

Diversity of pig farming styles: understanding how it is structured

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Abstract

Modern pig farmers work with a variety of objectives they apply to their current situation and future insecurities. They face the daily realities of managing their herd, organizing their time and resources and gaining an income, realities that have been shaped by the past. Supported by technology this daily reality is constantly progressing towards further increase of intensity and scale. The future is unpredictable and not promising. Falling prices, increased risks of disease outbreaks, food quality problems and conflicting interests of consumer demands, all help create uncertainty. Where do farmers take a stand in this turbulent environment? Field surveys have revealed that there is no single answer. Depending on their *ambition* for revenues and development and on their *rationale* for the current condition of the farm, farmers hold a variety of positions. There are various *styles of farming*. Each style represents a specific and integral logic in relation to their ambition and rationale. Farmers express their dominant logic in their specific objectives and strategies. Using results from field research in the Netherlands this paper illustrates what *styles of farming* mean, how they relate to management indicators, what relevance they have to diversifying and expanding markets and the opportunities and risks these present.

Additional keywords: sociological analysis, disease management

Introduction

Since the 1980s there has been a growing need for new concepts related to agriculture and rural areas. Technical developments have reduced the unpredictability of natural conditions for agricultural production, but the economic conditions have become less predictable. At the same time, the aim of agricultural practice is shifting from a focus on productivity to sustainability and diversification of rural functions. To support this shifting focus, new strategic concepts are required at farm level, as well as in renewing agricultural policies, institutional structures and infrastructures.

Scientific studies of styles of farming have described and explained the diversity in farming practices. Scientists conducted these studies in participatory trajectories. This paper, based on a PhD thesis (Commandeur, 2003), attempts to expand this approach and to bridge the gap between science and strategy. Based on survey studies in Twente and the Achterhoek, the eastern area of the Netherlands where pig production is most concentrated, it identifies different styles of pig farming.

Objectives of the article

The general aim of this article is to provide a representation and an understanding of styles of pig farming in relation to the structure of their space of information. The first specific objective of the article is to identify the interests of scientists and pig farmers. Next, the paper clarifies the notion of the structure of the space of information. To evaluate the differences and contrasts among farmers dimensions are specified that form a frame of reference for the evaluation. Next the conceptual notion of styles of farming is introduced. The diversity between styles of farming is expressed as contrast with reference to the dimensions. Through field examples the article shows how the notion of styles of pig farming can provide insights into different strategic options and perspectives for pig farmers and for rural regions.

The styles of pig farming found within the chosen region of the Netherlands represent the diversity of dominant logic of pig farmers, which is expressed as differences or contrasts with respect to various specified dimensions. The examples illustrate the relationship between styles of pig farming and the structural features in the farmers' space of information. In the discussion, long-term market perspectives are introduced to indicate the options for building new strategies based on understanding the diversity in styles of pig farming.

Interest of farmers and scientists

Pig farmers have an interest in stable and predictable conditions for pig production and marketing and achieving a fair and acceptable margin between costs and profits for making a living out of farming. Thanks to technical farm measures, conditions for uniform pig production are fairly well under control. However, economic conditions on pig markets and the external demands for specific modes of production are increasingly unstable, and increasingly threaten profitability. Farmers have no direct influence on these external conditions, but rather have to adapt to them. In anticipation of such external changes, farmers with different styles have interests in specific and adapted forms of farm management support and chain structures.

For rural sociologists and animal scientists grasping the notion of styles of pig farming can lead to an improvement in their understanding of the various ways in which one can be (and remain) a pig farmer in a specific region. With such improved understanding, these scientists can contribute to the development and application of measures required for improving the long-term prospects of pig farming. Through respecting the diversity in styles of farming, animal scientists will be able to refine their interpretations of (technical and economic) farm data and management indica-

tors. The dominant logic that exists amongst groups of farmers, which is represented as styles of farming, provides a specific frame of reference for interpreting these data. Extension officers can use these interpretations to develop specific farm management support measures that are appropriate to various styles of pig farming.

Styles of farming: a structural concept

Structural features and communications dominate the space of information in which farmers operate. The most evident structures are technical features and infrastructures. Firstly, there are techno-ecological features, such as (pigsty) climate, genetic material and the available options for farming within the constraints of soil type and available physical space. Secondly, there are features like the economic infrastructures, supply and sales markets, transport infrastructure, and investment opportunities. Thirdly, there are institutional infrastructures, such as farmers' unions and co-operatives, various governmental levels, institutes for research, education, extension, and management support, and animal health care stations.

