An interactive approach to policy impact assessment for organic farms in Europe

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The individual contributions in this publication remain the responsibility of the author.

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1 Executive Summary

Environmental objectives and the reduction of surplus production are increasingly subject of the Common Agricultural Policy. Increasing attention is paid to the support of environmentally sensitive forms of agriculture. Organic farming has been supported within the agri-environmental programme since 1992. This has lead to dynamic development of organic farming in many European countries. The rural development regulation, Council Regulation 1257/99 (EC 1999b), emphasises these agri-environmental measures even more within Agenda 2000. However, payment rates, eligibility and accompanying conditions vary widely among countries. Little is known about the comparative effects on profitability and development potential of organic farms and this raises the question of the impact of policy measures on the development of organic farms.

The **main objective** of this research was to analyse the impact of potential policy scenarios on organic farms in the European Union and to provide the basis for the future orientation of policy measures for supporting organic farms. Furthermore, test a new methodological approach to policy impact assessment was tested in terms of its applicability to international comparative policy impact analysis for organic farms.

Based on the experience that farmers' behaviour can only be insufficiently quantified and depicted in mathematical models, a **methodological approach** is presented which links focus groups – consisting of farmers and advisors – to a simulation model for policy impact analyses on organic farms. The selection of this approach for analyses of organic farms is discussed from a theoretical viewpoint and in view of experiences made with it's application.

Typical dairy and arable farms in the four EU-countries Denmark, Germany, Italy and the UK were selected as case study countries in order to achieve maximum representation with regard to regional distribution within the EU, development of the organic farming sector, support structures and market orientation. In each country, typical farms were selected in a step-by-step procedure based on various criteria and of a mix of data sources:

- Selection of regions typical for organic dairy and arable production.
- Definition of the size and structure of farms typical for that region.
- Definition of farm level details by focus groups.

The simulation model TIPI-CAL© (Technology Impact and Policy Impact Calculation Model) was used to simulate the effects of potential policy developments and adaptation strategies on the profitability of farms. Focus groups evaluated simulation modelling results and proposed adaptation strategies of farms to policy scenarios. This allowed to take the economic behaviour of farmers into account which generally cannot be depicted in farm economic modelling procedures.

As a result of the **evaluation of this methodological approach**, which is characterised by a mix of methodological elements (typical farms, based on focus groups, and the simulation model TIPI-CAL©), it can be concluded that it proved useful in addressing the research objectives under the constraints encountered. On the one hand, the selection of typical farms proved to be appropriate by statistical data at a later stage. On the other hand, the interaction of the model TIPI-CAL© and focus groups is appropriate to depict the economic decision making of farmers. Factors which are not influenced by farmers and which difficult to asses are depicted well by the simulation model, while farm development and adaptation strategies to policy changes are introduced into analysis via focus groups. Therefore, this approach to policy impact analysis can be recommended despite the high input required by focus groups.

Large differences between **typical organic farms** exist between the selected case study countries Denmark, Germany, the United Kingdom and Italy, providing an overview of the wide range that exists in terms of structure, farm size, management and profitability of typical organic farms in the EU. National differences spring to mind primarily in terms of organic aid and labour input.

The **effect of** the European agricultural policy package**, Agenda 2000**, on organic farms in the EU depends primarily on the farm type and land use: Gross margins of organic dairy farms are largely unaffected by Agenda 2000, while organic arable farms tend to suffer slightly.

In **dairy production**, the introduction of a milk quota payment and increasing slaughter premia for beef compensate for losses caused by decreasing milk prices. Furthermore, increasing milk yields via breeding improvements and a reduction in prices for concentrates compensate for part of the losses in market receipts. On dairy farms with a high intake of concentrates, livestock variable costs may increase less than on farms with a low intake of concentrates. Additionally, dairy farms will benefit slightly from increasing arable area payments, although arable crops contribute only minor shares to total gross margin.

Gross margin development of **organic arable farms** depends mainly on farm production structure. Farms with a high beef density and low yield levels in crop production tend to benefit from Agenda 2000 developments. Gross margin developments in crop production depend mainly on the cereal yield levels achieved. Farms with low yields tend to suffer less from price reductions and benefit relatively more from increasing arable area payments. Additional livestock payments overcompensate for losses due to price reductions in the beef sector. Livestock gross margins of farms with high prices for beef and low beef density suffer substantially from beef price reductions. Generally, organic farms will depend increasingly on government payments in Agenda 2000.

Results from focus groups and simulation modelling demonstrate that organic farms will need to pass through substantial adaptation processes in order to improve farm family income in the Agenda 2000 environment. **Adaptation strategies to Agenda 2000** are mainly related to growth, diversification and value addition.

Dairy farms tend to emphasise intensification (growth in herd size, area and milk yield improvements) despite the continuation of milk quota regime. In part a diversification into new production activities, such as field vegetables, intensive livestock systems or direct marketing may be promising options.

Arable farms focus on diversification through additional production activities, such as vegetable production, value addition by intensive livestock farm branches (e.g. pig or chicken rearing) or direct marketing. In general an increasing importance of intensive livestock and vegetable activities can be expected for all farm types.

The **impact of alternative policy scenarios** on the profitability of organic farms in the EU differs widely between scenarios and farms. Three scenarios were analysed:

- Scenario I simulated a supply policy-driven situation with increasing direct payments for organic production.
- Scenario II simulated a demand-induced situation with temporarily high price premia.
- Scenario III depicts a situation, in which a 25% price premium is paid for organic products at the farm level.

The highest profitability is observed in **Scenario I** on most farms, the impact on dairy farms being stronger than on arable farms. Only on the UK arable farm, losses due to deteriorating price premia are greater than additional support payments, as additional area payments are lower than in the other countries. In **Scenario II**, the demand-induced increase in price premia is only temporary and prices drop below the initial price levels by the end of the simulation period. However, profits are more or less maintained, the impact depending on the initial premia. In **Scenario III**, all farms except the Danish farms suffer losses in profitability, because price premia for organic products were lower than 25% in Denmark in the initial situation. The effect of Scenario III is strongest on arable farms, as price premia for crops tend to be higher than for milk.

The impact of these scenarios depends mainly on the initial price premia observed, the level of support payments and the nature of farms in each country. Farms with high yields suffer most from a reduction in price premia. In countries with high price premia the effect of price premia drops is stronger than in countries with low price premia. Similarly, price premia are a decisive factor for differences in the development of farm types. Area payments reduce the risk of losses in profitability due to price premia reductions.

According to focus groups, the **adaptation strategies** of organic farms do not differ significantly with different scenarios. Differences observed are primarily related to farm type and to farmer characteristics. In all scenarios, a trend towards greater specialisation of farms is observed. Farms strive to changed situations either by extensifying or intensifying production. Extensification is envisaged by considerable growth in area to take advantage of economies of scale. Furthermore, a trend to value-adding strategies is observed.

Based on these results, consideration of these trends in the design of policy measures can be recommended. Efficiency improvements help existing organic farms to reduce costs and increase competitiveness. Diversification helps farms to survive in their specific niche, while the organic market as a whole benefits from the supply of a wide range of products. Increased quantity and diversity of supply may foster the development of efficiency in processing and marketing as well as consumer satisfaction, and thus positively affect demand.

Increasing market integration of organic product markets in Europe is expected to increase competition among countries. Regional price differences are expected to decline and national and regional differences in production costs will become more important in the future. This is expected to lead to greater specialisation of farms and regionally more differentiated organic production. Hence, optimising production and reducing production costs without jeopardising organic process quality will remain an important task in the future.

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Abbreviations

AWU	Agricultural Work Unit
BSE	Bovine Spongiform Encephalopathy
CAP	Common Agricultural Policy
DE	Germany
DK	Denmark
€	EURO
EU	European Union
ECU	European Currency Unit
EAGGF	European Agricultural Guidance and Guarantee Fund
Council Regulation	Regulation of the European Commission
FCM	Fat corrected milk
FWU	Family Work Unit
GBP	Great British Pound
ha	hectare
IFCN	International Farm Comparison Network
IT	Italy
LFA	Less Favoured Area
LU	Livestock Unit
n.a.	not applicable
n.d.	not determined
OA	organic aid
ONI	Owner Net Income
t	tons
TIPI-CAL©	Technology Impact and Policy Impact Calculation Model
UAA	Utilisable Agricultural Area
UK	United Kingdom
USDA	United States Department of Agriculture

1 Introduction

1.1 Background and objectives

In the European Union, organic farming has developed dynamically over the last decade. In part this is due to the increasing focus on environmental goals in European Common Agricultural Policy since the 1992 CAP reform. In 1992, agri-environmental measures were introduced and for the first time provided a uniform framework for aid measures for organic farming. The agri-environmental regulation, Council Regulation 2078/92 (EC 1992), enabled member states to reclaim 50% of the eligible cost from the EAGGF budget for nationally implemented agri-environmental programmes. The subsequent CAP reform, the Agenda 2000 agreements (EC 1999a), placed even greater emphasis on the agri-environmental measures provided for under Council Regulation 1257/99 on rural development (EC 1999b).

By 1996, most EU member states had introduced support for organic farming based on the organic farming definition provided in Council Regulation 2092/91 (EC 1991) on organic production of agricultural products. The subsequent growth of the organic farming sector varied widely between countries and in 2000 the percentage of organic land area ranged from more than 12 % in Sweden to less than 1.0% in Greece and Ireland (Lampkin 2002). Reasons for these large differences in the development of the organic farming sector are seen in the nature of subsidies to organic farming, market characteristics and the national institutional environment (Dabbert et al. 2002; Michelsen et al. 2001).

The main objective of the agri-environmental programmes was to facilitate support for environmentally friendly farming practices within the framework of the CAP. Accordingly, the most prominent source of expenditure on organic farming is direct payments from the agri-environmental programmes. In some countries, up to 60% of money spent within the agri-environmental programmes is spent on organic farming (Denmark), while other countries have allocated little money to measures in support of organic farming (UK or Netherlands) (Foster & Lampkin 1999; Lampkin et al. 1999a & b). In total, 300 million ECU were spent on organic farming for the 15 EU countries in 1996 (Lampkin et al. 1999a).

The ways in which organic farming contributes to minimising the negative environmental impacts of agricultural production, to conserving farm incomes and reducing expenditure have been studied extensively (for an overview see Häring et al. 2001, Dabbert et al. 2002).

The positive environmental impacts of organic farming in comparison to conventional farming have been demonstrated by several authors (Conacher & Conacher 1998; Stolze et al. 2000; Köpke 2002). Organic farming's potential to reduce EU surplus production due to its lower yields and change in farming structure after conversion to organic farming, and its potential to reduce expenditure on the CAP have been analysed by Zanoli & Gambelli (1999) and Offermann (2000).

Numerous studies have analysed the economic impact of conversion on farms (e.g. Schulze Pals 1994; Offermann & Nieberg 2000). The profitability of organic farms has been analysed for single cases, regions or years (e.g. Ansaloni & Sarti 1996; Chiorri & Santucci 1997; Hartnagel 1998; SJFI 1998, 2000a, 2001; Stolze 1998; Fowler et al. 1999 & 2000). An overview of the profitability of organic farms in comparison to conventional farms showed that conversion to organic production methods seems to be an economically viable option within the EU (Offermann & Nieberg 2000). The regional or national impact of large-scale conversion has been modelled (e.g. Braun 1995; Wynen 1998; Offermann 2000).

The effects of the CAP reform on the profitability of organic farms have been discussed in general (Offermann & Nieberg 2000). However, the specific impacts of Agenda 2000 and future policy alternatives on the profitability of organic farms have not been studied comprehensively. Furthermore, no international comparison of these effects has been undertaken. This is mainly due to the fact that organic farming has only fairly recently become significant in terms of land area and number of farms and consequently gained recognition in the political sphere.

The organic farming sector continues to grow dynamically in most European countries, and the economic viability of an increasing number of organic farms is affected by EU policies on organic farming. Furthermore, rapid changes observed in the organic farming sector have resulted in a demand for quickly compiled, up-to-date analysis of the status quo of organic farms and scientifically sound prognosis of the development of organic farms.

The present research was part of a larger EU project, „Organic farming and the Common Agricultural Policy“, aimed at providing an assessment of the impact of current EU agricultural and environmental policies on the organic farming sector. The specific objective of the present research, a sub-project of this EU-project, is to analyse the impact of possible future EU policy options on organic farms in the EU.

Due to the dynamic nature of the organic farming sector and the lack of data on it, several methodological problems arise. On the one hand, an appropriate data base for such farm-level impact analysis needs to be identified or developed. On the other hand, adequate policy impact assessment tools and techniques of forecasting farm adaptation strategies must be selected. The second objective is therefore to test a new methodological approach and a policy impact assessment simulation model in terms of their applicability and the feasibility of using them for international comparative policy impact analysis for organic farms.

1.2 Approach

A brief introduction to the state of the organic farming sector in terms of methodological issues is followed by an introduction to various forecasting approaches. A discussion of methodological issues relating to applying forecasting

methods to the farm level sets the scene for introducing the methodology that was adopted for the present study. Expert-based farm-level forecasting methods are discussed in the light of farmers' economic behaviour and the degree of expert involvement. The choice of appropriate model farms is discussed, taking into account the specific situation of the organic farming sector. Finally, an approach to international policy impact analysis is introduced, the International Farm Comparison Network (IFCN) (Deblitz et al. 1998). This is based on a combination of expert knowledge and modelling procedures.

The third chapter characterises organic farms that are typical of the organic farming sector in the European Union. Four contrasting case-study countries are selected on the basis of a multi-criteria analysis: the United Kingdom, Germany, Denmark and Italy. For each country one typical dairy farm and one typical arable farm are identified and described in detail. Comparative analysis of typical organic arable and dairy farms provides an impression of the great diversity that exists regarding the size, structure and management of typical organic farms in the EU. The profitability of these farms is analysed *ex post* for the year 1999. Analysis of the differences highlights potential approaches to address these differences by means of agricultural policy in the future.

Chapter four analyses the impact of Agenda 2000 on the selected typical farms. The development of profitability is analysed and potential farm adaptation strategies to Agenda 2000 are discussed on the basis of assessments by focus groups.

The fifth chapter discusses the impact of the following three possible scenarios on typical organic farms:

- Scenario I: depicts a supply-policy driven scenario, with increasing direct payments for organic production.
- Scenario II: a demand-induced situation, with an increasing demand for organic produce but only temporarily high price premia.
- Scenario III: a hypothetical public-private shared-cost situation in which consumers accept a 25% price premium for organic products, which is fully transferred to producer prices. Area payments are paid to compensate for income losses only.

Chapter six provides a comprehensive discussion of the methodological approach used and its feasibility for use in future studies of the organic farming sector. Each step of this approach is discussed in detail with regard to the reliability of the results obtained, the feasibility of input in relation to output and, where appropriate, its applicability to the specific needs of policy impact analysis for organic farms. Furthermore, potential future support strategies for organic farms in Europe and their impact on the organic farming sector are discussed.

2 An interactive approach to farm-level policy impact assessment for international comparisons[1]

One of the main tasks of farm economics today is to provide farm-level analysis of the impact of agricultural policy and other legal measures for farmers and policy-makers. Farmers can benefit from demonstrations of the likely organisational and economic impact of policy measures, of ideal adaptation strategies to such changes, and their consequences for the further development of farms.

It is only a small step from analysing agricultural policy measures for farmers to evaluating agricultural policy measures for policy actors. The main concerns of agricultural policy actors are the impact on and adaptation strategies of farms, the potential development of the farming sector, and the effect of policy measures on public expenditure.

The decision regarding the most appropriate approach for analysing policy impact depends not only on the specific research objectives but also on the unique characteristics of the body of investigation.

The organic farming sector in Europe has developed dynamically in recent years. Although general growth was observed, the circumstances and extent of development vary widely between countries. The most important differences between countries lie in:

i) the history and stage of development of the organic farming sector;

ii) the existence and design of organic support measures; and

iii) the characteristics of the organic market.

In addition to stark differentiation between countries, these factors have led to a marked regionalisation within nations that transcends the regional specifics in conventional farming.

Comprehensive databases are scattered. For example, in most countries, time series on the development of the organic farming sector are only available in highly aggregated form at national level (total land area, number of farms), or for individual producers' organisations. Data on single crops, farm types, gross margins or regionally differentiated data at all levels of aggregation are more difficult to find. Time series data – if available at all – often cover only the most recent years.

In summary, the organic farming sector is still developing dynamically and so far little experience of specific policies has been gathered in most European countries. Consequently, there is a demand for quickly compiled, up-to-date

[1]Parts of this Chapter have been published previously (Häring 2000)

analysis that is scientifically sound. In addition, the poor data situation raises the question of how best to assess the impact of current and potential future EU policies relating to organic farming on organic farms in Europe. This question can be broken down to two methodological issues:

1. What is the most appropriate technique for forecasting the effect of policy option and adaptation strategies of organic farms to different policy environments?

2. What is the appropriate data base for such farm-level impact analysis?

In the following section, the reasoning behind the use of the chosen approach for analysing policy impact on organic farms is outlined. Different approaches to farm-level prognoses are briefly discussed in the light of the specific research objectives. Based on these theoretical considerations, an approach to farm-level impact analysis for international comparisons is presented.

2.1 Forecasts

Farm economic analyses are generally based either on observations of the past (*ex post*) or they have the objective of forecasting the future (*ex ante*). *Ex post* analysis derives unknown characteristics of certain variables in the past via other, observed variables of the past (Hüttner 1986). Thus they are mainly based on quantifiable historical data. Formal statistical or intuitive methods relying on empirically based reasoning can help to isolate the impact of specific policy measures observed in the past (Stolze 1998). For issues that cannot be resolved on the basis of quantifiable historical data, a forecasting (*ex ante*) approach must be adopted.

Forecasts are projections, estimates or predictions of some part of the future. Their determining factors can lie in the past, present or future (Henrichsmeyer & Witzke 1994). Traditionally, forecasting techniques relied on quantitative methods, but qualitative forecasting techniques are becoming increasingly popular (Weber 1990).

2.1.1 Quantitative forecasts

Quantitative approaches are also called analytical, objective or model-based forecasting methods and have been covered extensively in the literature (e.g. Weber 1990). Their most important characteristic is that their results can be reproduced, while qualitative methods, although scientifically based, are not necessarily reproducible.

Quantitative forecasting can be applied when the following conditions are met (Makridakis et al. 1998):

- information can be quantified as numerical data
- information about the past is available
- it can be assumed that some aspects of the past patterns will continue into the future.

This last assumption of continuity is an underlying premise of all quantitative and many qualitative forecasting methods.

Quantitative forecasting approaches vary considerably and fall between two extremes:

- intuitive or *ad hoc* methods, and
- formal quantitative methods, often based on statistical principles.

Intuitive methods are based on empirical evidence. They are simple and easy to use, but give little information about the accuracy of the forecast. Therefore, their use has declined as formal methods have gained in popularity.

Formal quantitative methods based on statistical principles are regarded as more accurate than intuitive methods. The most common formal quantitative methods are time series analysis, regression analysis or econometric approaches.

Formal statistical methods can also involve extrapolation, as long as this is done in a standard way using a systematic approach that attempts to minimise forecasting errors. Several formal methods exist which often require only limited historical data, e.g. averaging methods or exponential smoothing methods. Such methods are especially popular when up-to-date forecasts are needed but time and resources are limited.

2.1.2 Qualitative forecasts

Qualitative forecasting methods, in contrast, do not require data in the same manner as quantitative forecasting methods. In this case, induction takes precedence over logical deduction. The aim is to find an objective probability of feasible hypotheses based on a scientific justification of empirically observed reasoning (Tschamler 1983).

Qualitative approaches are often also called subjective, intuitive-creative or conjectural approaches. They rely mainly on intuitive judgements and the accumulated knowledge of experts. Due to their specific theoretical and practical knowledge and awareness of the problem, experts can judge future issues using empirically based reasoning (Helmer & Rescher 1959). The exact kind and amplitude of knowledge required varies with the problem under examination (Weber 1990).

Accuracy of qualitative forecasts can be achieved by means of a scientifically based, systematic and exact procedure.

The use of qualitative methods is generally justified if

a) no historical data exist;

b) the influence of external factors is greater than the impact of factors that could be isolated from the developments so far; or

c) ethical factors are more important than economic and technical factors (Martino 1983).

Although it is difficult to measure the usefulness of qualitative forecasts, they are used frequently for medium and long-term situations. According to Wheelwright & Makridakis (1977), two types of qualitative forecasting approaches can be differentiated: explorative and normative approaches. Normative methods first assess goals and objectives, and then work backward to identify the factors that will most likely lead to the achievement of these goals. One important normative qualitative method are decision matrices.

Exploratory methods seek to predict a future state based on knowledge of the *status quo* of the body of investigation and its orientation and trends based on theoretical reasoning. Exploration of the underlying processes of future states helps to obtain hypotheses by understanding the underlying principles and contexts, especially in cases where little basic knowledge exists.

There is significant empirical evidence comparing expert forecasts with those produced using statistical models (Makridakis et al. 1998). In most cases where data can be quantified, the predictions of models are superior to those of experts. Experts' judgements are influenced by a variety of biases and other limitations that influence the way they forecast and the accuracy of their predictions. In an attempt to improve the quality of qualitative forecasts based on expert judgements, groups of experts are employed.

According to the „n-head rule“ (Dalkey 1969) n heads contain at least as much and normally more information and cognitive abilities than only one. On the one hand, groups produce superior solutions to complex problems compared to individual experts (Wechsler 1978) as groups take more factors into account than a single individual would be capable of doing. On the other hand, however, social factors occurring in groups may vitiate the quality of group assessments. The most important factors in this respect are:

- competition;
- dominance of individual group members;
- group think (supporting the group leader and each other, avoiding conflict and dissent); or
- a lop-sided perspective.

One way of avoiding these problems is to restrict interaction among group members, as is done in the Delphi technique (Stolze 1998, Weber 1990), which will be described in relation to farm-level forecasts in section 2.2.3. One option for improving group performance with direct interaction among group members, is to appoint a third party to structure the process; such a person may identify and rank the major issues and ensure equal participation by all members. General recommendations on how to facilitate group processes are discussed in the literature on moderation techniques (e.g. Siebert 1997).

In the following section, arguments in favour of applying expert-based qualitative forecasting to farm-level forecasts are given and the degree of expert involvement is discussed. Furthermore, in view of the specific situation of the organic farming sector, the most appropriate approach to defining model farms is discussed.

2.2 Farm-level forecasts

2.2.1 Economic behaviour of farmers

The most important determinant of farm-level economic analysis is the economic behaviour of farmers. The explanations of behaviour offered by classical economic theory fail to fully explain farmers' decision making in a realistic setting. In reality, the „*homo oeconomicus*" rarely appears. In theory this rational entrepreneur strives to maximise his profit by choosing the most promising alternative from a large number of objectively known alternatives. This maxim of behaviour is used in mathematical methods of farm economic analysis and, to the extent that these mathematical programming methods were used, non-monetary and non-technological elements of decision making were neglected as non-quantifiable factors. However, research results provide evidence of the existence of non-economic objectives in entrepreneurial decision-making processes (Peters 1968). Comparisons of modelling results with reality have shown that the observed success of farming activities generally was sub-optimal compared to modelling results (Patrick & Eisgruber 1968; von der Ohe 1985). On the one hand this may be because farmers manage their farms suboptimal, on the other hand models may incompletely depict reality. The observation that highly efficiently working farmers also tend to be less successful than models predict indicates that the second option seems more likely.

Meanwhile doubts have arisen about the view that in all rational decision making the agent seeks the best result. Instead, it is argued, it is often rational to seek to 'satisfice', i.e. to get a result that is good enough, although not necessarily the best (Simon 1957; Brandes 1979; Brandes 1985). Satisficing action can be contrasted with maximising action, which seeks the biggest, or with optimising action, which seeks the best. Today it is widely recognised that non-monetary and non-technological objectives play an important role in entrepreneurs' decision-making processes (Simon 1957), although the generation of income and long-term subsistence are still rated the most important objectives of farm management.

The concept of the „*homo oeconomicus*" was adapted to the picture of the „adaptive or administrative man" (Simon 1957, 1959), an entrepreneur who seeks a satisfying alternative among those available, the choice depending on his objective view of the situation and his scale of values. Thus, instead of objective responses to the real environment, his decisions are subjective responses to an incomplete vision of reality. His personal utility function includes not only profit but also higher non-quantifiable objectives such as a fulfilled life, leisure time, independence, security, prestige, etc. (Torell et al. 2001). Furthermore, his objectives and his abilities change through learning. This applies equally to farmers who have different preferences and need different prescriptions for utility maximisation across their individual multiple goals (Brandes 1979). Empirical research on the nature of farmers' objectives suggests that farmers are economic satisfiers who place varying degrees of importance on profit maximisation (Duram 1999; Gasson 1973; Gillmor 1986; Harper & Eastman 1980; Hoffmann 1981; McGregor et al. 1996; Peters 1968; Sachs 1972; Vandermersch & Mathijs 2002). This observation goes as far as the assumption that family and farm business objectives correspond and should always be considered together (Harper & Eastman 1980; Nellinger 1990; Perkin & Rehman 1994; Rehman 2002), the most important objectives usually reflecting a combination of lifestyle and economic goals.

A purely normative approach to farm model calculations is therefore only justified if farmers' objectives are effectively identical to model assumptions and if all objectives can be quantified. A combination of non-monetary and non-technological objectives with the commonly used monetary objectives thus seems to provide a more accurate portrayal of the farm-specific decision-makers' utility function. However, as these objectives are difficult to quantify, multi-objective quantitative models do not necessarily exhibit superiority over similarly structured profit-maximising models (Barnett et al. 1982). Thus non-monetary and non-technological objectives are best integrated into farm analysis via qualitative approaches.

Based on the reasoning that farmers have situation-specific, site-specific and time-specific expert knowledge, socio-economic issues in agriculture are increasingly analysed together with the farmers themselves (Köhne 2001). By virtue of their participation, the farm manager's management system and utility function is represented (Brennan & McCown 2001). However, the extent of farmers' participation in the research process remains to be discussed and the question of how best to achieve or optimise their participation in view of the research objectives remains open.

2.2.2 Farmers' participation

Participatory approaches to research generally tend to involve stakeholders in the research process. They have been developed and adapted mainly to solve practical problems and are based on the premise that the best person to understand the limitations of a farm system is the person who uses it and benefits from it. Often, the aim is to facilitate empowerment of stakeholders through creation of knowledge and taking action for change (Maguire 1997). However, this aspect was not relevant to the present research and will not be discussed further here.

The involvement of stakeholders in research may include definition of the research agenda, conducting the research, monitoring and evaluation, as well as the dissemination of results. However, in actual practice, there is a wide range of forms of participation by farmers in research processes and they can vary on a variety of dimensions (Dick 1997):

- data provision: participants are informants;
- interpreting data: participants are informants;
- planning change: participants are planners and decision-makers;
- implementation: participants are implementers;

- managing the process of data collection and interpretation: participants are facilitators;
- designing the overall study: participants are researchers or co-researchers;
- being kept informed about the study and its implications: the participants are recipients only.

On each of these dimensions there is the choice of i) who is to participate and ii) to what extent are they to participate? The choices made on each of these issues clearly depend on the desired outcomes.

In farm-level economic studies, some participants are likely to be involved as informants, instead of striving for maximum participation by all stakeholders. Informants are identified who are likely to have relevant information, and a sample of these is compiled that is small enough to comply with time and budget constraints but likely to encompass as many views as possible. Depending on the research topic, the best option may be to aim for a maximum-diversity sample. In other cases, e.g. farm economic analysis, it may be more appropriate to select a sample of experts on a certain topic or region.

During the research process, participants are often asked to comment on the meaning of information previously contributed, thus becoming their own interpreters. Depending on who is in a position to implement plans and is motivated to do so, research responsibilities can be shared, with participants being made co-researchers. Local stakeholders can serve as facilitators of group-based methods for information as well as implementation. Additionally, participants can learn to design and manage their own research. Further decisions arise about how the wider group of people will be kept informed.

As applied to farm-level analysis, the various options for farmers' participation in the research process can be summarised as presented in Table 2-1. At one end of the scale, research may be conducted by farmers acting collectively, with the farmers setting their own research agenda and mobilising to carry it out without the involvement of outsiders such as initiators or facilitators. At the other end of the scale, the farmers would simply be the subject of the research. In the latter case, complete power remains with the outside observer, who analyses the situation. Farmers' representatives are chosen solely as a token and have no power to influence the research process (co-option). Between these two extremes, a range of other possibilities exist (Table 2-1).

Chapter 2

Table 2-1: Degree of farmers' participation

INVOLVEMENT OF FARMERS	Relationship of Research and Action to Farmers	Mode of Participation
Token representatives are chosen, but no real input or power	On	Co-option
Tasks are assigned, with incentives; outsiders decide agenda and direct the process	For	Compliance
Farmers' opinions asked; outsiders analyse and decide on a course of action	For/with	Consultation
Farmers work together with outsiders to determine priorities; responsibility remains with outsiders for directing progress	With	Co-operation
Farmers and outsiders share their knowledge to create new understanding, and work together to form action plan, with outsider facilitation	With/by	Co-learning
Farmers set their own agenda and mobilise to carry it out, in the absence of outside initiators and facilitators	By	Collective action

Source: Adapted from Pretty (1995) and Martin (1997)

At each point in the research process a decision has to be made on how participation will be achieved. The degree of participation in the different steps of the research process will always depend on the research objectives. The given research objectives of this study required only limited participation by experts. Farmers and advisors were only informants and interpreters, while advisors might help in managing the process of data collection and interpretation. Methodological options for integrating the judgements and accumulated knowledge of farmers in farm economic analysis are discussed in the following section.

