.
- Nordgren, P., *Ekonomisk värdering av tillväxtstrategier för mjölkföretag [Economic Evaluation of Growth Strategies for Dairy Farms]* (Report, Agroväst, Skara, Sweden, 2001), 23 pp. (to be found at: <http://www.agrovast.se>).
- Steiner, R., *Landwirtschaftlicher Kursus* (Section for Natural Science of the Antroposophic Society, Dornach, 1929).
- Swedish Farmers' Federation, *Sveriges Bänders Värdegrund för livsmedelsproducerande djur [Swedish Farmers' Value Basis for Livestock]* (2002) (to be found at: <http://www.lrf.se/miljo/index.htm>).
- Svenson, O., "Differentiation and Consolidation Theory: Decision Making Processes Before and After a Choice," in P. Juslin and H. Montgomery (eds.), *Judgment and Decision Making. Neo-Brunswikian and Process-Tracing Approaches* (Lawrence Erlbaum Associates, Publishers, Mahwah, New Jersey, 1999), 175–197.
- Vartdal, B. and A. Blekesaune, *Sosiale sider ved økologisk jordbruk. Ein sosiologisk studie av omleggingsprosessen [Social Aspects of Organic Farming. A Sociological Study of the Conversion Process]*, Rapport 1/92 (Senter for Bygdeforskning, Trondheim, Norway, 1992).
- Weinberg, S. L. and S. K. Abramowitz, *Data Analysis for the Behavioral Sciences Using SPSS* (Cambridge University Press, Cambridge, UK, 2002).
- Williams, F., *Reasoning with Statistics*, 2nd edn. (Holt, Rinehart & Winston, New York, 1979).
- Wynen, E., "Research Implications of a Paradigm Shift in Agriculture: The Case of Organic Farming," in A. K. Dragun and K. M. Jakobsson (eds.), *Frontiers in Environmental*

Economics (Department of Economics, Swedish University of Agricultural Sciences, Uppsala, Report 119, 1998).

Østergaard, E., *Ett skritt tilbake og to frem. En fenomenologisk studie av bønder i omstilling til økologisk landbruk [One Step Back and Two Forward. A Phenomenological Study of Farmers Under Conversion to Organic Farming]*, Doctor Scientiarum Theses 1998: 25 (Department of Horticultural and Crop Sciences, Agricultural University of Norway, Ås, Norway 1998).

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