These structural features can vary substantially among different regions, making interregional comparison of farm operations difficult. In extensive international studies, Hayami & Ruttan (1985) showed that two basic factors determine interregional (international) variation: (1) *intensity* [productivity per unit of resource (in this case land)] and (2) *scale* [amount of resource (land) per unit of labour input]. See also the discussions in Bolhuis & Van Der Ploeg (1985).

However, within the same region with more or less homogeneous technical structures and infrastructures (and also in comparative studies of different regions with comparable technical structures and infrastructures) scientists have found diversity in patterns of farming practices that cannot be reduced to variations in factorial prices, intensity or scale (Bolhuis & Van Der Ploeg, 1985).

Hofstee (1946) related this diversity in patterns of farming practices to the strength of different influences in structural communications. Neighbours, family and friends, extension officers, researchers and teachers, all participate in the structural communications within rural areas. Through specific discourses, they interpret the prevailing topics, sensitivities and conflicts and thus direct the choices farmers make and the solutions they choose, apply, and copy from one another. So the space of information is structured, not only in a technical, but also in a social sense. Farmers express the differences in outcomes of the social processes in a diversity of patterns. Hofstee introduced the term *style of farming* to describe these patterns in relation to the surrounding space.

These and other studies reveal a different kind of structure in the information space of farming. This structure consists of the shared and contrasting perceptions of farmers, traders, processors and policy makers, about what should be produced, where, and how it should be produced and processed (and with what quality features), as well as how 'the market' and 'the consumer' accept and validate it. These structures can be identified, constructed and reconstructed analogously to the way in which physical structures are identified, constructed and reconstructed. In this scheme,

styles of farming are representations of integrated farmers' logic developed in relation to a specified framework of techno-sociological dimensions (Commandeur, 2003).

Frameworks and definitions

Styles of farming are cultural repertoires (or patterns) in farming practices. Through the years a large number of definitions have been developed. In pre-industrialized farming, styles of farming were locally based cultural patterns (Hofstee, 1946; 1985). After industrialization, the structuring principles were identified as technology and markets (Van Der Ploeg, 1994) or technology and *business* (Commandeur, 2003) the latter of which emphasizes the interdependent relations between labour and markets. These dimensions specify the *space to manoeuvre* available to farmers, given their technical and infrastructural production conditions. The notion that farmers are tied to structured consistency and logic for their strategies reduces the image of independent farmers who face broad spectra of opportunities and dynamic options for decision-making, to constrained farm operators with, at the most, a handful of structurally embedded options for development.

Modernization and progress

Studies of the industrialization and modernization of farming identify the dimensional framework as dominated by succession, labour division and gender, location, and the notion of locality. The focus of such studies is on farmers' interactions with each other and with the emerging opportunities in their environment. Some research has focused on temporal aspects of these features, seeking to identify changes through time and the key moments when such changes occur. These emergent styles of farming reflect the vitality of farm continuity in the region. For examples see Bennett (1982) and Van Der Broek (1998).

Intraregional perspectives

In comparative intraregional studies the dominant dimensions are the techno-sociological framework, focusing on intensity and scale, and the factors that reflect other aspects of technology and business, such as market integration and ambition for revenues. Styles of farming are often expressed as metaphors, referring to the dominance of farmers' logic, reflecting the diversity in passions for farming. In studies that take a diversity of opportunities for agricultural production into account, the perception of *markets* is a dominant factor in the framework and is often related to *land use* (e.g. Roep & De Bruin, 1994; Van Der Ploeg, 1994; 2003; Wiskerke, 1997) and to the perception of product quality (Van Der Meulen, 2000).

Interregional comparison

Interregional comparisons of styles of farming are difficult to conduct, because such studies need to address the plausibility of the basis for comparison between the re-

gions. Regions are comparable if technical structures like environmental conditions, infrastructure and accessibility of institutional structures and networks are more or less similar, and if the styles of farming can be analysed in relation to the same dimensions.

Farming styles, types or systems?

Literature employs a range of, seemingly, closely related terms such as farming style, type and system. So some clarification of the differences between them is useful.