2.2.3 Methods

Two methods of conducting farm-level qualitative forecasts and involving farmers in the forecasting process are described below: the Delphi technique and focus groups.

Delphi and Delphi-like forecasts

The Delphi technique, first proposed by Dalkey & Helmer (1963), is a highly formalised group communication structure used to facilitate communication on a specific task. The purpose of Delphi technique is to elicit and refine the opinions of a group of people (Dalkey 1969). It is based on anonymity, structured interaction with controlled feedback, and statistical group responses (Weber 1990).

Specifically, the Delphi technique consists of an iterative expert interview with the aim to arrive at a group position regarding an issue under investigation. It consists of a series of a repetitive expert surveys, where answers remain anonymous (Albach 1970; Martino 1983). The most important commented and statistically analysed results are fed back to the expert focus group. The individual members are encouraged to reconsider and, if appropriate, to change their previous reply in light of the replies of other members of the group. After two or three rounds, the group position is determined by averaging.

The Delphi approach has proven especially useful for discussing questions beyond hard science and technology and for not giving scientific rigour to poor assumptions. The method is usually conducted asynchronously via paper and mail. The essence of the method is the question of how best to tailor the communication process to suit the research problem.

Variants of the conventional Delphi method have evolved. These are characterised by more open interview or survey characteristics and by allowing direct personal discussion (Kepper 1996). For example, Idea-Delphi is similar to conventional Delphi; however, instead of using standardised questionnaires and a selection of answers, it works with the request to freely articulate potential solutions. Another, contrasting variation of the conventional Delphi technique, the Mini-Delphi, combines individual and group situations: individual questionnaires are followed by group discussion and final individual interviews (Kepper 1996). This is similar to the Nominal Group Technique (Delbecq et al. 1975; McGrath 1984), where individual and group work is combined.

One variation is designed to consolidate expert opinion within a particular discipline in a very short time period: the Group-Delphi (Webler et al. 1991). The technique of repeated questionnaires and feeding of the results back into the process is exploited to encourage consensus on issues. However, the aspect of anonymity is abandoned and the feedback process is conducted as a conference. In a group session, discussion among participants is encouraged and a moderator asks experts to justify their opinions. Several small groups try to reach consensus in answering the questionnaire. These results are then presented by a moderator in a plenary session and deviating results are justified by the subgroups. Again, discussion aims at reaching group consensus. This process is repeated a second time with differently grouped focus groups. This results in consensus in a short period of time (Webler et al. 1991).

Due to the direct and immediate feedback, consensus-building capacity is enhanced, distortion of results by the moderator is avoided, and any ambiguities are immediately identified. Justification for dissenting viewpoints gives secondary insights into which deviations are accepted. They provide an internal check for consistency in accepted viewpoints. Another advantage is that sample mortality (drop out of experts) – often a problem in other forms of Delphi – is minimised, as the whole process is performed at once.

While, in the Delphi approach, interaction among group members is restricted to a certain degree, and results of prior rounds are fed back to a group of experts, in focus-group discussions communication and interaction are key elements, and feedback is immediate due to the simultaneous presence of all participants (Albach 1970).

Focus groups

Focus groups are organised discussion groups with a selected group of individuals to explore their views and experiences of a topic (Powell et al. 1996). The term 'group discussion' is often used synonymously. Discussions either evolve spontaneously or are stimulated by a moderator (Friedrichs 1990). Apart from the benefit of gaining insight into people's shared understanding of everyday life, focus-group research permits observation of the interaction of a group on a given topic (Atteslander 2000).

Focus groups should not be confused with group interviews, involving interviewing several experts at the same time, the emphasis being on questions and responses between scientist and participants. In focus groups, in contrast, a moderator poses questions to a group, and these are then discussed openly.

This interaction offers the potential that opinions are manifested and insights and data are produced which would not evolve from outside stimulus only (Morgan 1988). It enables participants to ask each other questions, as well as to re-evaluate and reconsider their own understanding of their specific experiences. Focus groups are particularly suited to obtaining several perspectives on the same topic and the underlying reasoning. Although attitude, feelings and beliefs may be partially independent of a group or its social setting, they are more likely to be revealed via the social gathering and the interaction entailed in being part of a focus group. Focus groups are particularly useful when power differences exist between participants and when one wants to explore the degree of consensus on a given topic (Gibbs 1997). They can help to explore a topic, to generate hypotheses or even arrive at consensus on a given topic.

The advantage of focus groups in comparison to other group approaches is that they are inexpensive, data rich and flexible and stimulating to participants (Fontanta & Frey 1998). Finally, focus groups enable scientists to gain large amounts of information in short periods of time, due to the organised nature of the event. However, they are limited in terms of their ability to generalise findings to a whole population, mainly because of the small number of people participating and the likelihood that the participants will not be a representative sample (Friedrichs 1990). Nevertheless, this approach is considered particularly suited to preliminary research where more structured approaches seem premature and time-economy is an issue (Lamnek 1989). Representative results may be gained by means of careful selection of participants.

2.3 Typical farms

In agricultural economics research, whole-farm analysis is generally conducted either on the basis of individually selected case-study farms, or survey data are used to construct synthetic case farms. Neither approach is without criticism. Research using case farms is mainly criticised for the selection process or the lack of a random or representative selection process. The results of case farms are often viewed as having no scientific merit beyond the gate of that particular farm. On the other hand, case studies can provide insights into „how the real world works" (NRC 1989), helping to formulate and test hypotheses.

Much of the debate concerning types of analysis performed and interpretation of the findings for case-study farms results from the lack of differentiation between typical farms in a modal concept and representative farms in a mean-variance concept (Feuz & Skold 1991). A case farm, actual or synthetic, may be either typical or representative, depending on the type of data and selection method used. When typical and representative farm concepts are not clearly distinguished, substantial errors can occur in aggregating the results or disaggregating data.

Since the 1960s, the most commonly used concept of case farms is the idea of a representative farm, meaning a weighted average in statistical terms of all farms in a group (Marshall 1952; Feuz & Skold 1991). This representative farm concept is especially popular for research concerned with regional responses and for aggregation of results. However, substantial errors and biases associated with aggregation and disaggregation of data can occur. An example may be used to illustrate this: many farms are not balanced in their resources; some may have excess land for the level of labour or capital, while others have excess labour for the amount of capital, etc. Averaging of data implicitly assumes that the surplus resources of one farm are available for use on another farm where those resources are limited. Taking into account the postulate that labour and capital markets are imperfectly functioning markets, it is reasonable to assume that these constraints affect only some of the farms. Further, types of technologies may differ substantially between farms and the averaging of several different types of technologies would potentially lead to a bias from using average data (Feuz & Skold 1991). One way of avoiding average bias from aggregate data is to develop sets of typical farms instead.

Typical farms are model farms in a modal concept and may be thought of as case farms, either real or synthetic. The important characteristic of typical farms is that the resource base and the technological constraints are typical in terms of „a model farm of farms of the same universe, representative of what a group of farms are doing that are doing essentially the same thing" (Elliott 1928), and not necessarily the mean of all of a group of farms.

In the US in the late 1970s, the USDA applied the idea of typical farms being typical enterprises in modal sizes and having a modal complement of machinery. As this concept allows for detailed examination and insights into individual farms while economising the resources required for the study, several authors subsequently took it up again in the 1980s (e.g. Richard & Nixon 1981; Batte et al. 1989; Taylor 1990, all cited by Feuz & Skold 1991). In recent years, the German Federal Agricultural Research Centre (FAL) has initiated the establishment of an International Farm Comparison Network (IFCN) a world-wide network of typical farms (Deblitz et al. 1998).

It remains open to discussion whether developing a synthetic typical farm might be more appropriate than an actual farm to represent a group of farms. Nothing is gained from the random selection of an actual farm, as it might be at the extreme end of a group. The selection of an average representative farm has been discussed earlier. Therefore, synthetic farms may be superior to

selection of an actual farm as being typical. The key lies in how to adequately define typical farms, and what criteria should be used in making typical farm classifications. Several important issues need to be taken into account:

i) justification for the farm type,

ii) criteria for classification, and

iii) the desired level of detail.

The latter is closely related to the purpose of the research and the scope of the project. The type of farm is most likely justified by the main commodity produced and the resource endowment (land, labour, capital). Further classification will most commonly rely on information on yield levels, technologies used, patterns of climate and soil, seasonal nature of labour availability, and capital in terms of fixed assets and for variable expenses.

If profound knowledge of the essential characteristics of the group from which a typical farm is to be selected is available, bias can be avoided by using modal or typical data rather than average data. An example where this comes into effect is the averaging of technologies mentioned above, which potentially leads to bias from using average data. This can be avoided by choosing a typical technology in a modal concept.

In the following an approach to selecting typical farms will be introduced, roughly following the IFCN approach for selecting typical farms, but adapted to the special circumstances of research related to a weakly developed farming sector, i.e. organic farming in the EU.

In policy impact research, it is extremely difficult to depict expected reactions of farmers to new measures. Especially in relation to decisions on investment and production, often not even the direction of aggregated behaviour is known. Thus, credibility of policy research and consulting suffers from the high margin of error of prognoses related to aggregated entrepreneurs' behaviour. One approach for dealing with this high margin of error is to replace the uniform entrepreneur by several types of entrepreneur (typical entrepreneurs or farms) and aggregate their decision-making processes and reactions to policy developments to draw conclusions at a level higher than the farm level (Brandes 1979). In the following section an attempt to base policy decisions on a range of farms and types of entrepreneurs is described.

2.4 The International Farm Comparison Network (IFCN) and the simulation model TIPI-CAL©

One possible approach to farm economic analysis and forecasting which takes into account the issues discussed so far is the **I**nternational **F**arm **C**omparison **N**etwork (IFCN) (Deblitz et al. 1998; Hemme 2000). The IFCN is an international network of agricultural scientists, advisors and farmers. Its main objective is to create and maintain a sustainable infrastructure for

1. international comparative analysis of agricultural production systems;
2. improved ability to analyse structural, technological and policy changes in international comparisons;
3. communication and data exchange among economists interested in farm-level analysis.

The envisaged network (IFCN) consists of three elements (Deblitz et al.1998; Hemme 2000), which are required to run the network effectively:

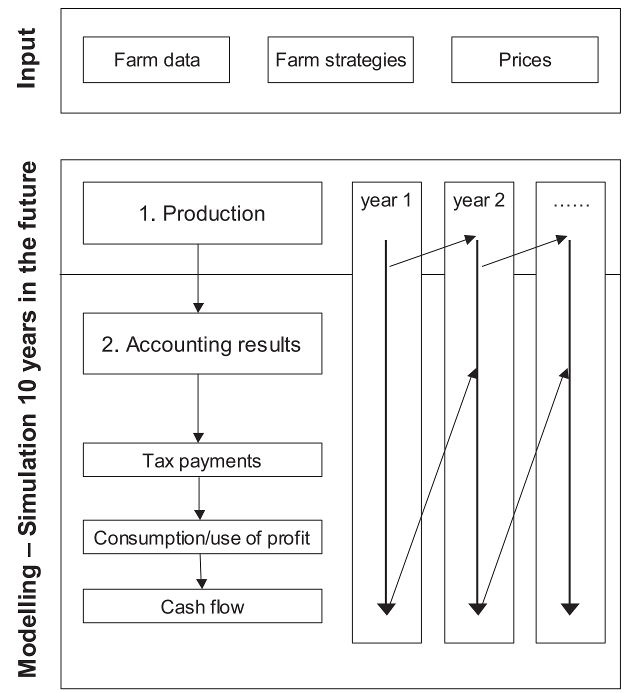
- Panels (focus groups): these consist of scientists, advisors, and farmers. They define typical model farms and discuss their development strategies.
- A data base of typical farms: used as representative model farms and providing the basis for further analysis (farm strategies, policy impact, etc.)TIPI-CAL©, a production and accounting model: developed specifically for international policy impact analysis at farm level.

Focus groups and the concept of typical farms was introduced in previous chapters. The model TIPI-CAL© will be introduced in the following section.

The farm-level simulation model TIPI-CAL© (**T**echnology **I**mpact and **P**olicy **I**mpact **Cal**culation Model) (Hemme et al. 1997) was developed specifically for interregional and international policy and technology impact analysis at farm level. It is therefore designed to be internationally compatible and applicable to various farm types and locations.

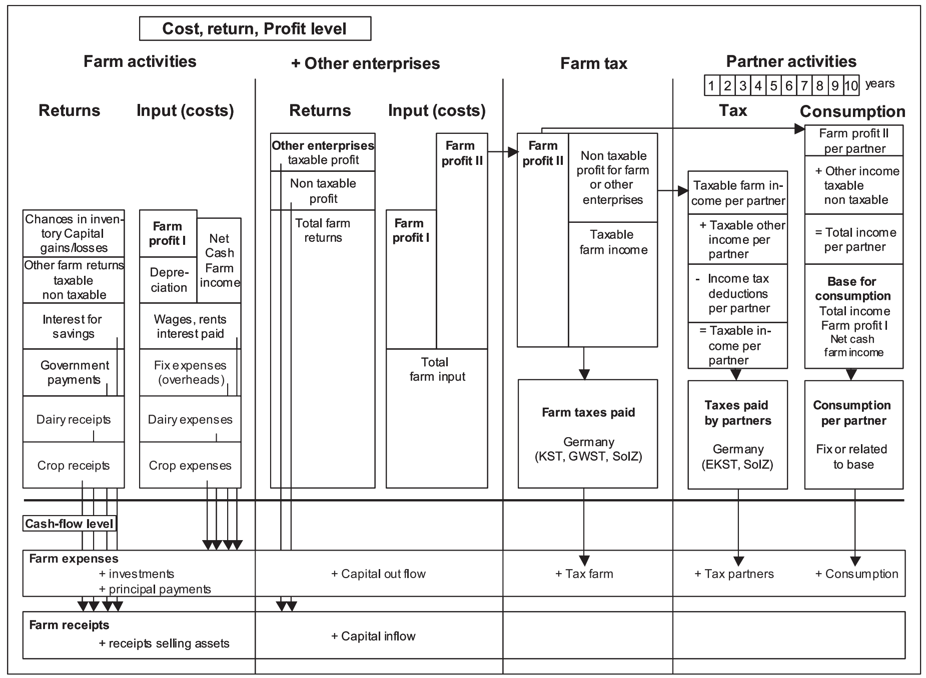
The simulation model TIPI-CAL© is programmed as a deterministic, farm-level, recursive dynamic production and full costing accounting model in Microsoft EXCEL (Hemme 2000). The model recursively simulates plant and animal production, farm policies, financial management and growth over a ten-year planning horizon. Based on simulation of agricultural output, an annual financial statement for one year, compliant with the principles of double entry book-keeping, including a balance statement, profit/loss account and cash flow calculation, feeds directly into the simulations of the following year (Figure 2-1). A detailed overview of the structure of calculation is given in Figure 2-2.

Figure 2-1: Modelling sequence of TIPI-CAL©



Source: Hemme (2000), modified

Figure 2-2: Detailed structure of TIPI-CAL©



Source: Hemme (2000)

TIPI-CAL© has been designed for use as a general farm-level simulation model. It was designed to be internationally compatible and applicable to various farm types and locations. The range of options for its use and potential adaptations are listed in Table 2-2:

Table 2-2: TIPI-CAL©: Options for use and potential adaptations

GENERAL OPTIONS	
Countries	Applicable to any country worldwide. In principle up to 230 different languages can be used.
Legal forms	Family farms, co-operations of up to 4 partners, co-operatives, stock companies, corporations.
Farm types	In 1999, applicable to dairy farms with and without own replacement and arable farms.
Off-farm activities	Rent of real estate, non-detailed enterprises, additional off-farm labour income of farm family, additional tax-free income, simulation of capital outflow or inflow.
Private drawings	From various sources (e.g. net cash farm income or profit) as fixed amount or function, adjusted to inflation (if desired).
Taxes	Sales taxes via flat rate or percentage, farm taxes, individual taxes for each partner, general tax module for individual definition of tax functions.
FARM STRATEGY OPTIONS	
Arable and forage production	20 different crops, yearly change of cropping patterns, 8 variable cost positions per crop, special adjustments possible per year, rent/purchase of land, use of own machinery in contrast to contract labour.
Milk production	Growth of herd or quota, replacement rate of heifers, adjustments in variable costs and milk yields, 14 variable cost positions per cow, 5 variable cost positions per kg milk, 5 fixed cost positions for the dairy enterprise.
Feed rations for cattle	Up to 4 rations for dairy cows, up to 2 rations for dry cows, up to 2 rations for each age-group of young stock.
Machinery, buildings, quota	Up to 100 machines, up to 20 buildings, up to 20 purchases of quota. Replacement options at the end of economic lifetime. New investments during simulation period.
Loans	Interest rates can be changed in simulation period, option of fixed or variable interest rate. Calculation of 10 different existing loans with different periods and interest rates. Endogenous uptake of loans in case of capital deficit. Simulation of one exogenously inserted loan. Repayment or annuity loans.
Depreciation	Linear depreciation at purchase prices or at replacement values.
POLICY OPTIONS	
General	6 different direct payments at whole farm level, support for investments
Plant production	Different set-aside rates for 20 crops, penalty set-aside, production quota for each crop, CAP payments and agri-environmental payments, payments for less favoured areas
Milk	Different quota regulations and direct payment options.
Beef	Various direct payment schemes, e.g. slaughter, beef special, extensification payments.

Source: IFCN (2002)

Most farm activities can be determined exogenously, while some are automatically simulated. Basic modelling assumptions defining farm simulation, simplifications made and automatically simulated activities are presented in Table 2-3.

Table 2-3: Basic modelling assumptions and simplifications made in TIPI-CAL©

Simulation periods	Production year = harvest year = sales & feed year. Simplified definition of economic periods: no storage of inputs and outputs, no credits and liabilities on deliveries and services. Investments for replacements are simulated in the middle of the year, i.e. they are used and depreciated at full rate in the year of purchase.
Investments and replacements	Economic lifetime, purchase year, current replacement value are entered. Machinery and buildings are replaced at prices according to a price index projection.
Feed supply and demand	Feed supply and demand are balanced by purchase or sale of feed in case of feed deficit or surplus.
Purchase & sale of heifers	Heifer deficit or surplus is determined via a herd simulation.
Operating loans & interest on savings	Liquidity is calculated at beginning, middle and end of year. Time periods of positive and negative cash are calculated via linear interpolation.
Loans in case of cash deficits	In case of cash deficits at the end of the accounting year, the model automatically takes loans.
Capital outflow/ drawings	Capital outflow/drawings are determined by the farm income situation and the function chosen for drawings.
Taxes	Tax payments can be determined by the income situation, tax reductions and national tax functions.

Source: IFCN (2002)

The simulation model has neither optimising algorithms nor endogenous adaptation mechanisms of farm organisation. Results depend directly on farm input data and price and policy assumptions. As a typical simulation model, it only serves to imitate and simulate reality in order to gain insight to structures and reactions (Berg & Kuhlmann 1993). In the present research study, it is not the optimal mathematical solution that is sought, but rather the most likely farm organisation or strategy. In this research, farm-level processes and decision-making processes were based on intensive co-operation with farmers and advisors. Farmers' strategic choices are not driven merely by optimising motives, and guidance of modelling procedures by farmers can introduce these elements in the solutions obtained (see section 2.2.1). Simulation of farms is mainly used to facilitate the development of a 'feel' for the management action taken by typical farms (Brennan & McCown 2001), while Checkland (1983) states, that „mathematical models of farming systems are most appropriate if not complicated by people with purposes and freedom of choice".

2.5 Research process

In the EU, the dynamic development of the organic farming sector in recent years has meant that experience regarding policy effects on organic farms is limited. This is reflected in the fact that, until recently, data on the sector was sparse, and there is a great demand for quick but up-to-date analysis of policy options for dealing with the changing situation in policy design for organic farming. From this point of view, analysing the impact of EU policy options on organic farming is a demanding task.

The generally chosen method of forecasting the effect of changes in the policy environment on existing farms via quantitative forecasting techniques was discussed. However, the lack of historical data and the dynamic (non-continuous) development of the organic farming sector rules out the use of quantitative forecasting methods for policy analysis in this sector.

Forecasting mechanisms of farm adaptation to policy changes via qualitative approaches was discussed in the light of the economic behaviour of farmers and farmers' participation. Based on the reasoning that farmers' decision-making processes are driven by a multitude of objectives, including non-quantifiable objectives that can not be depicted using quantitative approaches, qualitative forecasting methods based on farmers' assessment are recommended in the case of farm-level adaptations to policy changes. They allow inclusion of the intuitive reasoning and knowledge of farmers. For the research problem in question, focus groups of farmers seemed to be the best way to achieve farmers' participation in a timely manner.

With regard to the appropriate data base, the typical versus the representative farm concept was presented.

The IFCN approach to farm-level analysis and forecasting seemed to be appropriate for the given research problem for several reasons:

1. The typical farm concept defines model farms according to a modal concept. This approach is especially useful in sectors where little data is available.
2. Focus groups define these farms and help in forecasting future farm developments. The benefits of this approach have been discussed in detail in section 2.2.
3. The model TIPI-CAL© was developed specifically for international policy impact analysis at farm level, and is applicable to different farm types. This seemed to be an ideal prerequisite for the rapid compilation of forecasts for a rapidly changing sector such as the organic farming sector. Using an existing model seemed promising in terms of comparability of results and data from other studies. Furthermore, the aim was to obviate the need to spend time and effort constructing a mathematical programming model applicable only to this specific study. Practice has shown that many mathematical programming models are used only for one project and then become obsolete.

To date, the IFCN structure has been used mainly to compile production cost comparisons of conventional farms around the world (e.g. Hemme et al. 2002).

However, the objective of the present research was primarily to compile policy impact analysis, and not only to provide production cost comparisons. To achieve this objective, substantial adaptations to the IFCN procedure had to be made. Furthermore, the nature of organic farms and the organic farming sector also called for certain adaptations of the IFCN approach. Thus, the research process described in the following clearly represents an extension and further development of the IFCN approach.

The present research was the first step in the direction of establishing a network of organic farms as part of IFCN and testing the methodologies involved for their applicability to organic farms, the organic farming sector and the feasibility of IFCN as a methodology package per se.

The general IFCN approach is explained in detail by Hemme (2000); the exact implementation of the IFCN approach in application to the specific situation of the organic farming sector is described in the following section.

2.5.1 Case-study countries

Case studies are generally used to investigate a current phenomenon in its real environment. However, they not only serve to describe reality, but can also be used to analyse complex decision-making processes such as farmers' economic decision making (Klöble 1998; Yin 1995).

The level of detail required and time and resource constraints allowed only the investigation of a limited number of farms. A pre-selection was made by selecting only a few countries, and case-study farms were then selected within these. The final selection of case-study countries for detailed farm-level analysis had to serve two general objectives:

- countries should be as far as possible representative of the EU in general; and
- they should reflect as many different aspects of organic farms in the EU as possible.

Thus a qualitative multiple criteria procedure was used to select contrasting countries on the basis of their particularity within the EU (to cover a maximum range of pictures/experiences etc.). Criteria applied included:

a) regional representation within the EU;

b) stage of development of the organic sector;

c) the existence of organic support measures;

d) characteristics of the market for organic food;

e) market orientation of existing organic farms.

The availability of experts to help with further analysis was another important criterion for country selection, because the approach adopted relies largely on expert assessments.

A total of four countries was chosen, each being selected for different reasons. The final selection by no means represents the only possible combination of case-study countries. A brief description of the situation of the selected countries' organic farming sector at the time of selection (year 1998) is provided below:

The United Kingdom (UK) only recently experienced considerable growth rates in organic farming after a period of stagnation, despite its long tradition of organic farming. Implementation of Council Regulation 2092/91 in 1993 caused a marked increase in converting farms and, subsequently, the political climate as regards organic farming has improved significantly (Michelsen & Søgaard 1999). Support for organic farming was introduced with the implementation of Council Regulation 2078/92. However, payments are quite low and are restricted to conversion (Lampkin et al. 1999a&b).

The institutional situation for organic farming in the UK is characterised by strong competition with conventional farmers' unions and a lack of integration in the general agricultural administration (Michelsen et al. 2001; Hamm et al. 2002).

The market for organic products is characterised by strong consumer demand originating from food scandals such as the BSE crisis in the nineties. Subsequently, leading retailers became involved in the marketing of organic products. A large share of organically produced commodities are sold to organic outlets (80-100%) at high price premia (Michelsen et al. 1999). One of the national characteristics of the organic sector in the UK is the widespread practice of partial conversion to organic farming, as permitted by Council Regulation 2091/92.

Germany (DE) has an equally long tradition of organic farming. The first conversion programme was introduced in 1989 under the EU extensification programme (Council Regulation 4115/88), which was later extended to promote organic farming in the new federal states. The implementation of Council Regulation 2092/91 and subsequently, in 1994, the implementation of Council Regulation 2078/92, kept farmers in the organic sector and brought about a further increase (Michelsen & Søgaard 1999).

For many years, the institutional landscape in Germany was characterised by a great variety of organic farming associations, certifying bodies and other interest groups. They have co-ordinated their work more effectively only in recent years. Organic support schemes differ significantly across the federal states, due to the federal structure of Germany (Lampkin et al. 1999a&b; Michelsen et al. 2001).

On the demand side, development of organic farming in Germany is characterised by an only moderately developed, but fairly stable market. The share of organic products actually sold to organic outlets and the price premia paid vary widely (Michelsen et al. 1999, Hamm et al. 2002).

Denmark (DK) has had a short history of organic farming, but the sector's lively development is such that it is often regarded as the 'cutting edge' of the organic farming sector in Europe. It was the first country to introduce support for organic farming at national level. In 1987, legislation on organic farming

was passed and a national certification system was set up. As a consequence, national support to organic farms was introduced for conversion, market and processing initiatives and information services. Implementation of Council Regulation 2092/91 and 2078/92 introduced continuing organic farming support (Michelsen & Søgaard 1999). Since 1995 a National Action Plan for supporting organic farming exists.

Institutional support in Denmark was stronger from the beginning than in other countries: specialised institutions were set up to facilitate dialogue between organic and conventional farming institutions. This resulted in a constructive integration of conventional farmers' organisations, public authorities and institutions (Michelsen et al. 2001) and, from 1995, in the establishment of National Action Plans to support organic farming.

The well developed market for organic products is rated among the most important characteristics of the Danish organic sector. A large share of organically produced commodities are sold as organic (80-100%), but they are sold at fairly low price premia on the producer side as well as the consumer side (Michelsen et al. 1999). This seems to be mostly due to the early involvement of the national consumer co-op and the predominant marketing by supermarkets.

The organic farming sector in **Italy** (IT) is characterised by a strongly regionalised and turbulent history of implementation of organic farming support. Nevertheless, organic farming area and farms have developed rapidly since 1985, especially subsequent to the implementation of Council Regulation 2078/92 in various regions.

The institutional setting of organic farming is characterised by an inadequately functioning bureaucracy, weakly developed organic farming associations and a lack of information for farmers (Michelsen et al. 2001, Hamm et al. 2002).

The national market for organic products in Italy is poorly developed. However, a large share of organic produce is exported. Approximately 70-100% of all organic products can be sold as organic by the producers, but with relatively low producer price premia of 15 to 20% in most product groups (Michelsen et al. 1999, Hamm et al. 2002). Nevertheless, in terms of the aim of including a country representative of the Mediterranean region of Europe with its different climate, products and production structures, Italy proved appropriate.

2.5.2 Selection of typical farms

Typical model farms for these case-study countries were selected in line with the typical farm concept (section 2.3) applying the following minimum requirements. Farms were selected which:

- practice full-time organic farming;
- have been fully converted for a minimum of three years; and
- are managed by farmers with at least three years' experience in organic farming.

At the time of this research, the model TIPI-CAL© was still limited to specialised dairy, specialised beef and arable farms. However, organic farms typically tend to be mixed farms rather than highly specialised farms, as the organic production system relies mainly on farm-internal use of production factors. Despite this inconvenience, the selection of specialised farms (dairy, arable) seemed feasible but requires further specification.

The Common Agricultural Policy measures tackle both plant production (through area payments) and livestock farming (through headage payments). Therefore, the specific effects of these measures on mixed farms are difficult to isolate. By choosing two different specialised farm types, two important segments of organic farming – one representative of livestock farming, the other representative of arable farming – can be analysed separately and the effects of individual policies can be identified more easily.

Dairy farms were chosen as representative for organic livestock production because dairy cows are the most frequent species among market-oriented organic livestock, and dairy farms could be modelled most accurately using the simulation model chosen. Farms whose dairy activities contributed more than 50% to the gross margin were defined as dairy.