The difference between a *style* and a *type* (or any similar reference) lies in the aim and objective of acquiring the knowledge:

1. The aim of acquiring knowledge about *styles* of farming is to understand the diversity in logic among farmers. The objective is to make a clustering of farming strategies and practices of farming activities that express a similar logic, in order to characterize a stylized image that expresses the dominant logic of that group of farmers.
2. The aim of acquiring knowledge about *types* of farms (or farmers) is to categorize farms (or farmers). The objective is to classify the farms (or farmers) in distinct groups using specified (empirical) criteria.
3. The aim of acquiring knowledge about farming *systems* is to integrate the knowledge of the subsystems that create the whole of the farming enterprise. The objective is to describe and clarify the linkages between the subsystems.

Styles of farming are more easily recognized than represented by scientists and the use of the term *style* or *type* in literature is not as unambiguous as these terms suggest. Recognition of farming styles can come from the images and metaphors that the farmers employ. However, representation of farming styles implies the identification of reference structures and requires a discussion about the solidity and relevance of these structures in directing farmers' logic. Computerized analyses of 'solid' technical and techno-economic data may reveal diversity, including patterns of clustered farm data. Yet they should not be referred to as 'styles', unless the information is supplemented with the farmers' logic and analysed in relation to relevant structuring dimensions. For example, Ilari *et al.* (2003; 2004), who work in France with the national accountancy and do not use sociological information in their work, refer to the groups of farmers that they find as types, although these types show clear features of *style* images. Van Der Ploeg & Roep (1988) refer to the groups they found in similar research (based on the Farm Accountancy Data from the Agricultural Economics Research Institute, LEI) as *styles*, because of the cultural patterns that are implicitly represented by the clustered groups.

Farming, farm or farmer?

The English word *farming* refers to a dynamic activity; the farm is the result of the activity and the farmer is the one who practises the activity. So the English word refers to the process and the interactions between farm and farmer. (In some other languages this precise connotation can be absent.) Nevertheless, on a farm where several

Table 1. Styles of pig farming represented with metaphors as stylized characterizations of the diversity in dominant farmers' logic in the study area.

Techno (-economic) dimensions:	Labour productivity (intensity x scale)	Intensity: productivity of the sows	Scale: sows per labour input
Socio (-economic) dimensions:	Ambition for revenues; profits, livelihood, and private satisfaction	Function of the herd; animals, farm identity and techno-ecology	Role of the business; labour, efficiency and market participation
Styles of farming (in metaphors)			
Entrepreneur	Gaining profits through production efficiency.	Source for passionate optimization of farm management control.	Specialized, efficient and highly market integrated in global chains.
Craftsman	Gaining profits through high productivity levels.	Source for passionate devotion to productivity from sources (sows).	Technically professional labour integrated in quality market chains.
Steward	Gaining livelihood for farm continuity at the farm location.	Source for farm security in the context of making a living in rural life.	Utilization of capacities of family members; market access through regional networks.
Stockman	Gaining livelihood from pig farming at the farm location.	Source for farm identity in the context of making a living in pig farming.	Utilization of passionate labour for pig farming; low investment levels.
Shifter	Gaining livelihood at the farm location.	Source for opportunities in other passions in the	Routine, efficiency and low investments; search

people work and live, each individual will have a personal style. While it may be interesting – from a sociological point of view – to study the interactions between these personal styles (since different forms of personal interactions may lead to different farm developments), in a study of styles of farming one focuses on the activities from which the present farm as a whole has evolved. Therefore, the term ‘farmer’ in studies of styles of farming *...refers to the group of people who shape the practices on a particular farm, or in a particular style of farming. In other words, in terms of styles of farming, the ‘farmer’ is an abstract notion of the ‘acting agent’* (Commandeur, 2003: p. 44).

Styles of pig farming as a representative model

An additional discussion deals with the question whether or not land use should be taken as the principal structuring dimension directing the diversity in styles of farming. Ventura (2001) and Van Der Ploeg (2003) support this position. In doing so they draw on the original work of Hayami & Ruttan (1971; 1985) in which the area of agricultural land was used as the resource reference for definitions of *intensity* and *scale*. However, in pig farming, where production is often non-land based (or only indi-

rectly), the strategic factor from a farmers' perspective is the allocation of feedstuff rather than its production. So the number of producing sows is a more appropriate resource reference for defining intensity and scale than land availability or land use. The logic and passions of farmers form a focus of the approach still remaining true to the styles of farming approach, but land use is no longer a basic structuring dimension. Relevant reference structures other than land use that shape farmers' logic become thus more apparent. These can include dimensions that structure the objectives of farming, like the function of the herd, the production technology, the role and efficiency of labour and investments, the ambition for revenues, and integration in supply and sales markets.

This study focuses on styles of pig farming within a uniform market (feeder pigs of 25 kg). This research disregarded aspects of land use as this was a constant rather than a variable. Intensity and scale remained the main elements of the framework, but focused on the sow (rather than on land use) as the principle resource for productivity. Labour productivity, the ambition for revenues and the farmer's rationale about technology and business dominated the framework.

These different points of view can be summarized in the following general definition: *Styles of farming are stylized characterizations of the diversity in passions for farming, represented by the farmers' dominant logic, expressed in what farmers say and do, and identified through analysis of clustered contrasts and differences in the practices of farmers, in reference to a framework of relevant dimensions within a given information space.*

Styles of pig farming in the Netherlands: an intraregional survey

In 1998, a survey was conducted among 82 pig farmers in the pig production area in the east of the Netherlands: Twente and the Achterhoek. The survey used an extensive questionnaire based on previous results from 23 open interviews among pig farmers throughout the Netherlands in 1996. Seventy of the 82 farmers provided supplementary technical data from their management support programmes. After factor analysis and synthesis of relationships among techno and socio-(economic) dimensions, five styles of pig farming were distinguished. These styles reflected the diversity of passions for pig farming, expressed in the farmers' dominant logic. The characteristics of these five styles in relation to the reference dimensions are listed in Table 1.

The five styles of farming (with the exception of 'the shifter') exhibit a passion for pig farming. However, the positions in the perspective of labour productivity and ambitions for revenues differ: the entrepreneur and the craftsman opt for increasing labour productivity and gaining profits, whereas the other styles of farming opt for maintaining a livelihood. Other key differences also emerged:

1. The entrepreneur increases labour productivity through scaling up.
2. The craftsman increases labour productivity through intensification.
3. The other styles of farming enlarge and intensify the production because of necessity, i.e., in order to stay in business.

Subsequent analysis of the information relating to these farms led to the conclusion

Table 2. Technical indicators that reflect the productivity of sows for three styles of farming (entrepreneur, craftsman and stockman).

Metaphor	n ¹	Technical indicator					
			Piglets born alive --- (per litter) ---	Weaners ---	Farrows ² ----- (per sow per year) -----	Weaners ---	Feeder pigs -----
Entrepreneur	19	μ	11.0	9.9	2.33	23.3	22.7
		σ	0.4	0.4	0.08	1.1	1.1
		R ³				*	*
Craftsman	10	μ	11.5	10.2	2.37	24.2	23.4
		σ	0.5	0.4	0.06	1.1	1.1
		R	**	**	*	**	**
Stockman	12	μ	10.5	9.4	2.26	21.4	20.6
		σ	0.04	0.04	0.09	1.6	1.7
		R	**	**	**	**	**
Population (total survey)	70	μ	10.9	9.8	2.32	22.8	22.0
		σ	0.5	0.4	0.08	1.4	1.7

¹ n = number of farms.

² Farrow index.

³ Statistical significance of the correlation coefficient: * = $P < 0.05$; ** = $P < 0.01$.

that the five different styles of farming set a different value on the different farm assets. Relative differences in values were recorded in relation to the principal production source (sows), the principal product (feeder pigs of 25 kg), and the burdens of investments and labour demand in the production system. Styles of farming reflected differences in farm size, time management, labour division, investment pattern, housing and feeding system, sow replacement and culling pattern, genetic material, hygiene, health care, animal welfare and manure management practices, market orientation and perception of consumers. Within these differences, *efficiency* did not appear to be an absolute but rather a relative value, related to the dominant logic of the farmer and the way in which he structured different combinations of these factors. So the dominant logic of the farmers provides the contextual embedding in which data about farm performances must be interpreted.

The research illustrates that styles of farming have different qualities, and different capacities for adapting to changing circumstances. Farmers react differently to fluctuations of unstable markets, and will react differently to future events.