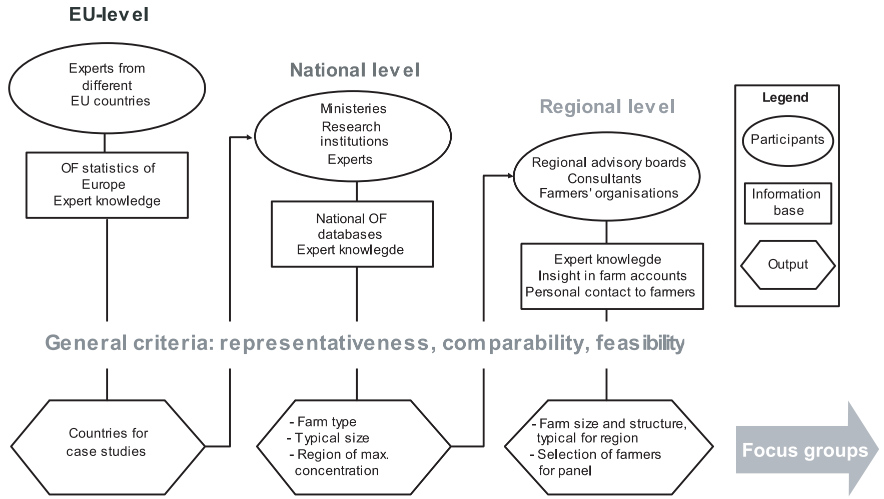
Typical arable farms should have cereal cultivation contributing more than 50% to the gross margin, for two reasons:

i) cereals are those arable crops most sensitive to changes in the current CAP environment, and

ii) cereal farms are easily compared between countries, because other arable crops (vegetables) often reveal a more pronounced regionality. The selection of typical arable farms showed how difficult it is actually to find organic arable farms with a gross margin contribution from cereals greater than 50%. Most organic farms rely on considerable gross margin contributions from other farm activities, such as beef or vegetable production.

Thus, although the two chosen farm types might not be the most representative farm types in each country, for the sake of cross-country comparison the same farm types were selected in all countries. Within each country typical farms were identified in a stepwise procedure as illustrated in Figure 2-3.

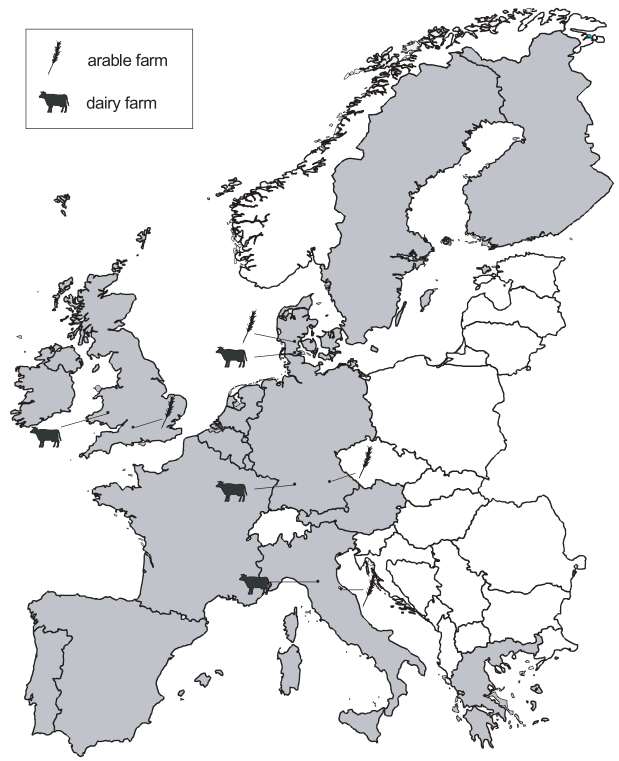
Figure 2-3: Identification of case-study farms



OF = organic farming

First, the type of dairy and arable farm typical for the respective country was selected and its average size defined on a national level. Second, regions with a high concentration of the respective farm type and size were identified for each country. The resulting location of typical organic dairy and arable farms in the selected case-study countries is highlighted in Figure 2-4.

Figure 2-4: Typical organic dairy and arable farms in selected EU countries



Within these regions, the exact structure and size of the typical farm was determined on the basis of typical farm accounts provided by regional advisory boards, farmers' organisations or consultants. Contacts were then established with farmers managing similar farms.

In each of the selected countries, very different criteria had to be used for selecting typical organic farms. In Denmark, official national statistics on organic farm types, structure and regional distribution exist (SJFI 1998 and 2000a). In Italy, in contrast, no such statistics have been compiled at the time. Information had to be drawn from various sources and the selection of typical farms was based on a mixture of quantitative data (Foster & Lampkin 2000) and qualitative assessments by various experts on the organic farming sector in Italy.

In the UK, general statistics on the sector (Foster & Lampkin 2000) were complemented by information on organic farm incomes in England and Wales (Fowler et al. 2000). In Germany, statistics of nation-wide coverage only existed for total land area and number of farms (Foster & Lampkin 2000, AGÖL 2000). Information on production structure was collected by the organic farming associations, but not on classification of farm types.

The nature of organic farming created a major constraint for this selection process: as already mentioned, typical organic farms are not necessarily specialised dairy or arable farms, but often tend to be of rather mixed character. In some countries, pure grassland farms would even be more appropriately identified as typical farms in terms of land share or number of holdings, as for example in Italy, where the largest share of organic farm area is grassland. However, in terms of market orientation, the example of Italy demonstrates that the most typical farm type is found in vegetable production. This highlights the difficulties encountered in the selection process. Expert evaluations therefore complemented the selection processes in all countries: intensive written and personal communication was carried out to discuss and evaluate the selection process.

Typical farms were defined in more detail by focus groups in a stepwise procedure described below.

2.5.3 Detailed farm definition, strategy and policy discussion in focus groups

Based on the recommendations of an advisor active in the selected region, farmers managing farms similar to the proposed typical farm were approached to participate in focus groups. The focus groups defined and discussed typical farms, broadly following the basic concept of the International Farm Comparison Network (IFCN) (Deblitz et al. 1998; Hemme 2000). The basic element of this concept are focus groups of experts consisting of four to six farmers with farms similar to the typical farm, and one advisor. In a moderated group discussion process, the following steps are taken with the aim of reaching a consensus (Figure 2-5):

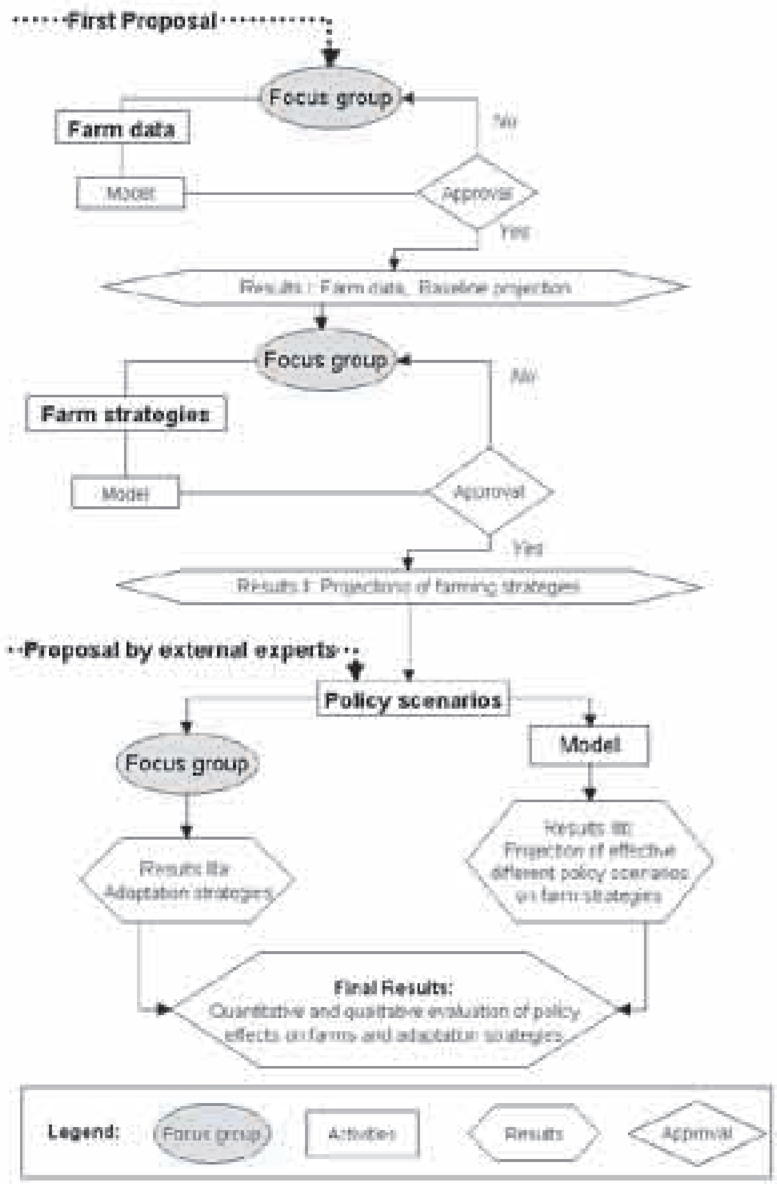
Chapter 2

a) economic and technical details are defined for typical farms;

b) their envisaged farm development strategies are analysed; and

c) the expected effects of policy changes are discussed.

Figure 2-5: Detailed farm discussion in focus groups



Detailed definition of typical farms

To facilitate the process, discussion is based on an initial proposal of a typical farm made by the advisor, bookkeeping data of the participating farmers and the knowledge of all focus-group members. Throughout the process, the advisor's role is to level out biases by knowing more farmers than those participating. Thus, the data obtained reflect a group opinion and are assumed to provide a far more accurate picture of reality than statistical averages from surveys.

Similar to other expert-based research approaches, the key to success of focus-group work lies in the careful selection of experts. In the present research, considerable effort was put into selecting the experts for focus-group discussions according to their willingness and competence to participate. Selecting experts of similar status was another focus of the selection process. Nevertheless, in some cases particularly dominant experts made it difficult to obtain equal input from all experts, despite the involvement of a moderator.

Another factor influencing the selection of experts was the need to physically gather at one location at the same time. From a theoretical viewpoint, this might have excluded valuable experts, but from a practical point of view farmers managing a typical farm and the respective advisors are most likely encountered regionally close together.

Group size is variously recommended as 6-10 (Morgan 1988; Krueger 1988) or even as broadly as 4-12 (Krueger 1988). As noted by Bold (2000), each extreme has its disadvantages: low productivity with few participants, and „social loafing“ with high participant numbers. In the present research, the envisaged groups size was 4-6, but some flexibility was required. In some cases, only half of the invited experts turned up for focus-group meetings, even for initial meetings, or „sample mortality“ was high at the second meeting. In other cases, focus groups seemed to prove a stimulating experience and many additional, non-invited guests appeared (up to 15) in the second meeting.

Data from the group discussions are then adapted to the simulation model TIPI-CAL© (Hemme et al. 1997; Hemme 2000) and examined for farm-internal plausibility by the scientist involved. The model TIPI-CAL© was also used to analyse

- profitability;
- farm development strategies, and
- the effect of potential policy changes during the subsequent steps of this research.

Where available data was complemented or confirmed by information standard farm planning data (ALB 1997; Borgen 1999; Chadwick 1998; Cormack 1999; Haggar & Padel 1996; Hydo Agri Dülmen 1993; KTBL 1998, 1999, 2000; Lampkin 1997; Lampkin & Measures 1999; LEL 2000; MacNaeidhe et al. 1996; Newton 1999; Ramsay 1997a, b, Schmelzle et al. 2000; ZMP 1997, 2000a, b).

An overview of the defined typical farm, a profit/loss calculation and a balance sheet are ideally sent to all focus-group members and are then individually

validated by means of a telephone interview with each group member. Alternatively, in some cases, e.g. when language difficulties occurred, feedback was limited to the respective advisor. This procedure was chosen to ensure that the data gathered are correctly interpreted and aspects that may have been overlooked in the discussions are taken into consideration. Corrected data is again sent out to members of the expert focus group as many times as is necessary to reach a consensus. In the experience of the present project, a maximum of two rounds of corrections and discussions was necessary.

Farm strategy and policy impact discussion

Potential development strategies of the typical farms are discussed, and economic and structural details are updated in the group by the same procedure. Projections of farm development with various business strategies in a stable political environment are assembled, modelled and results are confirmed using the aforementioned consensus process.

Finally, likely adaptation strategies to potential policy scenarios for the defined typical farm are discussed by the focus group. This step was planned as multiple feedback process like that used for the farm definition and strategy discussions. However, experience showed that the ability of focus groups to abstract long-term issues is limited, and therefore only the qualitative results from scenario discussions with focus groups feed into the final evaluation of policy scenarios. Nevertheless, is was possible to compile a comprehensive evaluation in combination with the quantitative results from simulation modelling.

In the present project, the original planning included three focus-group meetings, one for each step of the focus-group process as indicated in Figure 2-5. A trial run using the German dairy farm indicated that three meetings were not really necessary and that they overstrain the availability and willingness of farmers to participate. The process was condensed to two meetings:

1st meeting: Detailed definition of farm and discussion of envisaged farm development strategies

2nd meeting: Presentation and final confirmation of corrected base farm and farm development strategies and discussion of potential farm adaptations to changed policy environments

In total each of these meeting lasted from two to four hours, depending on the number and character of group members, time of the day and meeting location.

2.5.4 Definition of policy scenarios

A way of dealing with uncertain future in business or policy planning is the use of „scenarios“. Scenarios are consistent potential development paths describing how future situations might occur. *„Scenarios are images of the future, or alternative futures. They are neither predictions nor forecasts. Rather each scenario is one alternative image of how the future might unfold“* (IPCC 2001). Scenario analysis is considered a planning tool for the systematic confrontation with potential futures (Steinmüller 1997).

As a tool, it can help to define suitable strategies for dealing with the future in complex and rapidly changing social systems (Zanoli et al. 2000). This is based on the assumption that developments in the near future are determined to a great extent, while the distant future can only be described using a number of different scenarios (Hirschauer 2000). Compared to forecasts, scenarios are not suited to predicting the probability of an event in the future (Kreilkamp 1987). Once established, scenarios (i.e. policy developments) can be used to forecast reactions to various policy developments, and can thus serve as an auxiliary tool for forecasting policy impacts.

In a Europe-wide scenario analysis based on a range of experts on the organic farming sector in the EU, Zanoli *et al*. (2000) constructed various scenarios for the future development of the organic farming sector. This effort has been the most comprehensive scenario analysis ever undertaken on the European organic farming sector and it provided an ideal basis for selecting scenarios for the present study. However, this scenario analysis was only completed in the year 2000 and the level of detail was lower than expected.

However, modelling procedures required clear definition of the scenarios analysed. In the present evaluation, the exact definition of the scenarios used had to be suitable for two objectives:

- discussion with focus-group members; and
- simulation modelling with TIPI-CAL©.

Scenarios must be easy to comprehend and preferably highly contrasting, in oder to

- stimulate discussion among participants;
- avoid lengthy discussions about exact definitions of scenarios;
- enable visualisation of potential reaction processes to policy scenarios;
- facilitate a dialogue between participants, and
- prompt reactions.

In order to suit both the discussion with focus groups and the modelling procedures, brief quantitative and qualitative descriptions were used for group discussions, whereas for modelling procedures quantitative definitions of variable development over the simulation period were defined.

2.5.6 Specific modelling assumptions

For each country basic modelling assumptions had to be defined for policy independent cost and yield developments. Linear trend projections for the next 10 years are based on a linear regression analysis of the observed development over the last 10 years in each country, which was extracted from secondary data sources. Thus costs specified in this section are assumed to be independent of policy developments. Assumptions on yield developments for selected commodities are presented in Table 2-4, while assumptions on cost development are outlined in Table 2-5.

Table 2-4: Projected annual average yield increase (%) of selected commodities

	DE	IT	UK	DK
Wheat	0.7%	0.6%	1.3%	0.2%
Barley	0.9%	0.1%	0.9%	0.5%
Rye	0.9%	0.8%	0.9%	0.5%
Potatoes	1.9%	1.5%	0.9%	2.4%
Pulses	0.0%	0.2%	0.0%	0.0%
Milk	0.9%	1.2%	0.8%	0.7%

Source: Trend projections based on BML (1990-99); FAO (2000); ISTAT (2000a, b); Office for National Statistics (1999); Statistisches Bundesamt (1992-2000).

Organic yields are assumed to follow the generally increasing trend of conventional yields, while nevertheless preserving the relative yield gap between organic and conventional farming. The assumption that the relative yield gap will not become more pronounced due to lower yields and thus lower absolute yield increases is based on a generally observed and expected continued slowdown of the increase in conventional yields based on the effects of the 1992 CAP reform (Offermann & Nieberg 2000). Additionally, a reduction in intensification and yield increase of conventional farming is expected as an effect of Agenda 2000, with its envisaged decreasing output prices (Offermann & Nieberg 2000). Increasing environmental standards and rising input costs are expected to contribute to a further reduction in intensification. These assumptions do not, however, take into account the potential effects of a widespread distribution of genetically modified organisms in conventional farming.

In cases where yield developments in one country differed widely from the others, adjustments were made to EU 15 yield projections, as these discrepancies most probably originated from climatic or pest-related conditions in the respective country, rather than actual national changes in production methods or breeding. One such example was the initially projected yield increase of 5.4% per year for potatoes in Italy. Compared to yield projections of the other countries (0.9 to 2.4%) they were out of range. Consequently, the average annual increase in potato yields was set at 1.5% for Italy. In all cases where such an adjustment was made, national experts were consulted to confirm the adjustments and assumptions made.

Apart from the development of yields the general development of factor prices, fixed and variable costs determine the long-term development of agricultural firms. These are partly assumed to be independent of agricultural policy developments and are presented in Table 2-4. Although land rental prices depend greatly on the level of area payments under current agricultural policy as well as on the state of rural development in the respective region, they are difficult to project and so it was assumed that they remain constant in all countries.

Table 2-5: Projected annual average change (%) in costs and prices

	DE	IT	UK	DK
FACTOR PRICES				
Land rental	const.	const.	const.	const.
Qualified full-time labour	0.7%	2.5%	2.6%	3.2%
Interest rate	const.	const.	const.	const.
FIXED COSTS				
Land improvements	1.1%	3.5%	4.3%	1.3%
New machinery	2.5%	6.3%	3.6%	2.8%
Machinery maintenance	3.5%	3.3%	3.5%	2.7%
Buildings maintenance	2.2%	6.2%	4.0%	1.5%
Insurance	1.1%	3.4%	2.7%	1.4%
Advice & accounting	1.1%	3.4%	2.7%	3.0%
Telephone, office	1.1%	3.4%	2.7%	2.0%
Electricity, water	1.0%	3.1%	1.2%	0.6%
Other	1.1%	4.8%	4.3%	1.6%
VARIABLE COSTS				
Seeds	3.8%	3.9%	4.2%	0.1%
Fertiliser	0.7%	4.8%	-0.5%	1.0%
Plant protection	1.1%	2.7%	3.4%	0.5%
Fuel	4.5%	5.6%	5.5%	1.1%
Contract labour	1.1%	3.4%	2.7%	2.8%
Veterinary, medication	1.1%	3.6%	2.7%	3.1%
OTHER				
Consumer price index	2.4%	3.4%	3.4%	2.2%

Source: Own trend projections based on ABC (1998); Arve (2000a, b); Bank of England (2000a, b); BML (1990-99); De danske Landboforeninger (1996, 1998, 1999); EC (1999c); FAO (2000); Farmers' Weekly (2000); GSS (2000); ISTAT (2000a, b); Joergensen (1998); MAFF (1999a, b, c, 2000a, b); Nix (1999); ONS (1999b); SAC (1998a b); SJFI (2000b, c); Statistisches Bundesamt (1992-2000); Strecker (1999).

Interest rates are also assumed to remain constant, although general trends in interest rates can be observed for some countries, as they were subject to considerable fluctuations in the past and are expected to approach a common rate within the EU in the future.

National experts largely confirmed projections of fixed costs, and adjustments for changes in taxation etc. were made only in a few cases. For example, in Italy fuel prices increased considerably in the early nineties due to privatisation of a subsidised government energy provision system. This trend will most likely not continue and so only the most recent years (1995-1998) were considered for fuel price projections, which resulted in a trend of 5.6% instead of 8.4% per year. The same reasoning applies to the reduction in the price projection for electricity in Italy, where a 3.1% increase was assumed instead of 9.7%.

In Germany, liberalisation of the energy market led to a price reduction for electricity in recent years, which is only partly balanced out by new eco-tax and energy tax schemes. The observed negative trend is therefore not expected to continue, and prices are expected to pick up again, so an annual price increase of 1.0% was assumed.

For Italy, trends in consumer and labour prices were depicted only from developments in the years 1993 to 1998. For qualified agricultural labour, a 2.5% price increase was taken into account, whereas consumer prices are assumed to rise by 3.4% per year.

In cases where dramatic developments had been observed within that time frame, e.g. energy and fuel price development in Italy in the early nineties, only the last three to five years were extrapolated to the future. In other cases where one country differed substantially from all other countries, adjustments were made to the expected developments within the EU on the basis of average trend projections from the EU in the past. In all cases of adjustment, national experts were asked to confirm the adjustments and assumptions made.

2.5.7 Practical implementation and time requirements

This research was conducted between 1998 and 2000. As not all farms were developed and modelled at the same time, a schematic presentation of the required time-frame is given for one example, the German dairy farm in Table 2-6, which was the most straight forward example. For a variety of reasons research on some farms began only in the year 1999 and in the case of other farms large time gaps occurred between the individual steps.

Table 2-6: Time table of research phases: the case of the German dairy farm as an example

	1998				1999				2000			
(1) Identify regions and farms	■											
(2) Detailed farm definition		X										
(3) Farm modelling			■		■	■				■		
(4) Farm adaptation discussion				X								
(5) Define policy					■	■	■	■				
(6) Policy scenario discussion									X			

X Based on focus groups

These delays were due in part to difficulties in implementing the individual research steps. These steps are presented in Table 2-7, together with their objectives and the difficulties encountered.

Table 2-7: Practical implementation of research: steps and difficulties encountered

Steps	Activity	Difficulties
Identify case study regions and farms in each country	Literature review	• Mostly grey literature, difficult to access. • Coverage of 4 countries time-intensive.
	Collect information from producer organisations	• Contact may be complicated by language barriers or willingness to provide information. • Coverage of 4 countries time-intensive.
	Collect information advisory services	
	Expert interviews	
Detailed farm definition	Focus group meeting*	• Difficulties in abstracting from own to typical farm.
Farm modelling	Study the model TIPI-CAL	• No handbook or other written training information available on the model.
	Model adaptation to specifics of organic farming	• Insufficient number of livestock activities possible. • Addition of more livestock only permitted by model owners as specified by written contract.
	Define basic modelling assumptions (times series of yields and input and output prices) by literature review and information from national statistical services	• Information often not easily accessible. • No data available on organic farming. • General statistical data not available in English. • Coverage of 4 countries time-intensive.
	Adapt farm to model	• Difficulty getting to the root of problems occurring because access to certain parts of the model was denied.
	Implement farm adaptation strategies	• Insufficient number of livestock activities possible.
	Policy scenario implementation	• Not all scenario options can be introduced in national information.
Farm adaptations	Focus group meeting*	• Timing difficult due to limited availability of participants. • Farmers regionally far apart • Varying number of participants (2-15). • Advisors dominate discussion.
Definition of policy scenarios	Review literature on potential scenarios.	• Scenario analysis did not produce results with the degree of detail required.
	Participate in scenario analysis on European organic farming sector.	• Scenario analysis not finished before end of 1999.
Policy discussion	Focus group meeting*	• Timing difficult due to limited availability of participants. • Farmers regionally far apart • Varying number of participants (2-15). • Advisors dominate discussion.

*Focus groups: In total approx. 60 farmers and 10 advisors of all age groups and different backgrounds were involved to compile a total of 8 typical farms.

3 Typical organic farms in the EU[2]

The objective of this chapter is to provide an overview of the status quo of organic farms in the EU based on typical farms from selected case-study countries.

A brief presentation of the situation of organic farming in the selected countries and regions provides justification of the selection of typical farms. Although this selection took place between 1998 and 1999, the most up-to date data (for the year 2000) where available are presented to improve reader friendliness.

Typical dairy and arable farms in the United Kingdom, Germany, Denmark, and Italy are described and compared with respect to their structure, intensity, policy support, production cost and profitability based on production and accounting data for the year 1999. These farms provide the data base for policy impact analysis in the following chapters.

Details are given on factor endowment, total utilisable agricultural area (UAA), land use and performance as well as livestock management and performance. Physical comparison of farm types across countries is complemented by various intensity indicators:

- labour intensity in agricultural work units per defined area (AWU/100 ha UAA);
- stocking rate (LU/ha UAA); and
- for dairy farms, milk yield from forage.

Profitability of farms is compared via a modified definition of profit as farm family income in line with the Farm Accountancy Data Network definition (EC 1989). This represents the return to farm family's labour, land and capital and determines financial decision making on farms (Table 3-1).

Table 3-1: Definition of profit: family farm income

Farm output	+	Market receipts for sales of agricultural products
	+	Subsidies, compensatory payments
	+	Other farm income (rents, contract work, etc.)
	+	Net value of change in stock
Costs	-	Specific costs/variable costs
	-	Overheads (including depreciation)
	-	Wages, salaries paid to casual and non-family labour
	-	Interest paid on borrowed capital
	-	Rent paid
	=	**Profit (family farm income)**

Source: Offermann & Nieberg (2000), modified

[2]Parts of this Chapter have been published previously (Häring 2002 & 2003)

Factor endowment and costs are taken into account as follows:

- Farm family labour: for calculating farm family remuneration, one farm family labour unit accounted for an input of 2400 hours per year.
- Fixed capital: own capital is considered to be total assets excluding book values of land and quota.
- Return on capital: interest on own capital is valued by average interest rates observed in each country from 1996 to 1999.
- Depreciation is based on purchase prices of single factors in all countries assuming linear depreciation. In practice, this differed only in Denmark where depreciation is calculated as one third of the total book value of all assets of each year (Petersen 1999).
- Cost for purchased quota is taken into account in the year of purchase, as are rental values of quota.
- Value added tax is not considered in costs and revenues in order to avoid distortion of results according to national differences.
- Exchange rates: all results are presented in euros (€), taking into account the official irrevocably fixed conversion rates set by the European Commission (EC 1998). For the countries not in the EU monetary union, UK and DK, the annual average exchange rate for 1999 was used. Therefore, results for UK farms are briefly discussed in the light of the extreme exchange rate variations observed in 1999. For Denmark, these fluctuations were only minor and are therefore not discussed.
- Milk yield: given as fat corrected milk standardised to 4% fat.
- Farm-internal use of marketable production factors is taken into account at achievable market prices.

3.1 Organic farms in the United Kingdom

In the UK in 2000, 1,690 agricultural holdings farmed 375,270 ha organically, representing 2.38% of the total utilisable agricultural area and 0.72% of all holdings (Eurostat 2002). Organic farming in the UK is dominated by livestock farming, with 82% of total organic land area used as grassland or for fodder crops (Table 3-2). Relative to conventional farming, organic chicken and sheep & goats, as a percentage of all chicken and sheep & goats in the UK, represent the highest share of all animal categories. The most important farm types are dairy, cattle and sheep farms, with different percentages of arable land (Stolton 1998).

Table 3-2: Certified organic and in-conversion land area and animals in the UK in 2000

Land use	Organic land area (ha)	in % of total organic UAA[1]	in % of total land area of category
Cereals	37,930	10.11	1.13
Pulses	3,050	0.81	1.47
Root crops	5,610	1.49	1.48
Vegetables[2]	4,400	1.17	3.58
Perennials and fruits[3]	440	0.12	1.16
Arable fodder crops[4]	27,840	7.42	2.11
Permanent grassland	281,060	74.90	3.00
Other	14,940	3.98	1.47
Total	375,270	100.00	2.38
Livestock	**No.**		**in % of all animals**
Cattle	139,820		1.26
...of which dairy cows	32,380		1.39
Pigs	94,300		1.46
Sheep & goats	751,810		1.79
Chicken (in 1000)	6,530		4.26

1 Total UAA in 2000: 15,798,510 ha
2 Vegetables incl. melons and strawberries
3 Fruit & berries, citrus, wine, olives
4 Arable forage crops & ley

Source: Eurostat (2002)

Data on the main farm types and their shares of all organic farms in the UK further illustrate the importance of animal husbandry in the UK (Table 3-3). In 1998, cattle and sheep farms together and mixed farms contribute 24% and 22%, respectively, to all organic holdings in the UK, while 14% of all organic farms are dairy farms. Cereal and general cropping farms make up 22% of all organic farms (Table 3-3).

Table 3-3: Classification of organic farms in the UK[1]

Farm type	Organic holdings	in % of all organic holdings	Organic holdings in % of conventional holdings in each category
Cereals	29	9.7	0.18
General cropping	37	12.4	0.31
Horticulture	43	14.4	0.76
Pigs & poultry	0	0.0	0.00
Dairy	42	14.1	0.22
Cattle & sheep	17	5.7	0.27
Cattle & sheep	55	18.5	0.46
Mixed	66	22.2	0.70
Other	1	0.3	-
Total	298	100.0	0.35

1 Farms > 8 European Size Units in robust farm types. For classification of robust farms types see DEFRA (2002a)

Source: Foster and Padel (1998)

Within the UK, the organic land area is not evenly distributed: At the time of this research, England and Wales had the highest percentage of organically managed land and the highest share of fully converted organic land (Soil Association 1998). Within England and Wales, the south and west regions have a proportionally higher number of organic producers.

3.1.1 UK dairy unit

Organic dairy farms are predominantly found in south-west England and Wales (Soil Association 2000). Over 80 per cent of the agricultural land is classed as a Less Favoured Area, with livestock enterprises predominating (Michelsen et al. 2001). The concentration of organic dairy farms in these regions is mainly due to the early development of organic dairy processing. The majority of organic dairy farms are located in south-west England and tend to be larger than in Wales due to more favourable soils and climate and the historic development of farm structure. However, no preliminary survey data that could serve to define a basic model farm were available for the more typical region of south-west England, nor could an advisor be found for co-operation in that region. In

the Midlands/Welsh border region, organic dairy farms were more regionally concentrated and better contacts existed with fully converted organic dairy farmers and respective advisors.