Example 1. Herd management: attitude towards hyperprolificacy

Hyperprolificacy is the phenomenon of some sows being capable of producing more

piglets in a single litter than they are able to feed, simply because they have fewer teats than piglets. This phenomenon is not very common. More frequently piglet size varies within litters, particularly in relatively large litters of 12 piglets or more. In both cases the farmer has a problem if he wants to maximize the number of surviving piglets.

A number of management measures are known through which farmers can maximize the number of piglets surviving from large or excessive litters. These include:

1. Installing equipment in a special (hygienic and heated) pigsty for feeding the excessive piglets.
2. After weaning the piglets of a sow with good milk production, the sow is kept in the pigsty for lactating sows and presented with the excessive piglets from another sow, instead of returning her to the herd of barren sows.
3. The same as with 2, but in a system where the piglets are removed from the mother sow after one week. This system interferes less with the continuity of the gestation cycle of the herd.
4. Re-grouping the piglets from sows that farrowed together within a few days. Large piglets are put together with one sow and small piglets with another sow. In this way, small piglets have less competition from large piglets and the number of piglets per sow can be maximized.

Efforts to maximize the number of piglets to be born and to survive also have a problematic side. Small piglets are more susceptible to health problems than large ones. The larger the litter, the weaker and smaller the piglets when born, and the larger the losses in raising them. From a technical point of view, one may search for an optimum balance between gain and loss, and the amount of labour involved. However, from a sociological approach, there is a more basic question about passion and logic. Is the farmer motivated to implement specific measures trying to maximize the number of piglets to be born and to survive? If so, can the farmer accommodate these measures within the available housing system, as well as in his system of time and labour management? The answer is a *package decision*, where optimization can only take place after a principle decision about strategy. This principle decision differs between styles of farming. This point is illustrated in Table 2, which lists technical responses to this problem for three different styles of farming: entrepreneur, craftsman and stockman.

Technical analysis

The data in Table 2 show that sows on farms with the craftsman style produce, on average, one more living piglet than the sows on the farm of a stockman, and 2.8 feeder pigs more on a yearly basis, because of the additional effect of a higher farrow index. The craftsman style produces consistently higher than average results on all given indicators, whereas the stockman style produces consistently lower results. Sows on farms with an entrepreneurial style produce litters of an average size. However, entrepreneurs get a higher than average number of feeder pigs per sow per year than the other groups (22.7 compared with an average of 22.0).

The technical data show that these styles of farming employ different management systems, which vary in their management of litter sizes and piglet growth (Table 3).

Table 3. Combinations of contrasting aims of three styles of farming (craftsman, entrepreneur and stockman) with respect to management of litter size and piglet growth.

Aim for piglet survival	Aim for large litters		
	High	Medium	Low
High	Craftsman	Entrepreneur	(illogical)
Medium	(not discussed)	Population average	(not discussed)
Low	(illogical)	(not discussed)	Stockman

Sociological analysis

The results in Table 2 can be predicted from Table 1. The central focus of all pig farming (as adopted in this study) is producing uniform feeder pigs of a specific type at 25 kg body weight for 'the market'. There are two techno-sociological dimensions that dominate the farmers' logic for attaining this aim and that differentiate between the different farming styles: (1) the function of the herd, and (2) the role of the business (in this case labour and investments). The questionnaire responses and additional comments of the farmers illustrate these rationales:

1. A craftsman has a passionate devotion to optimize the desired production from a technical perspective and therefore focuses on sow productivity. A farmer with this style is devoted to having large litters and to raising a maximum number of piglets. He uses this as a criterion for selecting his sows. A farmer with this style implements technical measures and management procedures to deal with large litters and to maximize piglet survival rates. Of course, this farmer has a relatively higher percentage of piglet loss, but with a keen health programme, attention for artificial insemination and a sound culling and replacement management, this farmer achieves the highest rate of sow productivity. In interviews these farmers often underlined this fact, proudly saying that they belong to the national top 10%! Craftsmen will take advantage of genetic developments towards hyperprolificacy and will use hyperprolific sows to enhance their capacities so as to increase overall sow productivity.
2. An entrepreneur is passionate about optimizing the desired production from a perspective of economic margins, and therefore focuses on farm management. The management systems required for dealing with the birth and survival of the extra (weak and small) piglets are not labour efficient and this farmer does not implement most of these management systems, nor does he seek hyperprolific sows. The farmer is very keen on optimizing the health regime of the piglets and pays attention to artificial insemination and to culling and replacement management. Together these strategies lead to the best productivity results in terms of labour input. However, these results require investments in modern housing, farm automation and equipment. An entrepreneur is prepared to make these investments provided they will lead to greater labour efficiency.
3. A stockman is more passionate about pigs than about production and is a reluctant