The organic dairy farm defined as typical for Wales and representative of most full-time organic specialist dairy farms in the UK is located in south-west Wales, at a relatively low altitude ranging from a few metres to a maximum of 200 m above sea level, clearly indicating the lowland character of this farm. Soils are of Ordovician origin. Alluvium as a sedimentary deposit of marine or riverine sources forms the basis for silty clay loam or clay soils. The climatic conditions are favourable for dairy production, with approximately 900 – 1100 mm mean annual rainfall, which is relatively low compared to the surrounding more hilly regions, but still forms moist conditions. Temperature could be described as mild with an early rise in spring temperatures, prolonging the vegetation period. The mean annual temperature is 10.3°C. Cereal production, especially barley, becomes possible under these conditions, but grassland still remains the main land use due to extraordinary growth rates (Rudeforth et al. 1984).

The Welsh organic dairy farm rears 62 dairy cows and covers 59 ha fully converted UAA. Of these 59 ha, 33 are arable and 26 ha are permanent grassland. Details of land use, factor endowment and dairy herd policy are given in Table 3-4, while the corresponding profit/loss account for 1999 is given in Table 3-5. Crop rotation on the arable area is four or five years white clover ley followed by one year of cereal or field vegetables. Red clover ley is undersown in autumn and remains for two years, followed by an annual cereal crop.

With an annual average of 62 dairy cows plus replacement heifers, the business achieves an overall stocking rate of 1.3 LU/ha UAA. Dairy cows are mostly spring calving, but year-round calving is increasing. The herd achieves an average milk yield of 5,583 kg fat corrected milk per year (FCM) (Table 3-4) of which 3,636 kg are produced from forage. A small share of milk quota is rented at 0.12 €/kg or bought at 0.50 €/kg. Replacement heifers are home reared, and calve at 27 months. Insemination with a beef bull reaches 40% and all male calves and beef heifer calves are sold at one week of age. The most common breeds are British Friesian, at times cross-bred with Holstein Friesian to improve milk yields, or with MRI or Normande to improve milk protein or fat content. A flock of 150 tack sheep graze down pastures in autumn and winter.

Table 3-4: UK organic dairy unit: land use, dairy herd policy and factor endowment in 1999

Land use (yield)	Unit	
Total land area	UAA[1] (ha)	59.0
White clover/rye grass	ha	16.0
Red clover/rye grass	ha	11.0
Oats (4.3 t/ha)	ha	2.5
Barley (4.3 t/ha)	ha	2.5
Carrots (30 t/ha)	ha	1.0
Permanent grassland	ha	26.0
Livestock		
Dairy cows	No.	62
Stocking rate	LU[2]/ha UAA	1.3
Average FCM[3]	kg/cow year	5,583
FCM[3] from forage	kg/cow year	3,636
Replacement	%	18
Age of first calving	months	27
Insemination with beef bull	%	40
Factor endowment		
Labour	AWU[4]/100 ha UAA	2.6
Farm family labour	AWU[4]/farm year	1.0
Hired labour	AWU[4]/farm year	0.5
Casual labour	AWU[4]/farm year	0.2
Arable owned/rented	%	79/21
Grassland owned/rented	%	100/0
Quota	t	308
Own/rented quota	%	93/7

1 UAA (utilisable agricultural area)
2 LU (livestock unit)
3 FCM (fat corrected milk)
4 AWU (agricultural work unit)

This family farm operates with one full-time farm family manager and a part-time herdsman (Table 3-4), which explains the fairly high labour costs (Table 3-5). Alternatively, a second farm family labour unit might be available. Additionally, casual labour is employed at busy times such as harvest and calving for approximately 500 hours (= 0.2 AWU) per year at 7.59 € per hour. The business relies on contracting assistance. Milk, the major product, is marketed through an organic milk marketing board at an average of 0.43 € per kg FCM.

Land is divided into medium-sized, fairly distributed fields, which are mainly owner-occupied (Table 3-4). Arable land is rented at 759 €/ha, while grassland is available at 607 €/ha in this region. About half of the farm area is regarded as a Less Favoured Area, while for the other half the regular arable area scheme applies. However, as the cereal area of this farm is small and the existing ley area is needed for fodder production, the simplified scheme applies. Furthermore, the organic aid scheme does not provide continuing support for continued organic farming in 1999 and no other agri-environmental schemes apply to this organic dairy farm. Thus, returns from arable area payments or other support payments are low.

The farm has modern dairy facilities, including a fishbone parlour pipeline and bulk tank. A scraped, bedded cubicle houses all dairy cows and a simple 200 m^2 shed houses breeding heifers. The day and night grazing period is approximately 105 days, with an additional 60 days of daytime grazing only. Dairy variable costs are high (Table 3-5) due to high costs for concentrates used and for veterinary and medical services.

A number of traditional storage sheds and basic silage facilities also exist. The farm is equipped with silage and hay-making machinery and milking equipment. Part of the cropping work, such as slurry application, manure spreading, ploughing and combining is carried out by contractors, and is reflected in the crop variable costs incurred.

A profit/loss account for this Welsh organic dairy farm is provided in Table 3-5 for the year 1999.

Table 3-5: Economic performance of the UK organic dairy unit in 1999

	€[1]/per cow
Dairy market receipts	2,221
Beef market receipts	127
Crop market receipts	304
Payments general	48
....of which organic aid	0
Other returns	95
Total returns	**2,795**
Dairy variable costs	508
Crop variable costs	177
Gross margin	**2,110**
Labour paid	272
Rent paid	89
Interest paid on capital	140
Overheads	626
....of which depreciation	238
....of which other fixed costs	389
Total input costs[2]	**1,812**
Farm profit / cow	**983**
Farm profit / 100 kg FCM[3]	**17.6**
Farm profit / ha UAA[4]	**999**
Farm profit / FWU[5]	**58,980**

1 Calculations based on the annual average interbank exchange rate of 1 GBP = 1.5178 € in 1999.
2 Variable costs, overheads, wages paid, rents paid, interest paid on capital, overheads
3 FCM (fat corrected milk)
4 UAA (utilisable agricultural area)
5 FWU (family work unit)

Farm family remuneration amounts to 58,980 € in 1999 for the labour of one farm-ing family work unit, while total farm profit is 983 € per cow. Contribution of payments to profit is only 5% of total farm profit. Taking the exchange rate fluctuations of 1999 into account, the annual profit per FWU of 58,980 € ranges from 53,850 € at the lowest to 62,850 € at the highest. Although the effects of exchange rates are irrelevant when comparing this farm's results with other UK farms, the effect on comparability with the profitability of farms from other countries is pronounced.

In the UK, one of the commonly available success indicators of farms which is most closely related to farm profit definition, is Occupiers' Net Income (ONI), which is basically farm profit minus a notional charge for unpaid family labour. Compared to the average organic dairy farm profit for England and Wales of 932 €/ha ONI (Fowler et al. 2000), as well as compared to a conventional

comparison group with 525 €/ha ONI, the organic case-study farm achieved a higher profit (999 €/ha). However, these comparative data relate to 1997/98 and the large difference observed in profit is related to a significant increase in the organic milk price since then. The relative superiority of the organic farm profit over comparable conventional farm profit is due to a higher input per output ratio for the conventional group.

Compared to the national average wage of 31,751 € and 22,061 € respectively for all industrial and all agricultural services (ONS 1999a), the annual remuneration of family labour, 15,550 € per FWU, which takes into account the opportunity cost of land and capital, is significantly lower.

3.1.2 UK arable unit

In the UK, organic arable farms are predominantly found in eastern and central England. In these regions, especially in the eastern part of England, arable farms are generally large. In eastern England, farms tend to be larger than in central England due to more favourable climatic conditions and better soils. These farms probably contribute the majority of marketable products to the national market in organic products. In both regions, a high percentage of organically cultivated farmland can be observed. Although the organic arable farms tend to be smaller in the eastern part, a higher density of organic arable holdings can be observed in central England. Furthermore, many farms in the east have little livestock expertise or facilities and often depend on a stockless crop rotation (Cormack, 1997).

Especially in south-central England, the number of organic arable farms is high, although farms tend to be smaller than in eastern and central England. Arable systems with a considerable livestock density are commonly found. In accordance with the integrating nature of organic farming, the region with more mixed arable farm types, south-central England, was chosen as the representative region for full-time organic arable family farms in the UK. Additionally, this seemed to be a reasonable choice for methodological reasons, as it was necessary to find a sufficient number of farmers with organic arable farms within a reasonable distance.

The typical organic arable farm is assumed to be located in the counties of East and West Sussex in the south-east of England, in and around the South Downs, at an elevation of 50 to 200 m above sea level. Typically, the farm lies in a moderately hilly region, usually with east-west alignment, with steep northern scarps and gently falling southern slopes. The soils in this region are of Cretaceous origin, generally chalk, with tertiary deposits on southern dipslopes, consisting of unconsolidated sands and clays. Silty brown rendzinas, shallow grey rendzinas and brown earths are found (Jarvis et al. 1984). Climatic conditions are influenced by the generally low relief and proximity to the continent, modified by oceanic effects from the English Channel. The average annual rainfall ranges from 800 mm to 1,000 mm in higher regions. The average temperature lies at 16°C in July and 5°C in January. The favoured land use is arable cropping. However, only cereals like winter wheat and barley can cope with the shortage of water supply observed during the summer months. Permanent grassland is typical for steep escarpments, although deficiency of water restricts growth rates. Beef production is one possible enterprise for this grassland.

The typical organic arable farm cultivates a fully converted area of 245 ha, as outlined in Table 3-6; the corresponding profit/loss account for 1999 is given in Table 3-7. The following crop rotation applies: two years set-aside of red clover/ Italian rye grass ley, two years of winter wheat or field vegetables, one year of peas, two years of white clover/rye grass ley and two years of various cereals.

A suckler cow herd is reared for fertility management and use of permanent and temporary grassland, most commonly Hereford and Devon cross-bred with Limousin and Aberdeen Angus. Cows remain in the herd for 6 years, accompanied by a breeding bull. Spring-born offspring is retained and finished with grass and silage, heifers in a 18 months regime and steers in 23-24 months. An indoor winter period of 130 days is chosen for finishing in order to obtain sufficient farmyard manure.

Typically, a flock of approximately 150 ewes is kept, most commonly of the Suffolk or Hampshire breeds, often cross-bred with Texel. Ewes remain in the flock for 6 years and lamb in spring. Sheep graze all year round, receiving a maximum total dry matter intake of five per cent each as hay and concentrates.

Table 3-6: UK organic arable farm: land use, livestock policy and factor endowment in 1999

Land use (yield)	Unit	
Total land area	UAA[1] (ha)	245.0
Set aside: Red clover/ Italian rye grass	ha	45.0
Winter wheat (3.6 t/ha)	ha	100.0
Peas (2.4 t/ha)	ha	12.0
White clover/grass ley (silage, hay, pasture)	ha	43.0
Spelt (3.4 t/ha)	ha	10.0
Spring oats (3.9 t/ha)	ha	25.0
Permanent grassland	ha	10.0
Livestock		
Stocking rate	LU[2]/ha	0.3
Suckler cows	No.	30
Breeding bull	No.	1
Beef steers (23-24 months silage finished)	No.	12
Beef heifers (18 months grass finished)	No.	7
Ewes	No.	150
Factor endowment		
Labour	AWU[3]/100 ha UAA	1.5
Farm family labour	AWU[3]/farm year	1.0
Hired labour	AWU[3]/farm year	2.0
Casual labour	AWU[3]/farm year	0.6
Arable land owned/rented	%	80/20
Grassland owned/rented	%	60/40

1 UAA (utilisable agricultural area)
2 LU (livestock unit)
3 AWU (agricultural work unit)

This family farm is managed by one farm family manager plus two full-time permanent labourers and 1500 hours or 0.6 agricultural work units of casual labour are hired during busy times such as harvest and lambing at 6.8 € per hour. Due to its size, the farm is fully equipped with all necessary machinery and does not depend on contracting services.

Land area is mainly owner occupied, with large fields close to the farm stead. Grassland is rented at an average of 228 €/ha UAA. Building structure consists of the minimum facilities required: a deep litter barn for cattle, grain storage and several traditional sheds for machinery and sheep.

Suckler cow premium is available for all cows, beef special premium for bulls and steers. However, due to lack of quota, only 20 % of all ewes are eligible for sheep annual payments. All land is assumed to be eligible for the arable area payments scheme, however, no support payments for continued organic farming are received in 1999. The most important cereal products are marketed to a nearby organic mill (Wheat: 334 €/t, spelt and oats: 288 €/t), while beef is sold to a wholesaler at organic prices.

Farming family remuneration amounts to 61,727 € in 1999 for the labour of one farm family work unit, while farm profit on a per ha basis is calculated at 252 €/ ha UAA. Taking into account exchange rate fluctuations of 1999, the annual profit per FWU ranges from 56,358 € at the lowest to 65,777 € at the highest.

Table 3-7: Profit/loss account for the UK organic arable unit in 1999

	€[1] per ha
Livestock returns	105
Crop returns	683
Payments	315
... of which organic aid	0
Other returns	104
Total returns	**1,207**
Livestock variable costs	45
Crop variable costs	158
Gross margin	**1,004**
Labour paid	314
Rent paid	77
Interest paid on capital	30
Overheads	332
...of which depreciation	84
...of which other fixed costs	248
Total input costs[2]	**956**
Farm profit / ha UAA[3]	**252**
Farm profit / FWU[4]	**61,727**

1 Calculations based on the annual average interbank exchange rate of 1 GBP = 1.5178 € in 1999.
2 Variable costs, overheads, wages paid, rents paid, interest paid on capital, overheads
3 UAA (utilisable agricultural area)
4 FWU (family work unit)

Compared to the ONI of 224 €/ha for a representative organic cropping farm and 182 €/ha for a comparable conventional cropping farm analysed by Fowler et al. (2000), the profit of the arable organic case-study farm is surprisingly high. However, taking family labour input into account, the typical farm's results take an intermediate position between the aforementioned comparison groups, with 50,567 €/FWU for the conventional group and 85,629 €/FWU for the organic group (Fowler et al. 2000).

Compared to the national average wage of 31,751 € and 22,061 € respectively for all industrial and all agricultural services (ONS 1999a), the annual remuneration of family labour, 65,394 € per FWU, which takes into account the opportunity cost of land and capital, is significantly higher.

Due to the farms' high share of cereal area and the grassland area used for beef and sheep production, profit contribution from payments is high and amounts to 125% of total farm profit. As the organic aid scheme does not provide support for continuing organic farming and no other agri-environmental schemes apply, the income contribution of 2078/92 payments to farm profit is nil.

3.2 Organic farms in Germany

In Germany, the organic primary sector consisted of 9,570 organic holdings farming 489,090 ha in 2000, which represented 2.85% of total UAA and 2.03% of all agricultural holdings (Eurostat 2002). The largest share of organic land area is cultivated as grassland, fodder crops and cereals (Table 3-8). In terms of market shares by volume, organic cereals, vegetables and potatoes contribute 2.6%, 2.1% and 1.5% respectively to total production of these products (Hamm et al. 2002).

In animal husbandry, sheep and dairy cows are the most important animal groups, with sheep being clearly more strongly represented in organic farming in comparison to conventional farming. Nevertheless, organic sheep and goat meat covers a market share by volume of only 1.5% of the total domestic market for sheep meat, while organic beef contributes 2.3% (Hamm et al. 2002). Dairy cows are the second most important group of animals in Germany, with an estimated total milk yield of 370,000 t of organic milk per year (Hamm et al. 2002) and market share by volume of 0.9% of the total domestic milk market.

Chapter 3

Table 3-8: Certified organic and in-conversion land area and certified animals in Germany in 2000

Land use	Organic land area (ha)	in % of total organic UAA[1]	in % of total land area of category
Cereals	123,900	25.33	1.87
Pulses	19,260	3.94	9.08
Root crops	7,970	1.63	0.98
Vegetables[2]	6,440	1.32	6.32
Perennials and fruits[3]	6,970	1.43	3.36
Arable fodder crops[4]	48,200	9.86	2.82
Permanent grassland	229,100	46.84	4.48
Other	47,250	9.66	2.00
Total	489,090	100	2.85
Livestock		**No.**	**in % of all animals**
Cattle		370,690	2.49
of which Dairy Cows		85,250	1.79
Pigs		117,060	0.45
Sheep & goats		164,690	6.05
Chicken (in 1000)		980	0.91

1 Total UAA in 2000: 17,151,560 ha
2 Vegetables incl. melons and strawberries
3 Fruit & berries, citrus, wine, olives
4 Arable forage crops & ley

Source: Eurostat (2002)

3.2.1 German dairy unit

A typical full-time organic dairy farm in Germany was chosen in Baden-Württemberg, in the Region of Hohenlohe. This region is characterised by heavy soils, developed from slope deposits over limestone, marlstone or dolomitic, or silty and clayey soils, e.g. brown soils or pelosols (Billen 1997). At an altitude of 350-500 m, an annual average temperature of 9°C is observed, with an average temperature of 16°C in the growing season, which lasts from May to July. Average precipitation is approximately 800 mm per year (Billen 1997). Land use is dominated by arable farming (50-60% of total UAA) of cereals or forage crops (MLR 2000).

The typical German organic dairy farm rears 38 dairy cows and covers around 55 ha, of which 50% are presently arable and 50% are permanent grassland. Details of land use, factor endowment and dairy herd policy are given in Table 3-9, with the corresponding profit/loss account for 1999 in Table 3-10. Rented arable land is rented at 490 € per ha, while permanent grassland is rented at 256 € per ha. Crop rotation on the arable area is two years of autumn-sown clover/grass ley, followed by two cereal crops. With an annual average of 31 replacement heifers, the business achieves an overall stocking rate of 1.1 LU/ha. Dairy cows, mainly of the Simmental and Black-and-White breeds, calve all year round. On the basis of silage, maize silage, cereals and 155 grazing days, the herd achieves an average milk yield of 5,062 kg FCM per year, of which 3,714 kg are from forage (Table 3-9). In 1999, the milk quota price is 0.46 € per kg and can be rented at 0.12 €. Replacement heifers are home reared, and calve at 30 months.

The labour input of this family farm is either 1.7 farming family labour units, or one full-time farm family manager and one apprentice. Additionally, approximately 0.3 AWU of casual labour are employed at an average of 7.67 € per hour. Furthermore, the business relies on contracting assistance.

Total land area is fairly consolidated, with part of the land in a Less Favoured Area and another part in a Water Protection Zone. As the total cereal area of this farm is small, the simplified scheme applies in 1999. Support for organic farming is paid at 194 € per ha for cereals and 133 € per ha for grassland.

The farm is equipped with modern dairy facilities, including a fishbone parlour and scraped bedded cubicle housing for all dairy cows. Basic silage facilities and a number of simple sheds for storage exist. High overhead costs are in part due to high depreciation by farm machinery. The farm is equipped with basic cropping and hay-making machinery, as well as dairy equipment. Combine harvesting and silage making are carried out by contractors, and thus variable costs contribution from contracting assistance is nevertheless high. Milk is marketed to a dairy with an organic processing line at an average price of 0.38 €, while all other products are marketed through a producer group.

Table 3-9: German organic dairy farm: land use, dairy herd policy and factor endowment in 1999

Land use (yield)	Unit	
Total land area	UAA[1] (ha)	54.5
Clover/grass ley	ha	10.0
Winter wheat (3.8 t/ha)	ha	14.0
Maize silage (12.0 t/ha)	ha	2.8
Permanent grassland	ha	27.7
Livestock		
Dairy cows	No.	38
Stocking rate	LU[2]/ha UAA	1.1
FCM[3]	kg/cow year	5,062
FCM[3] from forage	kg/cow year	3,714
Replacement	%	20
Age of first calving	months	30
Insemination with beef bull	%	0
Heifers	No.	31
Factor endowment		
Labour	AWU[4]/100 ha UAA	3.6
Farm family labour	AWU[4]/farm year	1.7
Hired labour	AWU[4]/farm year	0.3
Arable land owned/rented	%	36/64
Grassland owned/rented	%	50/50
Quota	t	172
Own/rented quota	t	122/50

1 UAA (utilised agricultural area)
2 LU (livestock unit)
3 FCM (fat corrected milk)
4 AWU (agricultural work unit)

Farm family remuneration amounts to 14,458 € per family work unit, while, on a per cow and per ha basis, profit is 647 and 451 € respectively (Table 3-10). Payments contribute a 75% share to total profit, of which a 44% contribution to profit consists of support payments for organic production.

Farm family remuneration amounts to 14,458 € per family work unit, while, on a per cow and per ha basis, profit is 647 and 451 € respectively (Table 3-10). Payments contribute a 75% share to total profit, of which a 44% contribution to profit consists of support payments for organic production.

Table 3-10: Economic performance of German organic dairy unit in 1999

	€ per cow
Dairy returns	1,783
Beef returns	285
Crop returns	199
Payments general	485
....of which organic aid	213
Other returns	223
Total returns	**2,975**
Dairy variable costs	473
Crop variable costs	230
Gross margin	**2,272**
Labour paid	141
Rent paid	172
Interest paid on capital	16
Overheads	1,296
Depreciation	706
Other fixed costs	590
Total input costs[1]	**2,328**
Farm profit / cow	**647**
Farm profit / 100kg FCM[2]	**12.8**
Farm profit / ha UAA[3]	**451**
Farm profit / FWU[4]	**14,458**

1 Variable costs, overheads, wages paid, rents paid, interest paid on capital, overheads
2 FCM (fat corrected milk)
3 UAA (utilisable agricultural area)
4 FWU (family work unit)

Compared to results obtained from a farm branch analysis of 30 organic dairy farms in the same region (Table 3-11, Comparison group I), the similarity of results gained using the described methodology for the present investigation springs to mind and will not surprise, as several of the farmers whose farm was analysed within this comparison group (I) were from the same region as the farms in the present investigation. Nevertheless, as different farmers than those evaluated in the comparison group were present, it confirms the validity of results gained through the focus-group process. Data obtained for a second comparison group (II) consisting of 19 farms in a very different region of Baden-Württemberg, the Allgäu, further confirm this observation.

Table 3-11: Economic performance of the German organic dairy farm in 1999 compared to selected dairy comparison groups for the year 1998

INDICATOR	Typical German organic dairy farm	Comparison group I	Comparison group II
Average total UAA	54.5	54.3	56.7
Arable area share	0.49	0.58	0.71
Average dairy herd size	38	31	36
FCM (kg/cow year)	5,062	4,978	4,580
FCM from forage (kg/cow year)	3,714	3,394	3,330
Farm profit per kg FCM	0.13	0.13	n.d.
Farm profit per cow	647	643	n.d.
Farm profit per FWU	14,458	16,853	n.d.

Source: Haugstätter (1998), Gapp (1999), own calculations

Compared to the average profit of conventional dairy farms in Baden-Württemberg in 1998/99 (20,372 €/FWU or 718 €/ha UAA), farm family remuneration on the typical organic dairy farm is low. Furthermore, its profit of 451 € per ha UAA is slightly lower than the national average profit of 464 € per ha for full-time organic farms in 1998/99 (BML 2000). In comparison, the average organic holding cultivates approximately 60 ha and receives a comparably lower share of its profit from direct payments: 62%, of which nearly half come from agri-environmental schemes, while the present typical farm has a profit contribution of 75% from direct payments, and a profit contribution of 33% from organic aid.

A similar picture emerges from the results of a national conventional comparison group of farms (BML 2000), with a profit of 504 €/ha UAA in 1998/99. Only 32% of profit was contributed by payments, of which only 11% were from agri-environmental schemes.

In comparison to full-time conventional dairy farms in Baden-Württemberg in 1999/2000, with profits of 532 €/ha UAA, the profit of the organic case-study farms is particularly low (MLR 2001).

Compared to the average remuneration of family labour in Baden-Württemberg in 1999/2000 of 15,801 € per family work unit, the observed profit of 14,458 € per unpaid FWU was somewhat lower (MLR 2001). In comparison to the national average wage for all industrial and other employees of 35,353 € per labour unit and year (Statistisches Bundesamt 2000), all the agricultural activities mentioned result in inferior incomes.

3.2.2 German arable unit

In Germany, an organic arable farm was chosen from the former West German federal states, in order to represent a higher number of farms (see section 3.2). The main objective was to identify a full-time arable farm that received most of its total profit from arable cropping. As many organic arable farms have a considerable profit contribution from horticulture, fruit or livestock farming, or are mixed farms in the first place, this was a difficult task.

Typically, organic arable farms converted around 1990 and cover from 60 to 80 ha with a considerable share of permanent grassland. They are most frequently found in the regions of Schleswig-Holstein and Bavaria. Finally, a region in Bavaria was selected favourable to arable farming, where a large organic mill and bakery has existed for a long time and there was a high density of organic farms suitable for participation.

The region is characterised by a gently undulating to flat topography with an average gradient of less than 12% at an average altitude at 390 m above sea level. The growing season of 217 days is the result of a mild, moderately humid climate with an annual average temperature of 7.6°C and an annual average precipitation of 760 mm. Dominating soils are brown soils derived from loess.

This intensively farmed area dominated by arable farming is not only characterised by the lowest share of permanent grassland and one of the highest shares of UAA sown to wheat, but also by a high livestock density in comparison to the rest of Bavaria (StMLF 2000).

The typical organic arable farm cultivates an area of 85 ha as described in Table 3-12. A profit/loss account for this typical organic arable farm is provided in Table 3-13 for the base year 1999. Roughly, the following crop rotation applies: two years clover/grass ley, in the first year as set-aside, followed by a crop of winter wheat or potato with a catch crop such as vetch and a manure application. A crop of peas may be followed by potatoes plus a catch crop of maize. A second crop rotation may run parallel to the first: [1] clover/grass ley followed by winter wheat and rye plus a catch crop or [2] potatoes followed by a clover/grass ley and then winter wheat plus a catch crop.

Table 3-12: German organic arable farm: land use, livestock policy and factor endowment in 1999

Land use (yield)	Unit	
Total	UAA[1] (ha)	85.0
Set-aside: clover/grass ley	ha	8.5
Clover/grass ley	ha	8.5
Winter wheat (4.5 t/ha)	ha	17.0
Spelt (2.5 t/ha)	ha	4.0
Rye (4.9 t/ha)	ha	17.0
Peas (4.0 t/ha)	ha	17.0
Maize (5.5 t/ha)	ha	4.0
Potato (20 t/ha)	ha	4.0
Permanent grassland	ha	5.0
Livestock		
Stocking rate	LU[2]/ha UAA	0.2
Steers	No.	18
Heifers	No.	9
Factor endowment		
Total labour	AWU[3]/100 ha UAA	1.4
Farm family	AWU[3]/farm year	1.0
Casual labour	AWU[3]/farm year	0.2
Arable land owned/rented	%	31/69
Grassland owned/rented	%	100/-

1 Variable costs, overheads, wages paid, rents paid, interest paid on capital, overheads
2 UAA (utilisable agricultural area)
3 AWU (family work unit)

A small herd of steers and heifers is reared on the permanent grassland for fertility management and to ensure maximum use of the existing temporary and permanent grassland. Stores are bought at 8 to 9 months and are primarily grass and silage finished to 23 months. An indoor finishing period is included in order to obtain sufficient farmyard manure.

This family farm operates with one full-time farm family manager, assisted by 0.2 AWU casual labour per year paid at 8.2 € per hour. Due to recent farm growth, land is mainly rented and fields are only partly consolidated. This results in high land rental costs (Table 3-13). Arable land is rented at an average of 256 €/ha UAA, while grassland is available at 153 €/ha UAA.

The most important farm buildings are a deep litter barn, grain storage and grading facilitates, as well as a machinery shed. The farm is equipped with basic cropping machinery, except for combine harvesting and all field work related to potato cultivation. The business relies on contracting assistance to a great extent.

The regular arable area scheme applies and, within the agri-environmental scheme, only the organic aid scheme applies. Organic aid is paid at 256 € per ha independent of use; however, a ceiling of 12,000 € per farm in total agri-environmental payments restricts organic aid payments to 153 € per ha.

All products are marketed through long-term contracts with the marketing association of the organic farming association and sales are therefore very stable. For example, wheat and spelt are sold at 332 €/t and 562 €/t, respectively, while beef is sold at 1.79 €/kg live weight.

Farm family remuneration amounts to 36,926 € per family labour unit, while profit on a per ha basis is 434 €/ha UAA. Direct payments contribute 117% to total profit, 30% of all payments are contributed by the organic aid scheme.

Table 3-13: Economic performance of German organic arable unit in 1999 (€/ha)

	1999
Livestock returns	272
Crop returns	1,035
Payments	509
... of which organic aid	153
Other returns	-7
Total returns	**1,826**
Livestock variable costs	209
Crop variable costs	288
Gross margin	**1,329**
Labour paid	48
Rent paid	232
Interest paid on capital	61
Overheads	554
...of which depreciation	190
...of which other fixed costs	364
Total input costs[1]	**1,392**
Farm profit / ha UAA[2]	**434**
Farm profit / FWU[3]	**36,926**

1 Variable costs, overheads, wages paid, rents paid, interest paid on capital, overheads
2 UAA (utilisable agricultural area)
3 FWU (family work unit)

Compared to the national average profit of 464 €/ha UAA for full-time organic farms in Germany in 1998/99, profitability is only slightly lower (BML 2000). In comparison, the average organic farm cultivates approximately 60 ha, and receives a lower share of its profit from direct payments: 62%, of which less than half are from agri-environmental schemes. In contrast, the present farm has a profit contribution of 117% from direct payments and a 35% profit contribution from organic aid.

A contrasting picture is revealed by the results of a national conventional comparison group of farms (BML 2000). Of a profit of 504 €/ha in 1998/99, only 32% of profit was contributed by direct payments, of which only 11% were from agri-environmental schemes. The regional conventional average of 539 and 530 €/ha for cropping and mixed farms in Bavaria was even higher (BML 2000).

The observed profit of 36,926 € per farm family labour unit was significantly higher than the comparative national wage and the average conventional profit per FWU of cropping and mixed farms in Bavaria with 26,179, 22,565 and 14,282 € in 1999, respectively (StMLF 2000).

3.3 Organic farms in Denmark

In Denmark, 2,520 farms organically cultivated 141,120 ha in 2000, representing 5.34% of the total utilisable land area and 4.36% of all agricultural holdings (Eurostat 2002). Compared to conventional farming, production of vegetables, milk and sheep and goats is rather important on organic farms, while pig production is insignificant. In terms of market shares by volume, milk and cereals have a conspicuous position in the total domestic market, quantified at 11% and 12% respectively (Hamm et al. 2002). Accordingly, organic land use in Denmark is characterised by a high share of grassland and fodder crops (Table 3-14).

Table 3-14: Certified organic and in-conversion land area and animals in Denmark in 2000

Land use	Organic land area (ha)	in % of total organic UAA[1]	in % of total land area of category
Cereals	41,770	29.60	2.89
Pulses	4,580	3.25	6.96
Root crops	1,760	1.25	1.42
Vegetables[2]	980	0.69	8.56
Perennials and fruits[3]	230	0.16	2.39
Arable fodder crops[4]	63,540	45.03	15.48
Permanent grassland	16,160	11.45	10.04
Other	12,100	8.57	2.92
Total	141,120	100.00	5.34
Livestock		**No.**	**in % of all animals**
Cattle		164,080	8.70
of which Dairy Cows		66,570	10.40
Pigs		82,150	0.71
Sheep & goats		25,910	18.13
Chicken (in 1000)		780	3.91

1 Total UAA in 2000: 2,644,580 ha
2 Vegetables incl. melons and strawberries
3 Fruit & berries, citrus, wine, olives
4 Arable forage crops & ley

Source: Eurostat (2002)

In 1998/99, most organic holdings (75%) were situated in Jutland, with only 25% on the Islands (SJFI 2000a). Organic farms in Jutland were more than twice as large as the organic farms on the Islands (56 ha vs. 24 ha) and mostly full-time farms. Organic farms on the Islands accounted for only 13% of total gross organic output in Denmark, and their off-farm income was significantly higher, as 75% of all cropping farms are managed on a part-time basis. Furthermore, a significantly higher share of land is used for horticulture and cereals.

3.3.1 Danish dairy unit

Organic milk production in Denmark has increased rapidly in recent years. While in the dairy year 1994/95 only 49,200 t were produced, production increased to 134,700 t in 1996/97 and 395,000 t in 1999/2000 (Danish Milk Board 2001).

Most of the organic milk production takes place on full-time farms in Jutland (SJFI 2000a). One of the regions with the highest share of organic farming is Sonderjylland. In 1998, 330 organic farms cultivated 19,000 ha organically, representing 6.6% of all holdings and 6.9% of total UAA (Raunkjær 1998). Due to relatively more favourable natural conditions for dairy farming than for crops, the existence of a very active organic advisory board and early development of an organic dairy processing co-op, this region has many organic dairy farms.

Flat or gently undulating plains with sandy soils predominate. These well-drained soils with poor water-retaining capacity and an average annual precipitation of 450 mm result in a periodic need for irrigation in the growing season. A moderate climate, with an annual average temperature of 7.5°C and 850 mm annual average precipitation, results in a growing season of more than 200 days a year (Gläßer 1980). However, precipitation maxima in August and October often complicate harvesting activities and may affect cereal quality. As soils are typically susceptible to wind erosion, a system of hedges has been put in place for wind protection, running in north-south direction.

A typically structured organic dairy farm rears 60 cows and covers around 66 ha arable land (Table 3-15). A profit/loss account for this typical organic arable farm is provided in Table 3-16 for the base year 1999. A standard crop rotation is: two years of clover/grass ley sown after a cereal crop. With an annual average of 60 dairy cows, most commonly Holstein Friesian and Black-and-White cattle, and 58 replacement heifers, an overall stocking rate of 1.4 LU/ha UAA is maintained. Dairy cows calve year round. The dairy herd achieves an annual average fat corrected milk yield of 6,672 kg based on a silage and mixed concentrate feed ration, of which 3,330 kg are from forage. A high intake of concentrates contributes significantly to high dairy variable costs. Replacement is around 35% by home reared heifers, which calve at 27 months.

Chapter 3

Table 3-15: Danish organic dairy farm: land use, livestock policy and factor endowment in 1999

Land use (yield)	Unit	
Total land area	UAA[1] (ha)	66.0
Clover/grass ley	ha	43.8
Potatoes (18.0 t/ha)	ha	2.0
Maize silage	ha	2.7
Barley, feed (4.0 t/ha)	ha	4.0
Pea/Barley – silage	ha	12.0
Oats (3.8 t/ha)	ha	1.5
Livestock		
Dairy Cows	No.	60
Stocking rate	LU[2]/ha UAA[1]	1.4
FCM[3]	kg/cow year	6672
Age of first calving	months	27
Insemination with beef bull	%	0
Factor endowment		
Labour	AWU[4]/100 ha UAA[1]	2.1
Farm family	AWU[4]/farm year	1.2
Casual labour	AWU[4]/farm year	0.1
Land owned/rented	%	100/0
Quota	t	395
Quota owned/rented	%	100/0

1 UAA (utilisable agricultural area)
2 LU (livestock unit)
3 FCM (fat corrected milk)
4 AWU (agricultural work unit)

The farming family labour input of this farm is one full-time manager and part-time involvement of another family member. Approximately 0.1 AWU of casual labour is employed at harvest at an average of 13.44 € per hour, while combine harvesting is contracted.

Land area is 100% own land and relies on large fields averaging 5 ha, which are mainly close (< 3 km) to the farmstead. Land rental prices in this region are at 430 € per ha for arable and 296 € for grassland. As the cereal area is small, the simplified scheme applies. Support payments for organic farming are equal for arable and grassland (114 € per ha).

The farm has modern dairy facilities with bedded cubicle housing for all dairy cows, and a fishbone parlour. For breeding heifers, a deep litter barn exists. All animals have access to grazing for approximately 155 days per year. Due to inheritance legislation in Denmark, where young farmers do not inherit family farms but must purchase them from their predecessors at usual market prices, and due to recent growth coupled with machinery and building investments, interest payments are high.

The farm is equipped with all necessary machinery except a combine harvester. This in part explains the high crop variable costs. The area on which contracting assistance for harvesting is needed is reflected in high crop variable costs. In contrast, labour costs are low due to little paid labour input despite high labour prices (Table 3-16). Milk quota is all farm-owned due to the quota stock market arrangement in Denmark. In 1999, additional quota was available at 0.42 €.

The major product, milk, is marketed through an organic dairy co-op run by organic dairy farmers of the region at an average price of 0.37 €. All cash crops are marketed through the national food distribution co-op.

Farm family remuneration amounts to 28,506 € per farming family labour unit, with a 37% income contribution from direct payments, of which 60% are from organic aid. Profit per dairy cow amounts to 570 €, while farm profit on a per ha basis is 518 €/ha.

Table 3-16: Economic performance of the Danish organic dairy unit in 1999

	€[1] per cow
Dairy returns	2,353
Beef returns	236
Crop returns	239
Payments general	211
...of which organic aid	126
Other returns	96
Total returns	**3,134**
Dairy variable costs	788
Crop variable costs	344
Gross margin	**2,002**
Labour paid	81
Rent paid	0
Interest paid on capital	541
Overheads	811
...of which depreciation	355
...of which other fixed costs	456
Total input costs[2]	**2,564**
Farm profit/cow	**570**
Farm profit / 100kg FCM[3]	**8.5**
Farm profit / ha UAA[4]	**518**
Farm profit/FWU[5]	**28,506**

1 Calculations based on the annual average interbank exchange rate of 1 DKK = 0.1344 € in 1999
2 Variable costs, overheads, wages paid, rents paid, interest paid on capital, overheads
3 FCM (fat corrected milk)
4 UAA (utilisable agricultural area)
5 FWU (family work unit)

Compared to the gross profits of various national comparison groups of dairy farms, presented in Table 3-17, the profit of the case-study farm is significantly higher than that of all described categories, although profit contribution from direct payments is significantly lower.

Table 3-17: Economic performance of the Danish organic dairy farm compared to various national comparison groups of dairy farms

CLASSIFICATION	Typical organic dairy farm	Organic < 79 dairy cows	Organic > 80 dairy cows	Conventional	All organic farms 1999
Dairy cows (Average no.)	60	54	114	80	80
Average area (ha)	66	65	141	81	98
Gross profit/ha (€)	518	291	230	284	254
Direct payments (€/ha)	191	269	316	267	299
in (%) of gross profit	37	92	137	94	118

Source: SJFI (2001), own calculations

3.3.2 Danish arable unit

In 1999, 48% of all organic farms in the country were classified as arable farms, of which about 45% were fully converted (SJFI 2001). In 1999, 75% of these were part-time holdings, but the share of full-time holdings was increasing. Full-time farms are more likely to be found on Jutland, the mainland of Denmark, whereas part-time farms are more typically found on the Islands. As full-time farms are still very widely dispersed, it was difficult to identify a region with a high density of full-time arable farms.

Full-time organic arable farms are generally characterised by a high profit contribution from potatoes and horticultural crops or cattle. Of the area cultivated with fodder crops (30%), only part is grown as cattle feed, the rest as green manure for nutrient management (SJFI 2001).

The typical Danish organic dairy farm lies in the centre of Jutland, in a region of gently undulating topography with valleys running in east-west direction. Soils are typically sandy silt or silty sands, developed on eastern moraine bedrock. Average annual precipitation is 850 mm, with approximately 450 mm contributing to the growing season of 200 days a year (Gläßer 1980). Maxima of precipitation are observed in August and October and may affect cereal quality and harvesting activities.

The typical organic arable farm cultivates an area of 98 ha, relying on fairly large and closely aggregated fields of an average size of 5 ha in proximity to the farm, although a mere 55% of land is farmers' own property (Table 3-18). A profit/loss account for this typical organic arable farm is provided in Table 3-19 for the year 1999.

A typical crop rotation may be described roughly as follows: three years of clover/grass ley – winter wheat – oats or Barley – winter wheat – barley or barley/pea mixed cropping. For grassland use and nutrient management, a suckler herd of 25 Limousin or Angus cows is held, and all offspring except replacement heifers are finished: steers, bulls and heifers in a 24, 13, and 24 month regime, respectively. In order to accumulate farmyard manure for nutrient management, suckler cows, heifers and steers are housed in winter and bulls are housed all year round. Livestock has silage in winter, grazing in the summer plus transponder concentrate feeding. Total stocking rate is 0.65 LU/ha UAA.

Table 3-18: Danish organic arable farm: land use, livestock policy and factor endowment in 1999

Land use (yield)	Unit	
Total land area	UAA[1] (ha)	66.0
Clover/grass ley	ha	43.8
Potatoes (18.0 t/ha)	ha	2.0
Maize silage	ha	2.7
Barley, feed (4.0 t/ha)	ha	4.0
Pea/Barley – silage	ha	12.0
Oats (3.8 t/ha)	ha	1.5
Livestock		
Dairy Cows	No.	60
Stocking rate	LU[2]/ha UAA[1]	1.4
FCM[3]	kg/cow year	6672
Age of first calving	months	27
Insemination with beef bull	%	0
Factor endowment		
Labour	AWU[3]/100 ha UAA[1]	2.1
Farm family	AWU[3]/farm year	1.2
Casual labour	AWU[3]/farm year	0.1
Land owned/rented	%	100/0
Quota	t	395
Quota owned/rented	%	100/0

1 UAA (utilisable agricultural area)
2 LU (livestock unit)
3 AWU (agricultural work unit)

This organic arable family farm is managed by one full-time farm family labourer, assisted by approximately 0.1 AWU of casual labour at 11.4 € per hour. Contracting assistance is sought only for combine harvesting, as the farm is otherwise fully equipped. Building structures include a deep litter barn for cattle, a grain storage facility and various sheds for machinery. Due to recent growth from a part-time to a full-time farm with building investments, interest payments are high. Furthermore, in order to grow, additional land had to be rented. Of the total land area of approximately 98 ha, only 55% is the farm's own property; 35 ha of arable land and 9 ha of grassland is rented at 444 €/ha and 134 €/ha respectively. The regular arable area payment and beef special payment schemes apply. Apart from organic aid, which amounts to 114 €/ha irrespective of use, the farm participates in no other agri-environmental measure. Beef is sold at 1.24 €/kg live weight, while wheat is sold at 242 €/t and oats 222 €/t.

Farm family remuneration amounts to 22,080 € per family labour unit, while profit on a per ha basis is 270 €/ha UAA (Table 3-19). Direct payments contribute 138% to total profit, with 28% of this from the organic aid scheme.

Table 3-19: Economic performance of the Danish organic arable unit in 1999

	€[1] per ha
Livestock returns	105
Crop returns	683
Payments	315
... of which organic aid	0
Other returns	104
Total returns	**1,207**
Livestock variable costs	45
Crop variable costs	158
Gross margin	**1,004**
Labour paid	314
Rent paid	77
Interest paid on capital	30
Overheads	332
...of which depreciation	84
...of which other fixed costs	248
Total input costs[2]	**956**
Farm profit / ha UAA[3]	**252**
Farm profit / FWU[4]	**61,727**

1 Calculations based on the annual average interbank exchange rate of 1 DKK = 0.1344 € in 1999.
2 Variable costs, overheads, wages paid, rents paid, interest paid on capital, overheads
3 UAA (utilisable agricultural area)
4 FWU (family work unit)

Compared to the gross profits of various comparison groups, overall profit is significantly lower than that of the average of all organic arable farms despite the fact that payments represent a higher contribution to profit (Table 3-20). Labour-extensive part-time organic arable farms rely on much lower profit, while the more labour-intensive organic arable farms are much more profitable. These farms produce mainly vegetables and rely to a lesser extent on direct payments. These differences are mainly due to differences in production structure, as the case-study farm is a full-time cereal cropping farm with some livestock and a high income contribution from animal payments. Profitability of the typical organic arable farm compares most closely with the average for all conventional arable farms, as these are of a more mixed nature.

Table 3-20: Economic performance of the Danish organic arable farm compared to various national comparison groups of cropping farms

Classification	Typical organic arable farm	all organic farms '99	organic farms< 0.9 AWU	organic farms> 1.0 AWU	conventional
Gross profit per ha (€)	270	493	183	872	269
....from payments (%)	138	104	238	70	102
Average area (ha)	98	33	25	53	30
Horticultural crops (%)	0	11	2	23	8

Source: SJFI (2000a)

3.4 Organic farms in Italy

Italian organic agriculture in 2000 comprised of 45,700 certified and in-conversion holdings farming 824,560 ha, representing 6.31% of total UAA and 2.12% of all agricultural holdings (Eurostat 2002). In recent years, a rapid increase was observed in organic UAA and number of holdings. In terms of land use, organic farming in Italy is clearly dominated by grassland and production of fodder, which occupy more than 50% of the total organic land area. Accordingly, high numbers of sheep and cattle are observed (Eurostat 2002). Cereals, perennials and fruit production are the second most important uses in terms of land use, while in terms of market shares by volume, cereals and beef are the most important, contributing 3.4 and 2.3% respectively to total turnover of these products.

However, great regional differences exist in terms of total organically farmed area and number of farms. In southern Italy, 67% of organic farms cultivated 71% of total organic land, while in northern and central Italy 13% and 19% of organic farms farmed 15 and 13%, respectively, of the organically cultivated

land (Pecoraro-Scanio 2000). Two regions account for about 40% of the total organic land area in Italy, namely Sicily and Sardinia (Zanoli 1998). Of the remaining regions, Emilia Romagna and Calabria stand out with more than 8.6% and 8.9% of total UAA farmed organically. In Marche, nearly 7.1% of total UAA is organically farmed: in 2000, 2,400 holdings farmed 33,380 ha. Typically, organic citrus production predominates in Sicily, while in Sardinia most of the organic land area is used for animal husbandry. Tuscany is characterised by organic olive production; in Marche, the most important products of organic farms are arable field crops, characterised by an average of 86% of the total organic area sown to arable crops.

Table 3-21: Certified organic and in-conversion land area and animals (ha/ no.) in Italy in 2000

Land use	Organic land area (ha)	in % of total organic UAA[1]	in % of total land area of category
Cereals	159,920	19.39	3.96
Pulses	6,430	0.78	9.69
Root crops	5,900	0.72	2.22
Vegetables[2]	8,710	1.06	3.19
Perennials and fruits[3]	143,590	17.41	6.12
Arable fodder crops[4]	200,090	24.27	13.09
Permanent grassland	256,740	31.14	7.52
Other	43,810	5.24	3.87
Total	824,560	100.00	6.31
Livestock	**No.**		**in % of all animal**
Cattle	334,830		5.38
...of which dairy cows	87,150		4.60
Pigs	168,940		1.96
Sheep & goats	1,277,050		16.52
Chicken (in 1000)	4,480		3.18

1 total UAA in 2000: 13,068,670 ha
2 Vegetables incl. melons and strawberries
3 Fruit & berries, citrus, wine, olives
4 Arable forage crops & ley

Source: Eurostat (2002)

3.4.1 Italian dairy unit

Italian milk and beef production are clearly divided into two distinct production systems. Intensive milk and beef systems are concentrated primarily in the Po Valley, central Italy and the coastal plains of central and southern Italy (Ansaloni & De Roest 1997). The more extensive livestock farms are spread out in the less favoured areas of the country, such as the Alpine regions and Apennine mountains of central and southern Italy. Of these farms, a considerable share is organic, about two-thirds of which produce milk. Approximately 44% of these farms have specialised in producing milk for cheese production; 22% sell their milk at a quality appropriate for pasteurisation. This might explain the fact that although milk and milk products contribute 8% of the total organic market turnover (Michelsen et al. 1999), total milk market share is insignificant and organic milk production for fresh milk is not widespread in the country.

In Emilia Romagna, a boom in organic land area and holdings was observed: in the year 1995 490 holdings farmed 9,249 ha organically, while by January 2000 3,410 holdings farmed 96,310 ha or 8.65% of total UAA (Eurostat 2002). Organic dairy farming in Emilia Romagna is predominantly found in the mountainous areas of the Province of Bologna, in the northern Apennine (Anonymous 2000). In this region historically owned or rented family farms cultivate brown soils with an annual average precipitation of 840 mm. Precipitation maxima are observed in winter and spring. Annual temperature fluctuations of 15-20°C are observed, with an annual average temperature of approximately 18°C. This results in a slight annual water surplus with slight deficits in one to three months per year.

The Italian organic dairy farm rears an average of 28 dairy cows and covers around 42 ha (Table 3-22). The profit/loss account for this Italian dairy farm for the year 1999 is provided in Table 3-23. An eight-year crop rotation is pursued in the whole area: four years of alfalfa followed by one crop of wheat and two winter crops of barley, or one winter crop of barley, followed by beans and another barley winter crop. Stocking density is maintained at a relatively low level, at 0.9 LU/ha UAA. The Brown Swiss herd achieves an average fat corrected milk yield of 5,170 kg, of which 2,950 kg are due to forage. Replacement heifers are home reared and calve at 32 months. Milk is marketed at 0.43 € per kg to a large processing co-op running an organic milk processing line as first class organic milk for direct consumption. All milk quota is owned and additional milk quota is available at 0.34 € per kg, if needed.

The family farm is run by family labour only, as sufficient family labour is available. All land is arable land, of which about one-third is rented at 207 € per ha. Land is characterised by small dispersed fields in partially steep terrain that are not easily accessible.

The farm has modern dairy facilities with bedded cubicle housing, slatted floors, and a fishbone parlour. Replacement heifers are reared in an old barn and a simple open-front shed. Neither of the barns has access to pasture, but dairy cows at times use a small open yard. There are a number of old sheds for hay storage. The farm is well equipped with all the necessary farming machinery,

except for harvesting. This extensive machinery fleet, only used on the small farm area, results in high depreciation. Contracting assistance for harvesting makes up a large share of crop variable costs.

Table 3-22: Italian organic dairy farm: land use and animal husbandry policy in 1999

Land use (yield)	Unit	
Total land area	UAA[1] (ha)	42.0
Alfalfa	ha	29.0
Winter wheat (3.8t/ha)	ha	6.0
Barley (3.8 t/ha)	ha	7.0
Livestock		
Dairy cows	No.	28
Stocking rate	LU[2]/ha	0.9
FCM[3]	kg/cow year	5170
FCM[3] from forage	kg/cow year	2950
Replacement	%	15
Age of first calving	months	32
Insemination with beef bull	%	0
Factor endowment		
Labour	AWU[4]/100 ha UAA[1]	5.9
Farm family	AWU[4]/farm year	2.5
Arable land owned/rented	%	71/29
Grassland owned/rented	%	0/0
Quota	t	150
Quota owned/rented	%	100/0

1 UAA (utilisable agricultural area)
2 LU (livestock unit)
3 FCM (fat corrected milk)
4 AWU (agricultural work unit)

As little cereal area exists, the simplified scheme applies. Support for continued organic farming is paid at 185 € per ha for cereal area and 308 € per ha for grassland.

Farming family remuneration amounts to 19,645 € per farming family labour unit, with a 34% income contribution from payments (Table 3-23), of which 83% are from organic aid. On a per ha and per cow basis, farm profit is 1,169 € and 1,754 €, respectively.

Table 3-23: Economic performance of the Italian organic dairy unit in 1999

	€ per cow
Dairy returns	2,353
Beef returns	236
Crop returns	239
Payments general	211
...of which organic aid	126
Other returns	96
Total returns	**3,134**
Dairy variable costs	788
Crop variable costs	344
Gross margin	**2,002**
Labour paid	81
Rent paid	0
Interest paid on capital	541
Overheads	811
...of which depreciation	355
...of which other fixed costs	456
Total input costs[2]	**2,564**
Farm profit/cow	**570**
Farm profit / 100kg FCM[3]	**8.5**
Farm profit / ha UAA[4]	**518**
Farm profit/FWU[5]	**28,506**

1 FCM (fat corrected milk)
2 UAA (utilisable agricultural area)
3 FWU (family work unit)

Compared to the profits of Italian organic dairy farms in 1997 given by Salghetti (1997) and Offermann & Nieberg (2000), 1,412 ECU/ha or 740 ECU/ha respectively, this assumes an intermediate position. However, due to the high labour input of this dairy case-study farm, a much higher comparative profit of 30,193 ECU/FWU was observed by Salghetti (1997).

Within the region of Emilia Romagna, farm family remuneration on this organic dairy farm is significantly lower than for comparable conventional farms (Table 3-24), although on a per ha basis profitability is similar to that of specialist dairy farms in hillside and mountainous areas (INEA 2002). As mentioned before, the very high labour input of the typical organic farm explains this discrepancy.

Table 3-24: Economic performance of comparison groups of farms in Emilia Romagna

	Profit per ha (€)	Profit per FWU (€)
Typical organic dairy farm	1,169	19,645
All farms	1,426	44,883
All specialist dairy farms	2,052	31,982
Specialist dairy farms in hillside areas	1,969	32,530
Specialist dairy farms in mountainous areas	1,105	39,505

Source: INEA (2002)

3.4.2 Italian arable unit

Among the regions with a considerable share of organic farming, Marche has the highest share of organic arable farms. In 1997, nearly 99% of all full-time organic farms were classified as cropping farms (Vairo 2000). Typically, organic arable farms in Marche are part-time farms cultivating approximately 20 ha. However, for the sake of comparison with cropping farms from other countries, an arable full-time organic farm was envisaged. Based on the experience of focus-group members, farm structure and exact size was defined.

Typically, an organic arable farm in Marche is located in the mountainous or hilly Apennine regions of the Province of Pesaro. Traditionally, small owned or rented family farms predominate in this region. The mountain climates of the middle Apennine area are characterised by precipitation maxima in winter and spring, with a total of 830 mm per year. The average annual temperature is 20°C with temperature differences of 20-22°C within the year. This leads to water deficits in three months per year.

A typical arable full-time farm managed organically cultivates 40 ha, of which 50% is sown to cereals (Table 3-25). Apart from the area used for the permanent subsistence crops grapevines and olives, the typical farm roughly follows a standard 5-year crop rotation: grain legumes followed by two years of wheat – sunflower – barley. If area is to be converted, rotation starts with three years alfalfa, of which the first two years are declared set-aside, followed by a wheat crop. The specified land use (Table 3-25) reflects the whole farm with part in conversion and does not, therefore, accurately reflect either one of the crop rotations specified. The crop rotation contains a low share of soil-building elements and no livestock is reared. Hence, fertilisers and farmyard manure are bought from other farms. A profit/loss account for this Italian arable farm is given in Table 3-26 for the year 1999.

Table 3-25: Italian organic arable farm: land use policy and factor endowment in 1999

Land use (yield)	Unit	
Total land area	UAA[1] (ha)	40.0
Set-aside: alfalfa	ha	2.0
Alfalfa	ha	8.0
Durum wheat (3.5 t/ha)	ha	15.0
Spelt (2.5 t/ha)	ha	1.0
Soft wheat (4.0 t/ha)	ha	3.0
Sunflower (1.8 t/ha)	ha	8.0
Barley (4.5 t/ha)	ha	2.0
Vineyard	ha	0.8
Olive	ha	0.2
Factor endowment		
Labour	AWU[2]/100 ha	2.75
Farm family	AWU[2]/farm year	1.0
Casual labour	AWU[2]/farm year	0.1
Arable land owned/rented	%	55/--

1 UAA (utilisable agricultural area)
2 AWU (agricultural work unit)

Typically, such a family farm is run by one farm family member and assisted by 0.1 AWU of casual labour during harvest, which is paid at 7.0 € per hour. The farm is equipped with all the basic cropping machinery, except for harvesting, for which the farm relies on contracting assistance. Apart from simple storage facilities, no buildings exist. Of a total of 40 ha arable land, approximately 45% are rented in small, easily accessible fields at 135 €/ha.

The regular arable area scheme applies, along with the organic aid scheme within the agri-environmental scheme, which results in payments of 135 € per ha. Products are marketed as 100% organic. For example, soft wheat is sold at 258 €/t, spelt at 310 €/t.

Table 3-26: Economic performance of the Italian organic arable unit in 1999

	€ per ha
Crop returns	627
Payments	523
... of which organic aid	129
Other returns	-9
Total returns	**1,150**
Crop variable costs	530
Gross margin	**620**
Labour paid	42
Rent paid	116
Interest paid on capital	20
Overheads	160
...of which depreciation	49
...of which other fixed costs	111
Total input costs[1]	**868**
Farm profit / ha UAA[2]	**282**
Farm profit / FWU[3]	**11,280**

1 Variable costs, overheads, wages paid, rents paid, interest paid on capital, overheads
2 UAA (utilisable agricultural area)
3 FWU (family work unit)

Farming family remuneration amounts to 11,280 € per family labour unit; more than 100% of this comes from payments, of which only 25% are from organic aid (Table 3-26). Thus farm family labour remuneration is higher than the regional average farm and the regional average general field cropping farm in Marche (8,289 €/FWU and 8,032 €) but profit per hectare (282 €/ha) is significantly lower than the stated averages (538 €/ha and 382 €/ha) (INEA 2002). Similar average values are observed for farms of 16-40 hectares: 9,624 €/FWU and 555 €/ha. Compared to the national average profit (1000 €/ha) and farm family remuneration (15,613 €/FWU) for all farms in Italy, meanwhile, the profitability of this organic arable case-study farm is much lower (INEA 2002).

3.5 Comparative characteristics of organic dairy farms

3.5.1 Physical comparison

Typical organic dairy farms demonstrate great diversity within the EU in 1999 with regard to factor endowment, farm management and productivity. A summary of comparative physical indicators for all the dairy farms investigated are provided in Table 3-27.

Table 3-27: Comparative physical indicators of typical organic dairy farms in 1999

	UK	DE	DK	IT
Region	**Wales**	**Baden - Württemberg**	**Jutland**	**Emilia Romagna**
Land use				
Total UAA[1] (ha)	59	55	66	42
Permanent grassland	26	28	--	--
Leys	27	10	44	--
Cereals	5	14	5	13
Arable forage	--	3	3	29
Field vegetables/potatoes	1	--	2	--
Dairy herd policy				
Dairy cows (No.)	60	38	60	28
Annual replacement (%)	18	20	35	15
Age of first calving (months)	27	30	27	32
FCM (kg)	5,583	5,062	6,672	5,170
FCM from forage (kg)	3,636	3,837	3,330	2,950
LU[2]/ha	1.3	1.1	1.4	0.9
Milk quota (t)	308	172	395	150
Factor endowment				
AWU[3]/100 ha * year	2.6	3.7	2.1	5.9
FWU[4]/100 ha * year	1.7	3.1	1.8	5.9
Arable land owned (%)	79	36	100	71
Grassland owned (%)	100	50	100	--
Quota owned (%)	93	71	100	100

1 Utilisable Agricultural Area
2 Livestock Unit
3 Agricultural Work Unit
4 Family Work Unit

In Denmark, organic farms tend to be larger and rear larger dairy herds than in any other case-study country. The highest stocking density is observed here, as is the quickest replacement rate. The mainly Holstein Friesian and Black-and-White cattle herd had the highest milk yield of all farms investigated, with only 50% of total milk from forage. On the other hand, labour intensity is significantly lower than on all other farms.