investor. A stockman is unlikely to renew or renovate pigsties and equipment before they wear out. Therefore, a stockman accepts implicitly that his herd has relatively more housing-related health problems than other styles. His aim is not to maximize (or even optimize) the number of piglets born or surviving, nor to achieve the best farrow index (the average number of farrows per sow per year). He rather wants to keep the herd as healthy as possible under the housing circumstances. Health comes before productivity. A stockman would in general not take measures to increase sow productivity if these measures increased health risks. So the aims of a stockman for sow and labour productivity are different from those of an entrepreneur or a craftsman.

Conclusions

1. If the technical data for sow productivity are disaggregated for style of farming, they show different patterns, suggesting different management systems.
2. The sociological analysis of the dominant logic of the styles of farming coincides with the results of the technical analysis, confirming the existence of different logics for management.
3. Hyperprolificacy is an objective for a craftsman, but not for other styles of farming, because craftsmen are focused on increasing the production per sow. In future, the deviations from the population average of sow productivity will increase among styles of farming, because in some styles the required labour adaptation fits whereas in other styles a different focus is chosen.
4. The data reflect the results of dominant logic that the farmers apply. Vice versa, the dominant logic of the farmers can be used to predict the technical data. This is an ongoing process. Data and logic coincide.

Example 2. National disease management and risk

The outbreak of swine fever in the Netherlands in 1997/1998 was the first disease outbreak that alerted farmers, government and the public to the consequences of the combination of the EU non-vaccination policy (implemented in 1992) and the Schengen agreement (the EU agreement on open borders; implemented in 1994). Until then the Dutch agricultural sector had focused on the positive aspects of these developments, notably the expansion of markets and trade. The Dutch agrarian transport sector particularly benefited from these developments. There had been warnings from veterinary epidemiologists and other animal health experts and from farmers unions about the negative consequences (Van Der Ziel, 2004). In an article in *Agrarisch Dagblad* (Agrarian Daily) of November 1992 farmers and veterinarians complained about the government's laxity for not developing a protocol for outbreaks of foot and mouth disease. But the entire agricultural network of government, institutions, unions and enterprises was focused on the economic benefits of the non-vaccination policy (Berentsen *et al.*, 1992), and only few studies on preventive measures and re-evaluating and renewing the basis for prevention and control of disease outbreaks were undertaken, like Horst (1998). The relations between the increasing animal and meat transport sector and the risks of disease outbreaks were particularly

scarce. After the outbreak of swine fever, simulation models were developed, which estimated the risks of re-introduction by animal transport at 49% and by transport means 33% (Meuwissen, 2000). This was alarming in view of the expected imports for repopulation.

Based on the images of the differences in styles of farming, the risk of the unregulated structure of the transport sector of disease transmission among the different networks was postulated in 1996 and brought to the attention of the Ministry of Agriculture, Nature and Food Safety.

The *entrepreneur* is internationally oriented, and was quick to anticipate the potential of opening borders. The trading of pigs and feeder pigs throughout Europe became a growth market for Dutch pig producers and entrepreneurs were in the forefront of this. This in turn boosted the Dutch animal transport sector, increasing its market share and its networks across Europe. Through this international orientation they increased the risk of diseases being introduced into the country. The management system on the entrepreneurs' farms did increase hygiene measures because of their dominant logic of farming as a whole (see previous example), and led to the creation of hygiene barriers to the outside environment.

By contrast, the *steward* (see Table 1) is regionally integrated, both in the natural and in the social environment. A steward seeks and maintains market contacts through regional chain traditions. The market integration in the larger structures is indirect, through the (traditional) regional contacts. Since the logic of stewards is also connected with having a mixed farming system (dairy cattle, cereals), hygiene measures differ from the farms of entrepreneurs and their contacts with the environment are more open. Endemic pathogens can spread easily to the local environment and into the regional network.

The *transport sector* in the Netherlands is open in its organization with most transport enterprises being independent. There are few contract bonds that tie up transport means to certain product lines or sub-chains. So the same means of transport serve both the international network of the entrepreneur (with increased risks of disease introduction) and the local network of the stewards (with increased risks of spreading the pathogen). So the transport sector became a risk factor for animal disease outbreaks.