The typical UK dairy farm is somewhat smaller but operates with a similar stocking rate and labour intensity. Although a larger dairy herd (British Friesian) is reared on a smaller land area, stocking density is lower as offspring (40% beef) is sold earlier. And although total milk yield is considerably lower, a higher share (65%) is produced from forage. In contrast to all other farms, in the UK, organic dairy farms typically rely on permanently hired labour and an above-average share of owned land and quota.

Organic dairy farms in Germany and Italy show similar milk yields, although the German farm achieved more milk from forage than the Italian farm (75% compared to 57%). The German farm has more than 50% permanent pastures and is characterised by a low stocking density with a Simmental and Black-and-White herd. This farms has the lowest share of own land and quota and a comparatively high labour input.

The smallest farm size, the lowest stocking density and the highest labour input are observed in Italy, as the case-study farm is located in a hilly, traditionally extensively cultivated region dominated by small farms, and relies on small plots, which are difficult to access. This Italian farm rotated crops on all land, 71% of which is owned. Its Brown Swiss herd is replaced at the lowest rate of all the farms presented, with heifers calving for the first time at the age of 32 months.

3.5.2 Profitability

A closer look at the comparative cost structure (Table 3-28) shows that the Danish farm has the highest cost per cow, while the Italian farm operates most cost-extensively of all the farms, followed by the British and German dairy farms.

Table 3-28: Economic performance of typical organic dairy farms in 1999 (€ per cow)

	UK	DE	DK	IT
Dairy returns	2,221	1,783	2,353	2,179
Beef returns	127	285	236	453
Crop returns	304	199	239	51
Payments general	48	485	211	506
...of which organic aid	0	213	126	422
Other returns	95	223	96	-27
Total returns	**2,795**	**2,975**	**3,134**	**3,162**
Dairy variable costs	508	473	788	209
Crop variable costs	177	230	344	196
Total variable costs	685	703	1132	405
Gross margin	**2,100**	**2,272**	**2,002**	**2,757**
Labour paid	272	141	81	0
Rent paid	89	172	0	89
Interest paid on capital	140	16	541	0
Overheads	626	1,296	811	1,179
...of which depreciation	238	706	355	396
...of which other fixed costs	389	590	456	783
Total fixed costs	1127	1625	1432	1003
Total cost	**1,812**	**2,328**	**2,564**	**1,408**
Farm profit/cow	**983**	**647**	**570**	**1,754**
Farm profit/100kg FCM[1]	**17.6**	**12.8**	**8.5**	**33.9**
Farm profit/ha UAA[2]	**999**	**451**	**518**	**1,169**
Farm profit/FWU[3]	**58,980**	**14,458**	**28,506**	**19,645**
Profit contribution of organic support payments	**0%**	**67%**	**78%**	**76%**

1 FCM (fat corrected milk)
2 UAA (utilisable agricultural area)
3 FWU (family work unit)

The high costs of the Danish case-study farm are to a large extent due to dairy variable costs, which relate mainly to a high intake of imported concentrates. Crop variable costs are also higher than on other farms, mainly owing to a high input of contracting assistance. Costs for paid labour are low despite high labour prices (Table 3-29) due to only minor casual labour input for harvesting. As the farmland and farmstead is completely owned by the farm family, no rents are paid. This is due to the Danish inheritance legislation, where young

farmers do not inherit family farms but must purchase them from their predecessors at normal market prices. This is also reflected in the comparatively high interest payments. Nevertheless, depreciation is fairly low because the machinery fleet is kept to a minimum by machinery co-operations and because contracting assistance is used for certain activities instead of own machinery.

Table 3-29: Factor prices, area payments and achieved milk prices of typical dairy farms in 1999

	UK	DE	DK	IT
Factor prices				
Rent arable land €/ha)	759	460	430	207
Rent grassland (€/ha)	607	256	296	n.a.
Casual labour (€/h)	7.59	7.67	13.44	n.a.
Buy milk quota (€/kg)	0.50	0.46	0.42	0.34
Area payments				
Cereal area (€/ha)	0	194	114	185
Grassland (€/ha)	0	133	114	308
Output prices				
Milk price (€/100 kg FCM)	43	38	37	43
Cull cows (€/kg live weight)	0.68	0.61	0.69	0.97
Male dairy calves (per head, 2 wks)	30.36	153.39	134.40	103.30

n.a. not applicable

The most cost-extensively managed dairy farm seems to be the Italian dairy farm. Dairy variable costs are very low due to the very minor input of bought concentrates. Crop variable costs are fairly low because very little contracting assistance is sought. A fairly high share of costs is contributed by depreciation and other fixed costs. Depreciation is mainly due to a well equipped machinery fleet used on a relatively small area. Other fixed costs are high, mainly as a result of high insurance payments. A lack of scaling effects contributes to the high share of overheads to total costs.

The British farm stands out principally with regard to labour costs relating to employing a permanent part-time herdsman. Although land rent is comparatively high (Table 3-29), costs for land are low due to a high share of owned land. Compared to all other dairy farms, total depreciation is low as buildings are mostly low-cost arrangements and the machinery fleet is modest. Dairy variable costs are comparatively high due to high costs for veterinary and medical services and considerable expenses for imported concentrates. Crop variable costs are low, due mainly to the limited use of contracting assistance.

Costs of the German dairy farm were characterised by very high depreciation for an extensive machinery fleet and high other fixed costs, while dairy variable costs were intermediate due to high milk productivity from forage and low concentrate input. Crop variable costs are relatively high due to considerable contracting assistance despite a well equipped machinery fleet. Despite considerable contracting assistance and farm family labour input, costs for paid labour are relatively high. Furthermore, the highest land costs are observed here, due to the high share of rented land and high rental prices (Table 3-29).

Highest total returns per cow were achieved in Denmark and Italy, while the lowest total returns were observed in the UK. Low returns in the UK are in part due to the very low contribution from payments. In comparison to all other farms, the UK dairy farm receives neither considerable arable area payments nor organic farming support, as it has little cereal area and aid for continued organic farming does not exist in the UK (Table 3-29). Fairly high dairy returns result from high milk prices in the UK in 1999 (Table 3-29). Beef returns are very low due to extremely low prices for calves and cull cows. Crop returns are the highest of all the farms, due to marketed vegetables and potatoes.

In Italy, a high milk price is achieved because milk sold fresh for consumption generally achieves higher prices than milk for other uses, and an organic price premium is paid in Italy. Very high returns from beef sales result from high sales rates of calves and heifers at average prices and a high price achieved for cull cows. Furthermore, the highest payments for organic production are observed, as in Italy it is not only arable area that is eligible for high organic support payments, but also grassland.

The German farm also receives high organic support payments, not only for cereal but also for grassland area. However, crop returns are very low on the German farm as little cereal is sold. Beef returns are average due to a low replacement rate and a low price for cull cows despite a very high price for calves. Dairy returns are very low, due to the low milk yield and a below-average milk price. High other returns on this farm result from a high machinery turnover.

In Denmark, support for continued organic farming exists irrespective of land use, but is considerably lower than in the other countries (Table 3-29). Returns from dairy sales are high due to a high average milk yield despite a low price. Crop returns are above average due to marketed potatoes.

The UK dairy farm achieves the highest profit per cow and per hectare despite the lack of organic support payments. Although the gross margin is only average, other costs are fairly low, resulting in high profits. Farm family remuneration is the also highest of all the farms (58,980 €/FWU). Taking into account the exchange rate fluctuations of 1999, the annual profit per FWU is still the highest of all the farms (range: 53,850 € to 62,850 €).

The Danish dairy farm is characterised by the lowest gross margin, due to high variable costs, and the lowest profit per cow and 100 kg fat corrected milk, due to considerable other costs (Table 3-28) and despite having the highest returns. However, farm family remuneration is good (28,500 €/FWU) as their labour input is low, with a profit contribution of 78% from organic support payments. The low farm family remuneration in the case of the German (14,458 €/FWU) and Italian (19,645 €/FWU) dairy farms is primarily due to the high farming family labour input. In the Italian case, profit per cow is highest among all farms, with organic support payments contributing 76%, while the German farm is characterised by low profit per cow because of high costs, despite a profit contribution of 67% from organic support payments.

3.6 Comparative characteristics of organic arable farms

3.6.1 Physical comparison

The typical organic arable farms have been presented in detail in the foregoing chapters. For comparison, their resource endowment and land use are presented in Table 3-30. First, one is confronted with the pronounced differences in resource endowment. The UK farm is more than twice as large as any other typical arable farm, while the Italian farm has merely half the UAA of the second smallest one, the German farm. Furthermore, as in the case of the dairy farms, the Italian organic arable farm is characterised by the highest labour input, which is nearly double that of all the other farms.

Table 3-30: Comparative physical indicators of arable case-study farms in 1999

	UK	DE	DK	IT
Land use				
Total area (UAA[1])	245.0	85.0	98.2	40.0
Permanent grassland	10.0	5.0	9.3	--
Leys	88.0	17.0	23.6	10.0
Wheat, durum and spelt	110.0	21.0	49.8	19.0
Other cereals incl. maize	25.0	21.0	15.5	2.0
Peas	12.0	17.0	--	--
Vegetables/Potatoes	--	4.0	--	--
Sunflower	--	--	--	8.0
Vineyard	--	--	--	0.8
Olive	--	--	--	0.2
Yield example: soft wheat (t/ha)	3.6	4.5	5.0	4.0
Livestock				
LU[2]/ha UAA	0.3	0.2	0.6	0.0
Beef cattle	49	27	71	--
Sheep	150	--	--	--
Factor endowment				
AWU[3]/100 ha	1.5	1.4	1.1	2.8
FWU[4]/100 ha	0.4	1.2	1.0	2.5
Arable/grassland rented (ha)	47/4	55/0	35/9	18/0

1 (UAA) Utilisable Agricultural Area
2 (LU) Livestock Unit
3 (AWU) Agricultural Work Unit
4 (FWU) Family Work Unit

The Danish farm stands out in terms of stocking density, which is twice as high as that of the other livestock-carrying arable farms in the UK and Germany. This partly justifies the very low ley or legume share in the crop rotation of the Danish farm, while the British and German farms compensate for low nutrient inputs from livestock through imported feed by careful nutrient management within the crop rotation. In contrast, the Italian arable farm relies heavily on imported fertilisers and farmyard manure.

The average soft wheat yield is given as an indicator of yield potential, as this is the only marketed crop grown on all farms. The highest yield potential is observed on the Danish arable farm (5.0 t/ha), whereas the British arable farm achieves only 3.6 t/ha.

3.6.2 Profitability

Of all typical organic arable farms, the German farm has the highest total costs (Table 3-31), while the Danish and the Italian farms are characterised by the lowest costs.

Table 3-31: Economic performance of typical organic arable farms in 1999 (€ per ha)

	UK	DE	DK	IT
Livestock returns	105	272	225	--
Crop returns	683	1 035	561	627
Payments general	315	509	371	523
....of which organic aid	0	153	103	129
Other returns	104	-7	8	-9
Total returns	**1,207**	**1,826**	**1,165**	**1,150**
Livestock variable costs	45	209	25	--
Crop variable costs	158	288	136	530
Gross margin	**1,004**	**1,329**	**1,004**	**620**
Labour paid	314	48	34	42
Rent paid	77	232	186	116
Interest paid on capital	30	61	163	20
Overheads	332	554	351	160
....of which depreciation	84	190	103	49
....of which other fixed costs	248	364	248	111
Total cost	**956**	**1,392**	**895**	**868**
Farm profit/ha UAA[1]	**252**	**434**	**270**	**282**
Farm profit/FWU[2]	**61,727**	**36,926**	**22,080**	**11,280**
Profit contribution from organic support payments	**0%**	**35%**	**28%**	**25%**

1 UAA (Utilisable Agricultural Area)
2 FWU (Family Work Unit)

The Italian farm stands out in terms of high crop variable costs per ha due to two factors: costs for contracting assistance are high and fertiliser and farmyard manure are bought from other farms. Accordingly, little machinery exists and depreciation per hectare is lower than on all other farms, which is also partly due to a lack of buildings or other structures.

The German farm is characterised by high costs for livestock, as beef is fattened without producing own stock. The lowest costs for livestock despite high stocking densities are observed on the British and the Danish farm. In both cases livestock herds are replaced by own stock. The UK case stands out in terms of labour costs, due to its permanently hired labour of two full-time farm workers. However, all other costs seem to benefit from the large scale of the enterprise.

High costs for rented land on the German and the Danish farms are caused by a high share of rented land due to recent growth and relatively high land prices Table 3-32. The UK farm relies only on a small share of rented arable land. High interest payments are observed on the Danish arable farm due to its recent expansion from a part-time to a full-time farm with building investments. Recent growth also contributes to fairly high land costs. High overhead costs in Germany are caused by high costs for depreciation of machinery and buildings (including storage and grading facilities), along with high fixed costs relating largely to maintenance of buildings and machinery.

Table 3-32: Comparative factor prices of arable case-study farms in 1999

	UK	DE	DK	IT
Factor prices				
Rent cereal area (€/ha)	379	256	444	135
Rent grassland €/ha)	228	153	134	52
Casual labour (€/h)	6.8	8.2	11.4	7.0
Area payments				
Cereal area (€/ha)	0	256	114	135
Grassland (€/ha)	0	256	114	0
Output prices				
Soft wheat €/t)	334	332	242	258
Spelt (€/t)	288	562	--	310
Oats (€/t)	288	--	222	--

On the returns side, the British organic farm is the only farm that does not receive organic aid, while other payments contribute a considerable share to returns due to a high percentage of area eligible for arable area payments and participation in the set-aside scheme. Crop returns are average; a comparatively high price of the major crop, wheat, compensates for a low yield. Due to comparatively high prices (Table 3-32) and good yield levels, the German arable farm receives higher returns from cropping than all other farms. Irrespective of land use, this farm receives considerable organic aid in the form of area payments and, although a total payments ceiling of ca. 12,000 € restricts average organic aid payments to 153 € per ha, this still outperforms the average organic area payments of all other arable farms. Highest livestock returns, found on the German farm, are related to the high beef prices achieved.

The German arable farm achieved the highest profit in 1999 on a per ha basis and receives the highest average returns from organic aid. However, as family labour input is significantly lower on the UK arable farm than on all other farms, remuneration of farm family labour is nearly double that of all other farms. Even taking into account the exchange rate fluctuations of 1999, the annual profit per FWU of the UK farm ranges from 56,358 € to 65,777 € and is much higher than that of all the other typical arable farms.

As was the case with the Italian dairy farm, the Italian organic arable farm is characterised by a high labour input and thus low profit per family work unit, despite an average profit per ha comparable to the British and Danish cases.

Chapter 3

4 Development of organic farms within the framework of Agenda 2000

Farmers operate within a changing policy environment. Accordingly, farmers must adjust their businesses to these changes. Adaptation strategies to policy changes are either efficiency improvements in production in the form of increased turnover or decreased cost, or they are related to diversification into other agricultural or non-agricultural activities. Growth, both in terms of total land area and livestock numbers, can be a strategy to increase turnover and reduce cost due to scaling effects. The same effects can be achieved by changes in the farm's organisation, e.g. in land use or intensity of farming (Zimmermann 1997).

On the one hand, adaptation strategies depend on factor endowment and on-farm capacities such as land, labour and capital. On the other hand, factors independent of the farm itself also influence farm development decisions (Weinschenck & Henrichsmeyer 1966):

- natural conditions,
- personal characteristics, e.g. age, and preferences of the farmer and the farm family,
- technological developments,
- location,
- the policy environment (general and agricultural policy).

The objective of this chapter is to analyse the effects of European agricultural policy following the proposals put forward in the agricultural chapter of Agenda 2000 (EC 1999a) on organic farms.

The model farms' factor endowment, current land use, natural environment and locations were defined in detail in Chapter 3. Their development within the Agenda 2000 environment is simulated as described using the model TIPI-CAL© (see section 1.1.6). The policy environment implemented within this model will be described in section 4.1, while the personal preferences and perceptions of risk associated with each strategy are introduced via farmers' focus groups (see section 1.1.9). General technological developments are implemented in the model as described in section 1.1.11. Results will be presented as follows:

1) For each model farm, the impact of Agenda 2000 on the base farm (farm organisation as in 1999, described in Chapter 3) is discussed on the basis of gross margins for plant and livestock production and an extended gross margin and profitability.
2) The general factors influencing farm adaptations to policy changes are described for each farm. Several possible adaptation strategies to Agenda 2000 as proposed by focus groups and their expected profitability by 2008[1] resulting from simulation modelling are presented for each farm.
3) Based on the robustness of their profitability, the two best farm strategies are discussed.

4.1 Agenda 2000 framework

European agricultural policy follows the proposals put forward in the agricultural chapter of Agenda 2000, with a reduction in market protection and a drop in price support for European Agriculture (EC 1999a). Although organic farming support is included in the rural development regulation, Council Regulation 1257/99 (EC 1999b), area support for organic farming and agri-environmental measures remains unchanged. Details on price developments and payment levels within Agenda 2000 that are relevant for this study are given in Table 4-1.

In the cereal sector, intervention prices are significantly reduced, setting the minimum price standards within the EU, including import prices. A 15% intervention price decrease results in a significant reduction of farm-gate cereal prices. Lower prices enable the EU to increase cereal exports without the aid of export support and import levies. Due to a rise in world market prices, farm-gate prices are only partly affected by the intervention price reduction and drop by 10% (FAPRI 2000, Meister 1999). Naturally, lower cereal prices are transferred to livestock feed prices. Compensation for cereal price reductions is provided in the form of an increase in arable area payments, as specified in Table 4-1.

To compensate for this further liberalisation by Agenda 2000, area payments for cereals are upgraded from 54 to 63 ECU per tonne reference yield (EC 1999a). Payments for protein crops are increased by 6.5 ECU per tonne reference yield to increase the relative profitability of protein compared to other crops. Minimum set-aside area is set at 10%.

In general, these policy changes are expected to result in a loss of profitability of cropping activities. High yielding farms especially will suffer a drop in gross margins for crop production. In low yielding conditions, meanwhile, additional compensation payments might overcompensate losses due to decreasing prices (Vogel 2002). Organic arable farms are expected to suffer less as a result of Agenda 2000 than their conventional counterparts.

[1] Due to the structure of the model TIPI-CAL© the simulation period was chosen to run until 2008 to include the maximum effect of technological developments, intentionally ignoring the fact that Agenda 2000 finishes by 2006.

Chapter 4

Table 4-1: Agenda 2000: assumptions on prices relative to 1999 and compensation payments

	Unit	1999	Agenda 2000
Arable crops			
Prices – conventional cereals	%	-	-10[1]
CAP area payments			
Cereals	€/t	54.34	63
Maize	€/t	54.34	63
Oilseeds	€/t	94.24	63
Linseed	€/t	105.01	63
Pulses	€/t	78.49	72.5
Set-aside	€/t	68.83	63
Compulsory set-aside	%	10	10
Livestock			
Prices – conventional			
Beef	%	-	-20[2]
Calves and breeding stock	%	-	-5[2]
Concentrates	%	-	-10[1]
Payments			
Suckler cows	€/head	145	200
Bulls	€/head	135	210
Steers - per age group	€/head	109	150
Beef extensification < 1.4 LU	€/head	36	100
Slaughter premium	€/head	72	-
Cattle > 8 months	€/head	-	80
Calves	€/head	-	50
Milk market			
Price			-15%[3]
Additional quota			+1.5%
Compensatory payment per	€/t quota	-	17.24[3]
Organic farming			
Price premia in %			as in 1999
Area payments within agri-environmental measures			as in 1999, cept Bavaria

1 in two steps 2000-2001
2 in three steps 2000-2002
3 in three steps 2005-2007

Source: Assumptions based on FAPRI (2000), Dieterich (1999 and 2000) and Zanoli et al. (2000); EC (1999a)

In the livestock sector, decreasing intervention prices for beef and cereals translate into decreasing beef prices. Breeding stock and calf prices are less affected due to their predominant use in the dairy sector (FAPRI 2000). Premia for bulls and suckler cows increase significantly (EC 1999a) and an additional slaughter payment for all cattle over 8 months and an extensification premium are paid. An additional effect of these measures will result from the inclusion of all bovine animals and sheep on a farm for the purpose of calculating livestock density. Livestock density for the beef special premium and the suckler cow premium need not consider heifers.

In the dairy sector, intervention prices for butter and skimmed milk powder are reduced by 15% in three equal steps, which translates into a 13.5% drop in the price of milk (EC 1999a; Deeken & Hemme 2000). The quota regime will stay in force until 2007/08. Quotas will be increased by 1.5% in three steps in parallel with the price reductions, starting in 2005, except in certain member states (e.g. Italy) which received a specific increase in quota in two unequal steps in 2000/01 and 2001/02 (EC 1999a). To protect farm incomes, dairy premia are introduced over three years in line with price reductions: 5.75, 11.49 and 17.24 € per tonne in 2005, 2006 and 2007, respectively. Additional payments granted to member states within national envelopes will not be taken into account, as the individual use within each country was not yet known at the time this study.

Increasing premia for bulls are expected to overcompensate observed price drops in the beef sector. As premia for bulls are paid per capita, losses are expected to increase with increasing finishing weight (Zeddies & Zimmermann 1998). Profitability of suckler cow production is expected to increase significantly. In the dairy sector, quota payments may compensate for losses due to milk price reductions on low yielding farms.

Price premia for organic products received at the farm gate are expected to remain as observed in 1999, thus decreasing with conventional farm-gate prices.

4.2 Development of dairy farms

4.2.1 UK

The gross margin for the typical UK organic dairy farm remains constant with the implementation of Agenda 2000 (Table 4-2). Milk market receipts drop slightly, but are overcompensated for by increasing beef and milk payments (113 €/cow) due to rising quota costs related to increasing milk yields. Despite rising livestock variable costs (131 €/cow), the livestock gross margin remains unchanged. Crop variable costs increase only slightly, while crop market receipts rise, despite a drop in cereal due to crop yield improvements. However, due to rising fixed costs, the total profit of this dairy farm does not change.

Chapter 4

Table 4-2: Effect of Agenda 2000 on a typical UK organic dairy farm (€/cow)

	1999	2008	Change in %
Dairy market receipts	2,221	2,215	0
Beef market receipts	127	130	2
Livestock variable costs	508	639	26
Payments livestock	0	113	--
Gross margin livestock	**1,840**	**1,819**	**-1**
Crop market receipts	304	358	18
Crop variable costs	177	186	5
Payments crop	23	25	9
Gross margin crop	**150**	**197**	**31**
Payments whole farm	25	25	0
Extended gross margin	**2,015**	**2,041**	**1**
Other costs*	1,032	1,067	3
Profit per cow	**983**	**974**	**-1**
Profit per FWU (€/FWU)	**58,979**	**58,435**	**-1**

* (Overheads, wages paid to non-family labour, interest paid on borrowed capital, rents paid) - Other farm income

The farm adaptation strategies (Table 4-3) of this typical UK dairy farm are characterised by reluctance on the part of farmers to make substantial changes, such as taking on more permanent labour or investing in infrastructure, and a slight excess of on-farm forage production. Furthermore, maintaining flexibility in reacting to changing market situations seems to be a prime interest. This is also reflected in a cautious attitude towards converting land to organic production, as produce cannot be sold at organic prices during conversion. Converted organic land available for rent or sale is limited. The different adaptation strategies are described below.

One adaptation strategy to Agenda 2000 aims for a reduction of costs in the long term by **extensification**. Feeding and housing costs are reduced by prolonging the grazing period from 185 to 200 days, and by reducing concentrate intake in the feed rations. To prolong the grazing period, 4 ha additional ley grazing area is rented and roads and fencing need to be improved. To reduce concentrate input, ley silage area is increased by one ha to improve the winter fodder base. As organically cultivated land is not for rent, conventional land has to be converted and additional forage is only available in the second year after conversion.

Expansion of the dairy herd has the aim of better utilising existing housing structures in the medium term. The dairy herd can be increased by 6 cows. The current herd management provides a surplus of two to three breeding heifers per year, which are not sold until the desired herd size is achieved. Additional fodder requirements are covered by additional cereal (1.5 ha) and silage area (1 ha). Furthermore, improved timing of the harvest using contract assistance is expected to improve forage quality and quantity and reduce family labour input for cropping activities. Additional milk quota required is gradually rented. Additional milk produced can be sold to the existing organic dairy.

The aim of **rearing stores** is to improve efficiency of housing use and obtain a higher price for offspring in the short to mid-term perspective. This is motivated by very low prices for calves in 1999, and the prospect of increasing numbers of farms converting to organic production and a resulting need for organic stores. All offspring not needed for replacement of the farm's own dairy herd is therefore raised to be sold at an age of 8 months. The existing infrastructure can house the additional animals, so no investment is required. The option of finishing offspring is not considered, as little experience exists and investment in housing would be required. Additional fodder requirements will be covered by renting and converting land (4 ha). Additional organic concentrate required is imported. Additional labour requirements are covered by casual labour.

Motivated by a strong demand for vegetables and a low degree of self-sufficiency in the UK (Hamm et al. 2002), **field vegetables** are produced. To maintain flexibility in adapting to changing market situations, all additional machinery input required is contracted. This also enables better timing of harvesting and avoids a rise in fixed costs. Casual labour is hired for planting, weeding and harvesting. Based on climatic and soil conditions and the availability of qualified labour, field vegetables such as carrots and potatoes are the preferred crops. Field vegetable area is increased (4 ha) at the cost of cereal area, sown after white clover in the crop rotation. Carrots are expanded to 3 ha. For further diversification, 1 ha of potatoes is planted, although potatoes can only be cropped every fourth or fifth year in the rotation. The reduced on-farm cereal supply is compensated for by purchased concentrates.

Table 4-3: UK dairy farm's adaptation strategies to Agenda 2000

Strategies by 2008	Base farm	Extensi-fication	Herd expansion	Store rearing	Field vegetables
Land use (ha UAA)					
Total land area	**59.0**	63.0	61.5	63.0	59.0
White clover/ rye grass	**16.0**	19.0	~	16.0	~
Red clover/rye grass	**11.0**	12.0	12.0	12.0	~
Oats	**2.5**	2.5	4.0	4.0	1.0
Barley	**2.5**	2.5	~	4.0	-
Carrots	**1.0**	1.0	~	1.0	4.0
Potatoes	**0**	~	~	~	1.0
Permanent grassland	**26.0**	~	~	~	~
Livestock					
Dairy cows	**60**	~	66	~	~
FCM (kg)	**6,110**	~	~	~	~
Heifers	**42**	~	46	~	~
Stores	**0**	~	~	30	~
Other factors					
Family labour (FWU)	**1.0**	~	~	~	~
Hired labour (AWU)	**0.3**	0.1	~	0.8	0.5
Milk quota (t)	**341**	~	374	~	~
Profitability (€/FWU)					
Base farm 1999	**58,979**	~	~	~	~
by 2008	**58,435**	63,509	68,310	55,697	115,943

~ no changes compared to base farm, strategies implemented beginning in 2000

In the Agenda 2000 environment, the production of field vegetables results in the highest profitability in comparison to the base farm and all other strategies (Table 4-4), while rearing stores is the least profitable strategy. Even a 20% drop in the farm-gate price for the field vegetables produced (carrots and potatoes) would still result in the highest profitability of all the farm strategies (99,514 €/FWU).

This strategy benefits from falling cereal prices, as less cereal area is available for dairy feed and concentrate can be purchased at lower prices (Table 4-4). The increasing share of imported concentrates is reflected in rising livestock variable costs. Payments drop as the vegetable area, not eligible for area payments, is taken from the eligible cereal area (Table 4-4). Crop variable costs rise significantly through vegetable production (by 2008), but additional crop market receipts of 1,303 €/ha clearly outweigh these and compensate for the higher feeding costs of the dairy herd. Capital is freed due to reduced machinery investments, resulting in considerable market receipts from interest on capital, adding to the high profitability of this strategy.

Table 4-4: Best adaptation strategies to Agenda 2000 (€/cow): UK dairy farm

Strategies by 2008	Base farm	Best Field vegetables	Second best Herd expansion
Dairy market receipts	2,215	2,215	2,116
Beef market receipts	130	130	141
Livestock variable costs	639	639	754
Payments livestock	113	113	113
Gross margin livestock	**1,819**	**1,819**	**1,616**
Crop market receipts	358	1,611	344
Crop variable costs	186	395	206
Payments crop	25	5	30
Gross margin crop	**197**	**2,011**	**168**
Payments whole farm	25	25	25
Extended gross margin	**2,041**	**3,855**	**1,809**
Other costs*	1,067	1,923	774
Profit per cow	**974**	**1,932**	**1,035**
Profit per FWU (€/FWU)	**58,435**	**115,943**	**68,310**

* (Overheads, wages paid to non-family labour, interest paid on borrowed capital, rents paid) - Other farm income

Second best in terms of profitability is expanding the dairy herd. This strategy benefits from falling cereal prices and higher efficiency in the use of existing housing and labour. Nevertheless, in comparison to diversification into vegetable production, this strategy remains more vulnerable to milk price developments. For example, a drop from the 58% organic price premium in 1999 (DEFRA 2002b) to a 42% price premium would result in a lower profit (57,838 €/FWU) than the base farm profit in 1999. In contrast, assuming the same reduction in price premium for organic milk and the previously mentioned 20% price reduction for vegetables, profit would still be 89,289 €/FWU. Therefore, given the external and internal constraints of this farm, the most beneficial adaptation strategy to Agenda 2000 seems to be on-farm diversification into vegetable production.