The outbreak of swine fever in 1997/1998 can be traced back to the transport sector. The disease spread fast within the region of introduction, following existing patterns of social and business contacts in the region (Elbers *et al.*, 2001). The outbreak occurred in an area where agricultural colonization had taken place relatively recently (about 100 years or 3–4 generations ago) and in two distinct stages. Both groups of colonists brought their own networks of suppliers and contacts for transport and kept them over the generations. Although the epidemic spread extremely fast in the area where it was introduced, it took four months before it reached the other part of the colonized area.

After the swine fever outbreak, and the subsequent outbreaks of foot and mouth disease in 2000 and fowl plague in 2003, the Dutch government launched several series of measures, focused on improving the hygienic status of farm and transport means, and on reducing all transport of pigs, particularly of live pigs.

The government regulations were directed at individual farms and enterprises, requiring a list of uniform measures for improving the hygienic status of farms and transport means. They impacted differently on farms with different farming styles. On farms of entrepreneurs many of the measures were already implemented or were – due to the farm specialization – easy to implement. Stewards found the measures much harder to implement than entrepreneurs. The measures often involved substantial and unforeseen investments in the reconstruction of buildings, which sometimes was hard to integrate in the available space. The obligation to create a washing facility for transport means, and the fact that regulations did not differentiate between local transport and long distance transport of animals, were particularly contentious. On some farms it was impossible to implement these measures. Many stewards thought that although parts of the measures could be correct, other parts were ‘illogical’, particularly if they had mixed farms with a limited pig sector or little farm field contact with the environment where wildlife roams. So as a result the measures reinforced already existing market tendencies towards specialization and made life harder for farmers who wished to maintain a more diverse and integrated farming system. At the same time the Dutch government did not take the more simple measures that could separate high-risk international transport networks (and their contact farms) from low-risk (local) transport. By taking the postulated logic of styles of farming in considerations the government could have concentrated more on taking measures related to the specific risk factors of interactions of the styles of farming. In 2005, experts in epidemiological economics concluded after evaluating the three animal epidemics that *“Results showed that separation of national and international transport of pigs is the most cost-effective measure, especially when risk aversion is assumed.”*(De Vos *et al.*, 2005). This conclusion is remarkably similar to the suggestions that were made based on the postulated interaction between styles of farming.

Conclusions

EU and national regulations for the agricultural sector tend to focus on prescribing measures to be taken on farms and in enterprises, and not on measures at the level of the sector structure. Such measures systematically favour the entrepreneurial style of farming over other styles. This systematic bias favours the persistence and evolution of structures in the agricultural sector that undermine the sustainability of farming as a whole. In this example the principle mechanism for disease introduction and spread persists; with the measures introduced merely reducing the frequency of disease introduction and its spreading rate.

Yet, in the long-term future, competitiveness looks increasingly tenuous and not better compared with other styles of pig farming, as the cost structure in the Netherlands that used to favour this style, is coming under increasing pressure from newly emerging producer countries (e.g. Spain, Brazil and Eastern Europe). From the perspective of the national economy there is no *a priori* argument for specifically favouring this style over other styles of farming.

Discussion

Intensity and scale can explain interregional differences in production circumstances for farming (Hayami & Ruttan, 1985) although they do not offer a complete explanation, as social structures interact with the technical and techno-economic structures. The concept of styles of farming expresses this notion (Van Der Ploeg, 1994). Styles of farming are stylized characterizations of the diversity of passions for farming and farming practices, represented by the farmers' dominant logic. Their logic can be understood as contrasts and differences with reference to specified dimensions in the farmers' space of information. Acquiring knowledge about styles of farming can structure our understanding of the diversity of logic of farmers.

What are the strategic options for pig farming?

There are discussions all over Europe about the future of pig farming, particular in face of recurrent price crises, which seem to last longer and show less signs of recovery each time they occur (Van Der Ploeg *et al.*, 2002). The last crisis on the pig market started early 2002 and the long overdue recovery over the past few months is only partial.