4.2.2 Germany

The typical German organic dairy farm's gross margin will not change in the Agenda 2000 environment (Table 4-5). The livestock gross margin will not change despite increasing payments for milk and slaughtered beef. These overcompensate losses due to price drops for beef and increasing variable costs. The drop in milk market receipts due to a fall in the price for milk is fully compensated for by the increase in milk yield. The gross margin for plant production increases by 25 €/ha due to increasing arable area payments and despite increasing production costs. Total profit suffers significantly because other costs increase considerably due to higher fix costs and labour costs.

Table 4-5: Effect of Agenda 2000 on a typical German organic dairy farm (€/cow)

	1999	2008	Change in %
Dairy market receipts	1,783	1,787	0
Beef market receipts	285	259	-9
Livestock variable costs	473	563	19
Payments livestock	0	114	--
Gross margin livestock	**1,595**	**1,597**	0
Crop market receipts	199	191	-4
Crop variable costs	230	241	5
Payments crop	340	384	13
Gross margin crop	**309**	**334**	**8**
Payments whole farm	145	145	0
Extended gross margin	**2,049**	**2,076**	**1**
Other costs*	1,402	1,607	15
Profit per cow	**647**	**469**	-28
Profit per FWU (€/FWU)	**14,458**	**10,494**	-27

* (Overheads, wages paid to non-family labour, interest paid on borrowed capital, rents paid) - Other farm income

Potential farm adaptation strategies of the German organic dairy farm to Agenda 2000 (Table 4-6) are characterised by an availability of milk quota and land in the region on the one hand, but little available capital on the farm on the other. Nevertheless, farmers consider investments using private capital in several adaptation strategies described below.

Concentrating on **increasing the milk yield** of the dairy herd to increase market receipts is one option for trying to improve profitability in medium term. Protein input in the dairy feed ration is increased and potentially higher yielding dairy breeds are introduced to strive for higher milk yields. Grain legumes are grown at the cost of cereal area. Quota is rented as required. Large investments, e.g. for additional housing, are avoided.

Availability of land for rent and a personal long-term perspective, i.e. that of a middle-aged farm manager, encourages **herd expansion**. At the same time, extra care is taken in breeding for higher milk yields by introducing higher yielding breeds. The herd is increased to 60 cows and the dairy housing is amplified by building a new barn for heifers and expanding the dairy cow area. Additional land is rented to produce sufficient forage for the larger herd and a part-time agricultural labourer is hired. Quota is rented as required.

A demand for organic beef and the availability of land for rent encourages **finishing of steers** and investment in a deep litter barn. Some of the bull calves are retained and finished in a grass and silage-based 23-26 month regime. An additional 12 ha of land, mainly grassland, is rented and some extra labour is hired. All meat is marketed through an existing organic meat producers' organisation.

The **reduction of the dairy herd** can be a short to mid-term retirement strategy. Investments and additional costs, e.g. for quota, are avoided. Due to an increase in the average milk yield due to breeding improvements, the herd is gradually reduced to maintain production and quota levels. Although feed requirements per cow increase accordingly, the percentage of cereal production sold increases due to the reduced herd size. Hired labour input is gradually reduced to further reduce cost.

Table 4-6: German dairy farm's adaptation strategies to Agenda 2000

Strategies by 2008	Base farm	Milk yield increase	Herd expansion	Finishing steers	Herd reduction
Land use (ha UAA)					
Total land area	**54.5**	~	74.0	66.5	~
Clover/grass ley	**10.0**	~	13.7	13.0	~
Winter wheat	**14.0**	10.8	12.5	~	~
Maize silage	**2.8**	3.0	4.5	~	~
Permanent grassland	**27.7**	~	38.5	36.7	~
Peas	**0**	3.0	4.8	~	~
Livestock (No.)					
Dairy cows	**38**	~	60	~	33
FCM (kg/cow year)	**5,799**	6,012	6,012	5,799	5,799
Heifers	**31**	~	53	~	26
Steers	**0**	~	~	18	~
Other factors					
Family labour (FWU)	**1.7**	~	~	~	~
Hired labour (AWU)	**0.3**	~	0.8	0.5	0.1
Milk quota (t)	**202**	207	328	202	172
Profitability (€/FWU)					
Base year 1999	**14,458**	~	~	~	~
by 2008	**10,494**	9,593	14,428	6,220	8,719

~ no changes compared to base farm, strategies implemented beginning in 2000

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In the Agenda 2000 environment, this German organic dairy farm seems to be able to improve profitability slightly only by expanding its herd to 60 cows (Table 4-6). Despite large investments for a new barn and additional labour costs, a herd increase seems to be justified mainly because the efficiency of machinery use is improved and overheads are reduced, although the extended gross margin is higher in the second best strategy (original farm organisation) than in the best strategy (Table 4-7). In this strategy, livestock variable costs increase, as all additional quota was assumed to be rented at the time. Crop market receipts and arable area payments drop (Table 4-7) as the forage area is increased disproportionately and marketable cereals are reduced. Accordingly, less contracting assistance is sought and crop variable costs drop.

Herd expansion would not be feasible, however, if milk prices fell by only 5%. Increasing overheads due to investments for housing would not be justified, and the base farm organisation would yield a higher profit in the long term. Although a reduction in herd size to avoid additional costs for quota is expected to yield a lower profit in the long term, this seems to be good retirement strategy, as hired labour input can be reduced gradually and no additional capital will be fixed by investments.

Table 4-7: Best adaptation strategies to Agenda 2000: German dairy farm (€/cow)

Strategies by 2008	Base farm	Best Herd expansion	Second best Base farm
Dairy market receipts	1,787	1,870	~
Beef market receipts	259	325	~
Livestock variable costs	563	729	~
Payments livestock	114	116	~
Gross margin livestock	**1,597**	**1,582**	~
Crop market receipts	191	4	~
Crop variable costs	241	200	~
Payments crop	384	324	~
Gross margin crop	**334**	**128**	~
Payments whole farm	145	122	~
Extended gross margin	**2,076**	**1,832**	~
Other costs*	1,607	1,423	~
Profit per cow	**469**	**409**	~
Profit per FWU (€/FWU)	**10,494**	**14,428**	~

* (Overheads, wages paid to non-family labour, interest paid on borrowed capital, rents paid) - Other farm income
~ as base farm

4.2.3 Denmark

The typical organic dairy farm in Denmark is expected to increase its total gross margin by 5% under Agenda 2000 conditions (Table 4-8). This is primarily due to an increase in the dairy gross margin due to milk and slaughter premia (+162 €/cow), despite a drop in milk market receipts of 64 €/cow. Despite the drop in cereal prices, an increase in crop market receipts due to yield improvements as well as an increase in arable area payments is observed, although this cannot compensate for increasing (10%) crop variable costs. Profit increases accordingly, despite an 11% increase in overheads.

Table 4-8: Effect of Agenda 2000 on a typical Danish organic dairy farm (€/cow)

	1999	2008	Change in %
Dairy market receipts	2,353	2,289	-3
Beef market receipts	236	238	1
Livestock variable costs	788	786	0
Payments livestock	0	162	--
Gross margin livestock	**1,801**	**1,903**	6
Crop market receipts	239	247	3
Crop variable costs	344	378	10
Payments crop	211	222	5
Gross margin crop	**106**	**91**	-14
Payments whole farm	0	0	0
Extended gross margin	**1,907**	**1,994**	5
Other costs*	1,337	1,128	16
Profit per cow	**570**	**866**	52
Profit per FWU (€/FWU)	**28,506**	**43,287**	52

* (Overheads, wages paid to non-family labour, interest paid on borrowed capital, rents paid) - Other farm income

Adaptation strategies of the Danish organic dairy farm (Table 4-9) are characterised by an optimistic attitude in terms of the future marketability of organic products. The availability of land for rent or sale also plays a decisive role, as well as access to reduced agricultural loans for building and land investments.

In the year 2000, this dairy farm strives to increase its total land area considerably in order to decrease total feed costs by increasing farm forage production (Table 4-9). This is based on forthcoming changes in national organic farming standards concerning the total percentage of non-organic feed units permitted; amounts are to be reduced from 15% in 1999 to 10% and 5% in 2000 and 2005, respectively. The different adaptation strategies are described in the following:

One **adaptation strategy to Agenda 2000** is **minor expansion of the dairy herd.** This strategy primarily envisages a reduction in cost per unit of output by intensifying use of the existing infrastructure. The dairy herd is increased by approximately eight cows to the maximum housing capacity. Considerable breeding effort and an improvement in forage quality leads to an increase in average milk yield. Additional quota required is bought at the milk stock exchange market. In order to produce sufficient high-quality forage and reduce the use of imported concentrates, an additional 30 ha are bought and rented. At the same time, this allows the potato area to be increased. The input of contract labour, e.g. for ploughing and seeding, is increased in order to compensate for the increased labour requirement on the extra land and for the dairy herd.

A **major herd expansion** aims at reducing cost per unit of output in the long term, taking advantage of economies of scale by increasing the dairy herd by 35 cows and 50 ha land area. An existing barn is expanded to house the increased dairy herd, an additional farm assistant is hired and 10 ha of land are bought and 40 ha are rented. This allows not only extra forage to be produced for the expanded dairy herd, but facilitates compliance with organic regulations in the future. Furthermore, breeding efforts and an improvement in forage quality lead to an increase in the average milk yield. Additional quota required is bought through the stock exchange market.

The cultivation of **field vegetables** is encouraged by strong demand from the national food co-op for fresh root vegetables for consumption, e.g. carrots and parsnips. Furthermore, a market for industrial carrots exists. An area of two and three hectares is sown to carrots and parsnips after clover grass ley. Most additional machinery input required is contracted; pneumatic seeding equipment is bought in co-operation with neighbouring farmers. Casual labour is hired for hand labour such as weeding. In addition to the land used for vegetable production, land is rented to improve the forage base of the dairy herd.

Encouraged by a strong demand for organic pig meat in Denmark in 1999, farmers consider finishing a small number of pigs. Typically, **pigs** will be **reared free-range**, beginning with an average number of 110 pigs per year. Extra labour required related to pig rearing is compensated for by increasing contracting assistance for cropping and by hiring additional casual labour for irregularly occurring tasks such as manure spreading or transport of pigs. An investment in housing for 50 pigs at a time is required. Pigs are marketed through the national food co-op. Additionally, 3 hectares of land is bought and rented in order to increase farm forage production for the dairy herd. For the dairy herd, no major milk yield increase is envisaged.

Table 4-9: Danish dairy farm's adaptation strategies to Agenda 2000

Strategies by 2008	Base farm	Minor herd expansion	Major herd expansion	Field vegetables	Pigs
Land use (ha UAA)					
Total land area	**66.0**	96.0	116.0	86.0	69.0
Clover/grass ley	**43.8**	63.0	86.0	52.0	54.0
Potatoes	**2.0**	4.0	2.0	4.0	2.0
Maize silage	**2.7**	4.5	6.0	3.0	4.0
Barley (feed)	**4.0**	8.5	6.0	3.6	5.5
Peas/Barley (silage)	**12.0**	10.0	~	~	~
Oats	**1.5**	6.0	3.0	6.0	4.5
Carrots	**0**	~	~	3.0	~
Parsnips	**0**	~	~	2.0	~
Livestock (No.)					
Dairy cows	**60**	68	95	~	~
FCM (kg/cow year)	**7,466**	7,879	7,879	~	~
Heifers	**58**	62	87	~	~
Pigs (per year)	**0**	~	~	~	110
Other factors					
Family labour (FWU)	**1.2**	~	~	~	~
Hired labour (AWU)	**0.1**	0.1	1.0	0.6	0.3
Milk quota (t)	**445**	528	734	445	445
Profitability (€/FWU)					
Base year 1999	**28,506**	~	~	~	~
by 2008	**43,287**	64,036	53,615	41,173	51,139

~ no changes compared to base farm, strategies implemented beginning in 2000

In the Agenda 2000 environment, this Danish dairy farm is expected to yield the highest profit by increasing the dairy herd slightly (Table 4-10). Although total and livestock gross margins drop, a minor herd expansion is still the most profitable farm strategy in the long term, because overhead costs are reduced considerably by making the most of existing factors: the dairy barn, existing machinery and farm family labour.

In this strategy, livestock variable costs drop because imported feed is reduced by increasing on-farm production of forage and concentrate and the forage base of dairy rations. Extra labour requirements are compensated for by increased contracting assistance, reflected in higher crop variable costs.

Although a major herd expansion yields a similar profit in the long run, it does not seem justified due to the additional costs for housing and milk quota. This becomes particularly visible when the risk of a drop in milk price is taken into account: a 5% drop would result in a more marked difference in profit, nearly 24,000 €, between the two strategies.

Table 4-10: Best adaptation strategies to Agenda 2000: Danish dairy farm (€/cow)

Strategies by 2008		Best	Second best
	Base farm	Minor herd expansion	Major herd expansion
Dairy market receipts	2,289	2,420	2,420
Beef market receipts	238	235	248
Livestock variable costs	786	578	578
Payments livestock	162	168	168
Gross margin livestock	**1,903**	**2,245**	**2,258**
Crop market receipts	247	493	192
Crop variable costs	378	609	395
Payments crop	222	280	216
Gross margin crop	**91**	**164**	**13**
Payments whole farm	0	0	0
Extended gross margin	**1,994**	**2,409**	**2,271**
Other costs*	1,486	1,279	1,594
Profit per cow	**866**	**1,130**	**677**
Profit per FWU (€/FWU)	**43,287**	**64,036**	**53,615**

* (Overheads, wages paid to non-family labour, interest paid on borrowed capital, rents paid) - Other farm income

4.2.4 Italy

The Italian organic dairy farm's gross margin does not change with Agenda 2000 (Table 4-11). Increasing payments (+82 €/cow) from milk and slaughter premia compensate for the drop in market receipts for beef (82 €/ha), while the drop in milk prices is compensated for by increasing milk yields. The crop gross margin drops only slightly, with additional arable area payments compensating for most of the losses in market receipts. However, profitability increases significantly due a marked drop in overheads and increasing returns from savings.

Table 4-11: Effect of Agenda 2000 on a typical Italian organic dairy farm (€/cow)

	1999	2008	Change in %
Dairy market receipts	2,179	2,239	3
Beef market receipts	453	371	-18
Livestock variable costs	209	279	33
Payments livestock	0	82	--
Gross margin livestock	**2,424**	**2,413**	0
Crop market receipts	51	63	24
Crop variable costs	196	234	19
Payments crop	337	347	3
Gross margin crop	**192**	**176**	-8
Payments whole farm	0	0	0
Extended gross margin	**2,616**	**2,589**	-1
Other returns	**22**	**404**	1836
Other costs*	884	594	-33
Profit per cow	**1,754**	**2,399**	37
Profit per FWU (€/FWU)	**19,645**	**26,864**	37

* (Overheads, wages paid to non-family labour, interest paid on borrowed capital, rents paid)

Adaptation strategies of this dairy farm to Agenda 2000 (Table 4-12) are characterised by the availability of excess farm family labour for new activities as few opportunities for non-agricultural employment exist in the region. Furthermore, housing capacities restrict the herd size, while quota can be rented as needed. The different adaptation strategies are described below.

An **increase in dairy herd size** is envisaged, with the aim of creating a long-term perspective involving available farm family labour. A new cubicle barn is built to fit the increased herd and comply with Council Regulation 1804/99 on organic animal husbandry (EC 1999d). At the same time, considerable efforts will be made to improve milk yield to a minimum of 6600 kg per cow and year through breeding. The dairy herd is increased by twelve cows by own replacement within three years. Consequently, more land is bought for forage and cereal production, and additional milk quota is rented as required. Marketing of the additionally produced milk is secured via a dairy co-operative which is expanding its organic milk processing.

An option for diversifying production with a short-term perspective is the **production of wheat seeds**. Approximately three hectares of the cereal area are sown to wheat for seed production. A lack of cereals produced on-farm for feed is compensated for by imported concentrates. Additional labour required is easily covered by excess family labour. Seeds can be marketed through an organic farmers' association.

Chapter 4

Finishing some of the dairy heifers and **marketing meat directly** is a short to medium-term value-adding strategy that makes better use of excess family labour and forage area, but avoids large investments. Those calves or heifers usually sold, i.e. those that are not promising in terms of milk yield, will be finished in a 18 or 24 month grass and hay-based regime. No extra land is required, as a surplus in forage is produced. Animals are slaughtered externally but processed and vacuum-packed on-farm. Therefore, processing and packaging facilities are necessary. For these investments, no credits are available. Marketing efforts are limited as quantities are small and there is a large city nearby with weekend tourists stopping by the farm on a regular basis.

Reduction of the dairy herd can be a gradual retirement strategy or a medium-term strategy to take on an off-farm job. Labour input and cost are gradually reduced, in particular avoiding investments. To account for a gradual milk yield increase, herd size is gradually reduced to 20 cows to avoid costs for additional quota required. This strategy not only applies to farms with a retirement perspective, but also for the eventuality that milk prices do not justify the investment in milk quota. In both cases, less forage is required for the dairy herd and more cereals can be sold.

Table 4-12: The Italian dairy farm's adaptation strategies to Agenda 2000

Strategies by 2008	Base farm	Herd expansion	Cereal seeds	Direct market meat	Herd reduction
Land use (ha UAA)					
Total land area	**42.0**	63.0	~	~	37.0
Alfalfa	**33.0**	50.0	32.0	32.0	28.0
Winter wheat	**4.0**	5.0	3.0	4.0	4.0
Barley	**5.0**	8.0	4.0	5.0	5.0
Soft wheat seeds	~	~	3.0	~	~
Livestock (No.)					
Dairy cows	**28**	40	28	28	28
FCM (kg/ cow year)	**6,122**	6,600	~	~	~
Heifers	**18**	28	18	23	17
Other factors					
Family labour (FWU)	**2.5**	~	~	2.6	~
Milk quota (t)	**179**	263	~	~	150
Profitability (€/FWU)					
Base year 1999	**19,645**	~	~	~	~
by 2008, MMR	**26,864**	9,946	25,800	30,869	21,864

~ no changes compared to base farm, strategies implemented beginning in 2000

In the Agenda 2000 environment, this dairy farm is expected to yield the highest profit by marketing some of its products directly (Table 4-13). Although variable costs increase significantly due to the extra costs for processing and marketing, additional receipts fully compensate (Table 4-13). Market receipts from cropping and gross margin decrease because more cereals are used on-farm for beef production. Extra labour requirements are compensated for by additional farm family labour. However, the base farm organisation and the production of cereal seeds yield very similar profits and, taking the potential risks of direct marketing into account, the original farm organisation seems most feasible.

Table 4-13: Best adaptation strategies to Agenda 2000: Italian dairy farm (€/cow)

Strategies by 2008		Best	Second best
	Base farm	Direct market meat	Base farm
Dairy market receipts	1,726	1,726	~
Beef market receipts	500	500	~
Livestock variable costs	470	470	~
Payments livestock	82	82	~
Gross margin livestock	**1,838**	**1,838**	**~**
Crop market receipts	48	48	~
Crop variable costs	234	234	~
Payments crop	347	347	~
Gross margin crop	**161**	**161**	**~**
Payments whole farm	0	0	~
Extended gross margin	**1,999**	**1,999**	**~**
Other returns	616	616	~
Other costs	1483	1483	~
Profit per cow	**2,866**	**2,866**	~
Profit per FWU (€/FWU)	**30,869**	**30,869**	**~**

* (Overheads, wages paid to non-family labour, interest paid on borrowed capital, rents paid)
~ as base farm

4.3 Development of arable farms

4.3.1 UK

The gross margin of the typical UK organic arable farm suffers from Agenda 2000 developments by 6% (Table 4-14). Crop market receipts increase unexpectedly (29 €/ha) in the long term due to an increase in crop yields, despite the drop in prices for some cereals (Table 4-14). Livestock receipts drop (-109 €/ha) due to decreasing beef prices, but are not compensated for by a drop in livestock variable costs due to lower cereal prices, because beef is mainly grass and silage-finished. Changes in arable area as well as livestock payments are minor on this farm as only a small proportion of land is sown to eligible cereals. Independent of Agenda 2000 developments, this farm's profitability will suffer most strongly from increasing overheads and labour costs (314 €/ha to 379 €/ha). In addition to the 6% drop in gross margin, overheads increase slightly, resulting in a decrease in profitability of nearly 30%.

Table 4-14: Effect of Agenda 2000 on a typical UK organic arable farm (€/ha)

	1999	2008	Change in %
Crop market receipts	683	712	4
Variable costs plant production	158	161	2
Payments crop	273	279	2
Gross margin crop	**798**	**830**	**4**
Livestock market receipts	193	84	-56
Livestock variable costs	45	44	-2
Payments livestock	13	30	+131
Gross margin livestock	**161**	**70**	**-57**
Payments whole farm	24	36	150%
Extended gross margin	**959**	**900**	**-6**
Total other costs*	707	721	2
Profit per ha	252	179	-29
Profit per FWU (€)	61,727	43,901	-29

* (Overheads, wages paid to non-family labour, interest paid on borrowed capital, rents paid)- Other farm income

Adaptation strategies to the Agenda 2000 environment (Table 4-15) on this farm are limited by the available time of the manager of this fairly large and diverse farm (245 ha). Furthermore, maintaining flexibility in reacting to changing market situations and avoiding capital fixation in infrastructure as far as possible seem to be important factors. This farm therefore tends to diversify production by means of new farm activities. The availability of land does not prose a problem in this region. The envisaged strategies are described below.

Diversification of land use to include **field vegetable production** is implemented by planting potatoes, carrots, and white cabbage on 10 ha at the cost of winter wheat area. Additional skilled casual labour required is hired for planting and weeding. Most additional machinery operations required are contracted, and only weed control devices are bought: a flame weeder and a spider hoe for inter-row weeding.

Another option for diversification is to **market lamb and beef directly** to nearby restaurants and an organic shop. This way, a 300% higher price premium can be achieved. However, some market development is required. In the first year, only 10% of total meat can be marketed directly, but in the following years the share of directly marketed meat increases by 20% per year for beef, while only 50% of lambs can be marketed directly in the long term. Slaughter, cutting, storage and vacuum packing is contracted. For delivery of boxed meat, a refrigerated vehicle and an additional 260 h/year of casual labour are required.

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Table 4-15: UK arable farm's adaptation strategies to Agenda 2000

Strategies by 2008	Base farm	Field vegetables	Directly marketed meat	Breeding sows	Landlord rotational land
Land use (ha)					
Total UAA	**245**	~	~	~	~
Set aside	**45**	~	~	~	~
Winter wheat	**100**	90	~	~	95
Peas	**12**	~	~	~	~
White clover/grass ley	**43**	~	~	~	~
Spelt	**10**	~	~	~	~
Spring oats	**25**	~	~	~	~
Permanent grassland	**10**	~	~	~	~
Carrots	**0**	4	~	~	~
Cabbage	**0**	2	~	~	~
Potatoes	**0**	4	~	~	~
Landlording for intensive vegetable production	**0**	~	~	~	5
Livestock (No.)					
Suckler cows	**30**	~	~	~	~
Beef steers	**12**	~	~	~	~
Beef heifers	**7**	~	~	~	~
Ewes	**150**	~	~	~	~
Breeding sows	**0**	~	~	250	~
Other factors					
Family labour (FWU)	**1.0**	~	~	~	~
Hired labour (AWU)	**2.6**	3.1	~	3.6	~
Profitability (€/FWU)					
Base year 1999	**61,727**	~	~		~
Strategies by 2008	**43,901**	122,026	68,138	78,363	45,978

~ no changes compared to base farm, strategies implemented beginning in 2000

Another option is to use part of the second year set-aside area as pasture lots for **breeding sows**. A minimum total area of 8 ha is required, but 10 ha are converted in order to rotate lots more frequently. Weaners are sold at the age of six weeks. Initial investments for gilts, water installation, dry sow and farrowing arcs are required. Sufficient straw is available on-farm. Management of the sow herd requires a qualified full-time worker. Alternatively, this strategy could be implemented by renting rotational land for sow rearing in a co-venture arrangement.

Alternatively, **land for intensive organic vegetable production is let** at an ideal position in the crop rotation. The farmer avoids additional labour and management input involved in taking up a new production line. The renter is provided with well maintained fields suited to vegetable production within the crop rotation. For part of the basic cropping operations, such as seed bed preparation, a co-operation agreement on machinery is reached with the main farms and the renter can concentrate available capital on investing in specialised vegetable machinery. Furthermore, use of existing storage facilities is included in the rental agreement.

The best strategy for adapting to the Agenda 2000 environment seems to be field vegetable cultivation (Table 4-16). This diversification strategy relies on fixed contracts for vegetables, substituting vegetables for crops (cereals) that are directly affected by price reductions within Agenda 2000. Accordingly, crop market receipts rise by 525 €/ha and average variable costs of plant production rise by 227 €/ha.

Table 4-16: Best adaptation strategies to Agenda 2000: UK arable farm (€/ha)

Strategies by 2008		Best	Second best
	Base farm	Field vegetables	Breeding sows
Crop market receipts	712	1,237	712
Variable costs plant production	161	388	152
Payments crop	279	265	279
Gross margin crop	**830**	**1,114**	**839**
Livestock market receipts	84	84	1,471
Livestock variable costs	44	44	1,159
Payments livestock	30	31	31
Gross margin livestock	**70**	**71**	**343**
Payments whole farm	36	36	36
Extended gross margin	**900**	**1,221**	**1,218**
Total other costs*	721	723	898
Profit per ha	**179**	**498**	**320**
Profit per FWU (€)	**43,901**	**122,026**	**78,363**

* (Overheads, wages paid to non-family labour, interest paid on borrowed capital, rents paid)- Other farm income

However, taking into consideration a more widespread response by farms to the strong demand for field vegetables, a drop in vegetable prices should be anticipated. For example, a 10% and 20% drop in output prices for vegetables would result in a reduction in profitability of this farm organisation of 3% and 18% respectively, which would nevertheless be higher than any other strategy. Total payments are slightly reduced, due to a loss of arable area eligible for payments. Although total labour costs increase from an average of 379 €/ha to an average of 417 €/ha, total other costs drop due to increasing returns on capital (interest on savings: 55 €/ha). In summary, it is surprising that vegetable production has not been considered earlier.

The second best option is to rear breeding sows. This strategy takes advantage of falling cereal prices, while accepting the need for moderate investments. Additional market receipts from piglets outweigh the additional variable costs incurred and costs for depreciation and labour. Alternatively, sows could be reared as a co-venture with another farmer. This has the advantage of reducing the required management input and capital fixation for the farm manager. Both strategies require qualified labour, which needs to be hired.

4.3.2 Germany

The typical German arable farm's gross margin remains largely unaffected by Agenda 2000 (Table 4-17). The gross margin for crop production drops only slightly as yield improvements compensate for part of the losses resulting from decreasing cereal prices. Payments in crop production decrease slightly despite the envisaged increase in arable area payments, because total organic payments for arable crops decrease due to changes in the regional organic farming scheme. With Agenda 2000, regional support payments for certification were included in the ceiling for payments in the agri-environmental scheme within which support payments for organic production are implemented. Therefore, the average payment per ha decreases slightly.

Market receipts from beef drop considerably (-54 €/ha), while the reduction in variable costs due to reduced cereal prices is minor, because beef is mainly grass and silage-finished. Increasing livestock payments (+32 €/ha) only partially compensate for the reduced market receipts for beef (Table 4-17) and the livestock gross margin drops by 8%. Reduced interest payments help to conserve profitability despite a drop in the farm's gross margin.

Table 4-17: Effect of Agenda 2000 on a typical German organic arable farm (€/ha)

	1999	2008	Change in %
Crop market receipts	1,035	1,023	1
Variable costs plant production	288	294	2
Payments crop	432	423	-2
Gross margin crop	**1,179**	**1,152**	**-2**
Livestock market receipts	272	218	-20
Livestock variable costs	209	198	-5
Payments livestock	73	105	44
Gross margin livestock	**136**	**125**	**-8**
Payments whole farm	5	6	20
Extended gross margin	**1,320**	**1,283**	**-3**
Total other costs*	886	845	-5
Profit per ha	**434**	**438**	**1**
Profit per FWU (€)	**36,926**	**37,219**	**1**

* (Overheads, wages paid to non-family labour, interest paid on borrowed capital, rents paid) - Other farm income

This German organic arable farm has more than doubled in size in the last ten years and, due to high prices and difficulties regarding access to additional converted organic land, no further expansion in total land area is anticipated in any **adaptation strategies to Agenda 2000** (Table 4-18). Furthermore, the farm avoids capital fixation in large investments. Hence, the most likely strategies are minor changes in crop production. However, despite the organisational changes and investments required, diversification into livestock rearing is considered. The different adaptation strategies are described below.