Long-term market trends are subject to extensive debate. Some scientists think that undifferentiated commodity sales will continue to dominate the market for pigs and other farm products (e.g. Van Bruchem *et al.*, 2004). North-western European pig farmers will continue to lose their markets be it under the pressure of international competition. Is product diversification a possible way out? There are signs that the markets are differentiating. A market for cut parts with differentiated prices for ham, shoulder, etc. is developing in France as well as in the Netherlands. The current policies of the European Union boost origin designation and labels, such as protected geographical indication (PGI), protected designation of origin (PDO), organic, and certificates for special characteristics (CSC). In addition, product ranges are increasing. Many traditional delicacies, like pâté, dried meat and sausages are being revived. Furthermore, there is a growing market for prepared dishes, which is simultaneously diversifying into 'convenience foods' and 'delight foods'. If this diversification of markets continues to develop, it will have implications for the whole supply, production, sales and chain infrastructure. Different styles of farming will have a greater variety of options for diversification.

Techno-sociological support for farming-styles-related herd management

Management support decision models are currently streamlined, based on the implicit assumption of an entrepreneur (in economic models) or a craftsman (in technical models). The objectives and constraints, as well as a desire for model optimization for the farmers, are derived from general and uniform assumptions. Yet, analyses of styles of farming not only show that there is a diversity of objectives and constraints, depending on the farmers' logic, they also show that optimization is not a linear process. There are sets of management options a farmer can choose from for implementation

on the farm, depending on his dominant logic and his style of farming. Recognizing this, herd models for farm support should be built up from a modular basis, which can incorporate different 'logic' combinations and thereby specifically support various styles of farming.

For example, it is shown that the aim of the entrepreneur is to maximize profits through cost reduction. The herd model for this style is a specialized pig farming model with clear constraints in terms of labour efficiency. Inefficient technical novelties like hyperprolificacy are excluded. The farm model is a specialized pig farm. In the evaluation of cost reduction, transfer to another location is among the options.

The aim of the steward is farm continuation, with the family on the farm location. Transfer to other locations is not among the options. Shifting to other production activities as well as new types of enterprise, such as tourism, social care or on-farm processing are opportunities that might emerge in the model, as the model is based on a mixed farm. However, the constraint is that the family members must be able to do the workload and that the investment level does not jeopardize farm continuation.

Concluding remarks

This article provides a way of understanding the diversity in the logic of pig farmers, in terms of *styles of pig farming*. It shows how one can make explicit, in a scientific way, the diversity in farmers' logic in relation to relevant dimensions. The methodology allows scientists to improve their interactions with farmers and representatives of the surrounding institutions and enterprises, about future strategic options. If scientists develop an understanding and representation of the logic of the farmers in relation to the dimensions that structure the farmers' logic, they open opportunities for style-differentiated – and therefore more specifically focused – policy measures, both on-farm (through specific technical extension) and more generally (in structure-oriented institutional policies and co-operation).

This article presents two examples of the importance of understanding *logic patterns*. The first example is the diversity in patterns of herd management. It illustrates the link between farmers' rationales, reflected in styles of farming, and farm results, reflected by technical indicators. Improving farm results from the level of one style to another does not imply a gradual change towards 'doing everything in a better way'. It implies a fundamental shift in logic and rationale, in farm structure, and in farm management patterns. So there is no obvious *a priori* answer to the question of which style is most economic or profitable.

The second example illustrates how the international political process of liberalizing markets will bring inherent changes in patterns of trade and production. EU policy boosted international animal trade from the Netherlands and benefited Dutch transporters. In hindsight it might be said that there was an overly narrow focus on the economic benefits of enlarging open markets, which meant that the removal of implicit controls imposed by existing market structures and the potential of the new structures for increasing risk were overlooked. It is true that the process of globalization is beyond the control of the Dutch government and marketers, and that the option

of 'not participating' in the further opening of agricultural markets does not exist.

Nevertheless, after the three recent animal disease outbreaks in the Netherlands (1997/1998, 2000 and 2003), the Dutch government remains focused on regulating individual farms and enterprises. Such measures have a differential effect on various styles of farming, favouring some and discouraging other.

This article has only briefly addressed the questions of increasing costs and decreasing margins for (pig) farming in the Netherlands. Yet the arguments contained within it strongly suggest that despite uniform approaches, diversified pig farming has persisted and has contributed to the development of the sector. It is therefore likely that accepting and supporting diversity has a better future perspective than concentrating on uniformity. Further study of the styles of (pig) farming is an important tool for pig (and other) farm enterprises and institutions in the agricultural sector to identify and anticipate future strategic and structural opportunities within the ongoing process of globalization.

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