Table 4-18: German arable farm's adaptation strategies to Agenda 2000

Strategies by 2008	Base farm	Cereal seeds	Field vegetables	Laying hens	Finishing pigs
Land use (ha)					
Total land area	**85**	~	~	~	~
Set-aside: clover/grass ley	**8.5**	~	~	~	~
Clover/grass ley	**8.5**	~	~	~	~
Winter wheat	**17.0**	12	12	~	~
Spelt	**4.0**	3	~	~	~
Rye	**17.0**	12	~	~	~
Peas	**17.0**	~	~	~	~
Maize	**4.0**	~	~	~	~
Potato	**4.0**	~	~	~	~
Permanent grassland	**5.0**	~	~	~	~
Winter wheat seeds	**0**	5	~	~	~
Spelt seeds	**0**	2	~	~	~
Rye seeds	**0**	4	~	~	~
Carrots	**0**	~	5	~	~
Animals (No.)					
Steers	**18**	~	~	~	~
Heifers	**9**	~	~	~	~
Laying hens	**0**	~	~	1,000	~
Pigs	**0**	~	~	~	300
Other factors					
Family labour (FWU)	**1.0**	~	~	~	~
Hired labour (AWU)	**0.2**	~	~	0.4	0.4
Profitability (€/FWU)					
Base year 1999	**36,926**	~	~	~	~
by 2004	**36,928**	43,999	32,241	34,100	32,888
by 2008	**37,219**	45,151	32,683	35,091	33,902

~ no changes compared to base farm, strategies implemented beginning in 2000

Expected changes in organic standards in the year 2000 will demand the exclusive use of seeds of organic origin. Therefore, **production of organic seeds**, e.g. cereal seeds, is considered. This short to medium-term strategy does not require any major investments, as the cereal production process does not change substantially. Only minor additional costs fare incurred or quality control, certification and marketing. To begin with, seeds of winter wheat, spelt and rye are produced on 5, 2, and 4 ha, respectively.

Demand for organic vegetables is increasing on the German market for organic products. **Field vegetable production** is therefore considered, but only under a forward contracting agreement with the food processing industry, in order to minimise risk. Five hectares are sown to carrots, as this is the minimum area considered feasible in terms of contracting agreements and machinery investments. Preferably, the additional machinery input required is contracted. Alternatively, the required machinery is bought and free machinery capacities contracted out to other carrot-growing farmers. Casual labour for hand weeding can be hired at need.

A strong demand for organic eggs and falling conventional and organic cereal prices motivate the rearing of **laying hens** as a value-adding strategy for farm-grown non-marketable cereals. The production of eggs does not require a large area, but considerable investments in housing have to be made. A perchery housing system is built with automatic feeding, egg collection and manure removal. Additional labour can be hired for regular tasks such as feeding, manure removal and egg collection as well as for irregular work such as cleaning and restocking. Eggs are marketed directly, and so considerable effort and time is invested in marketing and delivery.

Fattening of pigs is also considered, based on the perception that a strong demand for organic pork exists. This long-term strategy requires considerable investment in housing for a minimum of 300 animals per rotation, using parts of existing buildings. Feed is based on an imported total mixed ration. Additional permanent labour input required is compensated for by a higher casual labour input at labour peaks.

The most profitable adaptation strategy to Agenda 2000 is to produce cereal seeds (Table 4-19). The gross margin for plant production increases (+74 €/ha), due to the higher market value of seeds which in part compensate for the price reductions for wheat in Agenda 2000. However, the simulated profit given for the production of cereal seeds represents a best-case solution. Expected prices might be overestimated in the long term, as organic seed supply will catch up with demand. A 10 or 20% price drop for organic seeds would still result in higher profitability, of 42,029 € or 38,714 € per FWU respectively. Compared to the livestock-rearing alternatives, this strategy has the added advantage of maintaining flexibility and being risk-averse, as no capital is fixed.

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Table 4-19: Best adaptation strategies to Agenda 2000: German arable farm (€ /ha)

Strategies by 2008	Base farm	Best strategy Cereal seeds	Second best Base farm
Crop market receipts	1,023	1,165	~
Variable costs plant production	294	362	~
Payments crop	423	423	~
Gross margin crop	**1,152**	**1,226**	**~**
Livestock market receipts	218	218	~
Livestock variable costs	198	197	~
Payments livestock	105	105	~
Gross margin livestock	**127**	**126**	**~**
Total payments	6	7	~
Extended gross margin	**1,285**	**1,359**	**~**
Total other returns & costs*	847	828	~
Profit per ha	**438**	**531**	**~**
Profit per FWU (€)	**37,219**	**45,151**	**~**

* (Other farm income) - (Overheads, wages paid to non-family labour, interest paid on borrowed capital, rents paid)

4.3.3 Denmark

The gross margin of the typical Danish arable farm increases with the implementation of Agenda 2000 (Table 4-20), mainly due to a marked increase in beef special payments (+95 €/ha) and arable area payments (+18 €/ha), which overcompensate for the effect of decreasing market receipts for cereals and beef. The variable costs of plant production and livestock rise slightly due to rising factor costs. Profit increases by 30%, although the increase in the gross margin is only minor, especially due to a drop in overheads.

Table 4-20: Effect of Agenda 2000 on a typical Danish organic arable farm (€/ha)

	1999	2008	Change in %
Crop market receipts	561	545	-3
Variable costs plant production	136	152	12
Payments crop	304	322	6
Gross margin crop	**729**	**715**	**-2**
Livestock market receipts	225	180	-20
Livestock variable costs	25	27	8
Payments livestock	67	162	142
Gross margin livestock	**267**	**315**	**18**
Payments whole farm	0	0	--
Extended gross margin	**996**	**1,030**	**3**
Total other costs*	726	680	-6
Profit per ha	**270**	**350**	**30**
Profit per FWU (€)	**22,080**	**28,606**	**30**

* (Overheads, wages paid to non-family labour, interest paid on borrowed capital, rents paid) - Other farm income

Due to its recent expansion from a part-time to a full-time farm and the difficulty of renting land in this region, this Danish organic cropping farm does not consider major expansion in terms of area in any strategy. Hence, strategies envisaged by the farmer mainly involve diversification, as outlined in Table 4-21 and described as follows.

Finishing pigs represent a mid-term diversification strategy aimed at utilising the available land better and distributing risk to several farm branches. Initially, 200 pigs of the Danish landrace or Yorkshire breeds are fattened per year. An investment in new housing is inevitable, as no appropriate structures exist. Pigs are finished on the basis of barley produced on-farm, imported protein mix and own forage. Additional labour required is hired as casual labour in order to compensate for the additional regular farm family labour input.

Seed production is considered in view of the change in regulations, obliging all organic farms to only use organically produced seeds from the year 2000. Hence, one of the diversification strategies most commonly considered by organic arable farms is the production of seeds (wheat and Lolium perenne) as an alternative or complementary to cereal production. As little investment is required and changes can be made quickly, this is considered a feasible and flexible short-term strategy. The required area is taken from wheat.

Falling cereal prices and a strong existing demand for vegetables create an incentive to convert part of the wheat area to **field vegetables**. However,

cultivation of vegetables is only considered in a contractual agreement. Initially, two hectares of leek and two hectares of carrots are planted. Alternatively, red cabbage or onions could be considered. All additional machinery operations required are contracted, and additional casual labour for weeding is available at all times.

Table 4-21: Danish arable farm's adaptation strategies to Agenda 2000

Strategies by 2008 Land use (ha)	Base farm	Finish pigs	Cereal seeds	Field vegetables
Total land area	**98.2**	~	~	~
Set-aside: Clover/grass ley	**9.8**	~	~	~
Winter wheat	**34.7**	~	29.7	30.7
Oats	**10.3**	~	~	~
Clover/grass silage+pasture	**23.2**	~	~	~
Barley (feed)	**10.2**	~	~	~
Permanent pasture	**10.0**	~	~	~
Wheat seeds	**0**	~	3.0	~
Grass seeds	**0**	~	2.0	~
Leeks	**0**	~	~	2.0
Carrots	**0**	~	~	2.0
Animals (No.)				
Suckler cows	**25**	~	~	~
Heifers	**26**	~	~	~
Bulls	**11**	~	~	~
Steers	**9**	~	~	~
Pigs produced per year	**0**	185	~	~
Other factors				
Family labour (FWU)	**1.0**	~	~	~
Hired labour (AWU)	**0.1**	0.3	~	1.5
Profitability (€/FWU)				
Base year 1999	**22,080**	~	~	~
by 2008	**28,606**	27,740	28,607	49,361

~ no changes compared to base farm, strategies implemented beginning in 2000

Growing field vegetables represents the most profitable adjustment to Agenda 2000. Crop variable costs rise as additional machinery requirements are contracted and casual labour for weeding is hired. This is fully compensated for by additional market receipts from vegetable production. Average payments decrease slightly (-14 €/ha), as vegetable area is taken from cereal area eligible for arable area payments. This seems to be a fairly robust strategy, as drops of up to 25% in prices for vegetables still result in higher profitability than any other strategy.

Table 4-22: ***Best adaptation strategies to Agenda 2000: Danish arable farm (€/ha)***

Strategies by 2008		Best strategy	Second best
	Base farm	Field vegetables	Seed production
Crop market receipts	545	1,435	570
Variable costs plant production	152	279	171
Payments crop	322	308	314
Gross margin crop	**715**	**1,464**	**713**
Livestock market receipts	180	180	180
Livestock variable costs	27	27	227
Payments livestock	162	162	162
Gross margin livestock	**315**	**315**	**115**
Payments whole farm	0	0	0
Extended gross margin	**1030**	**1,779**	**828**
Total other costs*	680	1,176	478
Profit per ha	**350**	**603**	**350**
Profit per FWU (€)	**28,606**	**49,361**	**28,607**

* (Overheads, wages paid to non-family labour, interest paid on borrowed capital, rents paid) - Other farm income

The second best farm adjustment is to produce cereal seeds, although this strategy yields only slightly higher profit than the original farm organisation. Taking into account the risks associated with any new farm activity (e.g. learning effect, overestimation of achievable prices), it seems more reasonable to continue the original farm organisation.

4.3.4 Italy

The profitability of this Italian organic arable farm is expected to decline in the coming years, mainly due to increasing fixed costs. However, only minor effects are expected from Agenda 2000 developments (Table 4-23). While the effect of the drop in cereal prices is only minor (-4 €/ha) and is compensated for by rising area payments (+9 €/ha), rising factor prices translate into higher crop variable costs and a significantly lower gross margin.

Table 4-23: ***Effect of Agenda 2000 on a typical Italian organic arable farm (€/ha)***

	1999	2008	Change in %
Crop market receipts	627	623	-1%
Variable costs plant production	530	618	17%
Payments crop	523	532	2%
Gross margin crop	**97**	**5**	**-95%**
Total other costs*	338	429	27%
Profit per ha	**282**	**108**	**-62%**
Profit per FWU (€)	**11,280**	**4,304**	**-62%**

* (Overheads, wages paid to non-family labour, interest paid on borrowed capital, rents paid) - Other farm income

Although this full-time farm is much larger than the regional average, the farm's **adaptation strategies to Agenda 2000** (Table 4-24) are characterised by a trend towards non-agricultural diversification. The different adaptation strategies are described below.

A flexible growth and diversification strategy is to produce **seeds and medicinal plants.** Chickpeas for seeds and green anis are introduced on 10 ha with the aim of creating new market segments. This land is rented and converted to organic production. To compensate for additional management input, all machinery operations required are contracted and additional casual labour is rented for a total of 160 person days per year. Some old machinery is replaced by other, more specialised machinery.

Greater specialisation is envisaged by introduction of an orchard of apricot and cherry **fruit trees**. This medium to long-term strategy requires an increase of 10 ha in rented land area. For the planting of an orchard, a one-off payment is provided by the EU under Council Regulation 2328/90. Machinery operations required on the rented land (old and new) are contracted, and casual labour is hired for a total of 120 person days per year. As an orchard requires specialised machinery, some machinery investments are made. Fruit is sold completely through market intermediates.

Equally, fruit could be **marketed directly.** This direct marketing effort for 5% of total apricot and cherry production will require some labour for developing a market and restructuring of a room in the farmhouse for storage.

Reforestation envisages long-term extensification. Part of the total land area is extensified by planting woody species and walnut and cherry trees on 8 ha at the cost of alfalfa area. No specialised machinery is necessary, but an additional 160 person days of casual labour are hired per year. Reforestation is subsidised through Council Regulation 2080/92 on afforestation. No marketable yield is produced in the near future, as all species are planted for timber.

Table 4-24: The Italian arable farm's adaptation strategies to Agenda 2000

Strategies by 2008 Land use (ha)	Base farm	Medicinal plants and seeds	Fruit	Fruit, directly marketed	Reforest-ation
Total land area	**40.0**	50.0	50.0	50.0	~
Set Aside: Alfalfa	**10.0**	~	20.0	20.0	2.0
Durum wheat	**15.0**	14.0	6.0	6.0	~
Soft wheat	**3.0**	~	~	~	~
Spelt	**1.0**	6.0	~	~	~
Barley	**2.0**	~	~	~	~
Sun flowers	**8.0**	~	10.0	10.0	~
Vineyard	**0.8**	~	~	~	~
Olive	**0.2**	~	~	~	~
Apricot	**0**	~	3.0	3.0	~
Sweet cherry	**0**	~	1.0	1.0	~
Sour cherry	**0**	~	1.0	1.0	1.0
Green anise	**0**	4.0	~	~	~
Chick pea seeds	**0**	1.0	~	~	~
Walnut trees	**0**	~	~	~	1.0
Other woody species	**0**	~	~	~	6.0
Other factors					
Family labour (FWU)	**1.0**	~	~	~	~
Hired labour (AWU)	**0.1**	0.6	0.5	0.6	0.3
Profitability (€/FWU)					
Base year 1999	**11,280**	~	~	~	~
by 2008	**4,304**	**-1,102**	**7,383**	**28,463**	**-1,924**

~ no changes compared to base farm, strategies implemented beginning in 2000

The **profitability of the farm's adaptation strategies to Agenda 2000** are provided in Table 4-24. Fruit production is expected to yield the highest profit in the long term with the rising bearing capacity of the trees. Before that, the extra costs for labour, depreciation of new machinery and interest on liabilities are higher than the additional market receipts (Table 4-25). Direct marketing of the fruit produced increases total profitability considerably, although some extra labour for marketing efforts and minor investments for a storage room are required. The objective of this farm seems to be to diversify into other

activities, possibly developing a niche market, taking advantage of payments for the establishment of orchards without increasing their own labour input. The additional labour input for fruit cultivation and direct marketing is covered by hired casual labour.

Table 4-25: Best adaptation strategies to Agenda 2000: Italian arable farm (€/ha)

Strategies by 2008	Base farm	Best strategy Fruit, marketed directly	Second best Fruit
Crop market receipts	623	792	1,236
Variable costs plant production	618	628	628
Total payments	532	537	537
Gross margin crop	**537**	**701**	**1,145**
Total other returns & costs*	429	553	576
Profit per ha	**108**	**148**	**569**
Profit per FWU (€)	**4,304**	**28,463**	**7,383**

* (Other farm income) - (Overheads, wages paid to non-family labour, interest paid on borrowed capital, rents paid)

4.4 Summary

The effect of the European agricultural policy package, Agenda 2000, on organic farms in the EU depends primarily on the farm type and land use. Gross margins of **organic dairy farms** are largely unaffected by Agenda 2000, while organic arable farms tend to suffer slightly (Table 4-26).

In **dairy production**, the introduction of a milk quota payment as compensation for decreasing prices for milk and increasing slaughter premia for beef tends to overcompensate for the losses caused by milk price drops. In all cases, increasing milk yields via breeding improvements and a reduction in prices for concentrates compensate for part of the losses in market receipts. Accordingly, on farms with a high intake of concentrates (see Table 3-27), livestock variable costs may increase less than on other farms, e.g. the Danish dairy farm. Additionally, dairy farms will benefit slightly from increasing arable area payments, although arable crops contribute only minor shares to total gross margin (6-22%).

Table 4-26: Effect of Agenda 2000 on gross margins & profitability of organic farms by 2008 without adaptations

	UK	DE	DK	IT
		Dairy farms		
Milk yield (kg FCM)	*5,583*	*5,062*	*6,672*	*5,170*
Gross margin livestock - change in €/cow	-21	2	102	-11
Gross margin crop - change in €/cow	47	25	-15	-16
Extended gross margin - change in €/cow	26	27	87	-27
Profit change - change in €/cow	-9	-178	296	645
Extended gross margin - change in %	**+1%**	**+1%**	**+5%**	**-1%**
Profit - change in %	**-1%**	**-24%**	**+52%**	**+37%**
		Arable farms		
Yield in % of regional reference yield 1999*	*61%*	*81%*	*96%*	*121%*
Livestock density (LU/ha)	*0.3*	*0.2*	*0.6*	*0.0*
Gross margin crop - change in €/ha	32	-27	-14	-83
Gross margin livestock - change in €/ha	-91	-11	+48	--
Extended gross margin - change in €/ha	-59	-37	+34	-83
Profit - change in €/ha	-73	+4	+80	-174
Extended gross margin - change in %	**-6%**	**-3%**	**+3%**	**-95%**
Profit - change in %	**-29%**	**+/-0**	**+30%**	**-62%**

* Yield example: wheat

Gross margin development of **organic arable farms** clearly depends on the farms' production structure. Farms with a high beef density and low yield levels in crop production tend to benefit from Agenda 2000 developments. Additional livestock payments overcompensate for losses due to price reductions in the beef sector, e.g. the Danish farm. Livestock gross margins of farms with high prices for beef and low beef density, e.g. the UK and the German arable farm, suffer substantially from beef price reductions.

Gross margin developments in crop production depend mainly on the cereal yield levels achieved (Table 4-26). Farms with low yields tend to suffer less from price reductions and benefit relatively more from increasing arable area payments, e.g. the UK arable farm. In contrast, the Italian arable farm suffers very high losses due to price reductions for cereals because of its above-average yield level. In summary, organic farms' dependence on government payments tends to increase significantly with Agenda 2000, as is presented in Table 4-27.

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Table 4-27: Payment contribution to gross margins (%)

	UK	DE	DK	IT
Dairy				
Payment contribution in 1999	2	21	11	18
Payment contribution by 2008	8	29	19	15
Arable				
Payment contribution in 1999	31	38	37	84
Payment contribution by 2008	33	41	47	99

The effect of Agenda 2000 on gross margins is only minor. Nevertheless, profitability of the model farms may develop rather differently. The Danish model farms are expected to experience a significant increase in profitability in the coming years, mainly due to decreasing interest charges. This could be related to the selection criteria of farms and the resulting fairly low age of focus-group members and recent take-over of farms from their predecessors at normal market prices. A similar trend is observed on the Italian dairy farm, where interest on savings increases in the simulation period. The contrary is observed on the German dairy farm: fixed costs and labour expenses rise significantly, resulting in a deterioration in profits.

In most cases, the main restrictions on the **further development** of the organic farms analysed seem to be the availability of capital and the conversion period, during which produce cannot initially be marketed as organic. Hence, the possibility of renting converted organic land is also a declared restriction. Farms seem to be reluctant to convert additional land area, as produce cannot initially be marketed as organic. In Denmark, a very optimistic attitude towards the future marketability of organic products seemed to prevail in 2000, in both the dairy and the livestock sector.

On **dairy farms**, the availability of capital is particularly decisive. Expanding the dairy herd or increasing milk yields usually requires investment in additional housing and quota. In addition, land area needs to grow with an increasing dairy herd to produce sufficient forage on-farm. At the time of strategy discussions, pressure to increase forage area and thus to convert land was prevalent at the time of the strategy discussions (2000) due to the implementation of the EU Regulation on animal husbandry.

Some of the **arable farms** have expanded considerably in recent years and therefore have little available capital. In general, the organic arable farms analysed demonstrate a temporising attitude towards market and policy developments and a preference for maintaining flexibility in adapting to changing market and policy situations. Therefore, capital fixation tends to be avoided and minor organisational changes or diversification strategies requiring little capital are considered.

To **adapt to Agenda 2000**, organic farms envisaged a range of organisational changes at the time of focus-group meetings. **Dairy farms** tended mainly to envisage strategies relating to dairy production, as Agenda 2000 tends to benefit organic dairy farms. Either the size of the dairy herd or the management of dairy production is adjusted, or part of the offspring is finished for meat production as a supplement to milk production. Only in a few cases is diversification of production into field vegetable or cereal seed expected as a strategy for adapting to changing legislation.

As organic **arable farms** are more susceptible to price drops in the Agenda 2000 environment than dairy farms, they will adjust their farms significantly in the future. The nature of the strategies envisaged depends largely on the specific market situation in each country. Arable farms most frequently diversify their arable production, e.g. by introducing vegetables or cereal seeds, or add value to cereals, e.g. by finishing pigs or rearing hens. Vegetable production is encouraged by a strong demand for organic vegetables in the northern countries. The demand for organic seeds is expected to increase due to changes in organic regulations. Strategies related to animal production are encouraged by demand on the one hand and by dropping cereal prices on the other. However, animal rearing strategies seem to be less popular than arable diversification strategies due to a lack of experience with animals and the investment required. The Italian arable farm represents an exception, considering fruit production and reforestation. Extreme losses due to Agenda 2000 provide and incentive to seek niche production – if possible in combination with direct marketing and the option of EU support for establishment of crops/trees. Furthermore, the farmers are aiming towards reducing their own labour input to part-time.

In order to increase or, in some cases, maintain family farm income, farms will have to adapt their businesses. The best and thus most likely adaptation strategies to Agenda 2000 and their impact on farm family income by the year 2008 compared to the expected family farm income based on the original base farm organisation are presented in Table 4-28.

Table 4-28: Most likely adaptations to Agenda 2000 and their profitability by 2008

	UK	DE	DK	IT
Dairy farms	**Field vegetables**	**Herd expansion**	**Minor herd expansion**	**Meat, marketed directly**
Profit (€/FWU)	115,943	14,428	64,036	30,869
% difference to base farm organisation in 2008	+98%	+32%	+48%	+15%
Arable farms	**Field vegetables**	**Cereal seeds**	**Field vegetables**	**Fruit, marketed directly**
Profit (€/FWU)	122,026	43,999	49,361	28,463
% difference to base farm organisation in 2008	+178%	+19%	+72	+561%

In the UK, the most beneficial farm organisation for both the dairy and the arable farm seems to be the introduction of field vegetables, mainly due to high prices levels for organic field vegetables in the UK in 1999 (Table 4-28). Even assuming a price reduction of 20% for organic field vegetables, this still seems to be the most beneficial development for both farm types in the UK, not taking into account a possible further deterioration in vegetable prices. In Germany and Denmark, farm organisational changes are less substantial; both dairy and arable farms only slightly modify their existing activities (Table 4-28). In Italy, a trend towards direct marketing of produce is observed, which could be due to a lack of organised marketing structures for organic products.

In summary, potential exists for increasing farms' incomes by making organisational changes or by taking up new activities. However, not all strategies proposed by focus groups are promising. In particular, the uptake of animal rearing activities by arable farms needs to be reconsidered.

5 Potential scenarios for the development of the organic farming sector and their impact on organic farms

In this chapter, the effect of potential future policy environments on organic farms in the EU is assessed. In contrast to Chapter 4, which discussed a concrete policy package implemented within the European Union, namely Agenda 2000, this chapter deals with the impact of more distant and uncertain policy developments.

The future development of policy environments and the evolution of their underlying driving forces are highly uncertain. Scenarios may help us systematically to confront potential future developments (Steinmüller 1997) and define suitable strategies for dealing with the future in complex and rapidly changing social systems (Zanoli et al. 2000).

In order to outline the range of possibilities in the policy environment for organic farms in the EU, two contrasting scenarios were chosen, broadly following the scenarios developed by an interdisciplinary team of experts from the European organic sector (Zanoli et al. 2000).

The difficulty in implementing the scenarios proposed by Zanoli et al. (2000) lies in their complexity, which cannot be depicted in its entirety in the simulation procedures. Furthermore, for the sake of interpretation, only a few variables could be adapted to each scenario and considerable simplifications had to be made. These assumptions are based on theoretical considerations which are discussed briefly below.

Scenarios are introduced by narratives (Zanoli et al. 2000: modified), the corresponding modelling assumptions are specified in detail. Their impact on the profitability of typical organic farms in their original farm organisation (base farm) is presented. However, potential farm adaptation strategies are not presented in detail, as focus groups had difficulties in proposing detailed farm adaptation strategies. Nevertheless, more generally discussed potential farm developments are given. The period under consideration is the period 2000-2008, and Agenda 2000 is the underlying agricultural policy package. Results for the alternative scenarios are presented in comparison to Agenda 2000.

5.1 Theoretical background

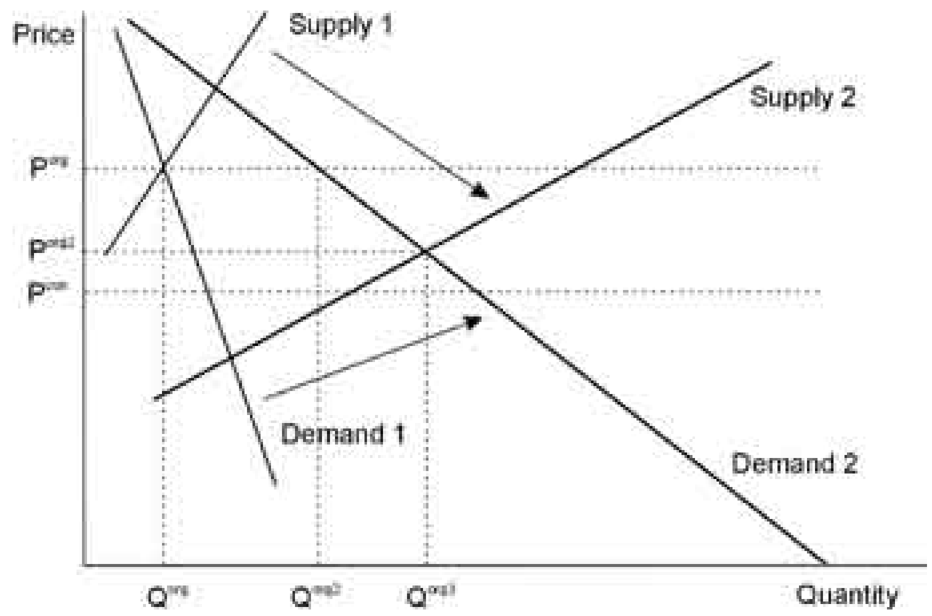
Financial support for organic farming is intended to compensate for yield losses and additional costs incurred due to restrictions imposed by organic production standards. Initially, area payments increase the profitability of organic farms and thus ease the entry barriers to organic production and prompt farms to convert. Erosion of price premia or prices can be expected as soon as demand stabilises and supply starts to outstrip demand at prices current (Figure 5-1).

As long as demand is inelastic and low (Demand 1), supply is restricted to a small number of farms. Limited demand and conversion costs restrict the number of interested farmers. In this case, supporting conversion to organic farming is expected not only to harm producers, but may nearly cancel out any supportive effect the subsidies might have (Hamm 1997; Offermann & Nieberg 2000).

Food scares can turn a considerable number of consumers to organic food, shifting the demand curve from Demand 1 to Demand 2. However, new consumers tend to be more price sensitive and the interest in organic products rises mainly among consumers who would buy organic products only at reasonable premia.

Growth in demand is sufficient for producers to increase production. Existing farmers expand their land area, as intensification of organic farms is limited by organic production standards. Additionally, new farms enter the sector and the supply curve shifts and flattens (Supply 1 to Supply 2). Supply may eventually outstrip demand at price P^{org}, the price will drop (P^{org2}) and approach the price of conventional food (P^{con}). Furthermore, as the organic market develops from a small highly specialised niche market and organic food becomes more readily available, high price premia will not hold. Increased supply will facilitate efficient processing and marketing, reducing their costs and consumer price premia as well as broadening supply, all together creating additional demand.

Figure 5-1: Organic market development



Source: EC (2001)

To provide an estimation of the effect of a broad range of possible policy environments, the three alternative scenarios will be discussed in their effect on farms and adaptation strategies:

- Scenario I: depicts a supply policy-driven scenario, with increasing direct payments for organic production.
- Scenario II: a demand-induced situation, with an increasing demand for organic produce but only temporarily high price premia.
- Scenario III: a hypothetical public-private shared-cost situation in which consumers accept a 25% price premium for organic products, which is fully transferred to producer prices. Area payments are paid to compensate for income losses only.

5.2 Scenario I

In this scenario, the competitiveness in European agriculture increases as European agricultural policy adheres to Agenda 2000, where market protection and price support are reduced. Nevertheless an extremely positive attitude towards organic farming is adopted. Agri-environmental measures are strongly supported and special benefits are given to organic farming. Area payments to organic farming are doubled compared to Agenda 2000, while payments for other agri-environmental schemes and general CAP payments remain unchanged (Table 5-1).

Table 5-1: Scenario I compared to Agenda 2000

	Developments
Area payments for organic farming within agri-environmental programmes...	...increase by 100%[1]
Organic price premia at producer level...	...drop by 30%[2]

1 The UK introduces continuing organic farming support at 50% of conversion support in 1999: 76 €/ha for arable land; 55 €/ha grassland; DE arable farm: the ceiling of 24,000 (1999) was also doubled.
2 As a result of increased area payments, farms convert, supply outstrips demand and prices begin to drop from 2003 on.

Source: Own assumptions based on Zanoli et al. (2000)

This extremely positive attitude is mainly due to increased economic stability in Europe, with high welfare and a propensity to consume. Quality of life, including food and environmental quality issues, receives increasing attention not only from consumers but also from farmers. The range of processed products available and the number of consumers buying organic food broaden considerably. The remaining insecurity about genetically modified products increases the number of consumers buying organic products. Broad support for technical advice and research focussed on technological innovations for organic farming lead to significant innovations in production methods. However, breeding efforts do not succeed in increasing yields at a higher rate than conventional farming.

Higher area payments for organic farming increase the number of farmers converting, while existing organic farms expand their total area. This leads to a marked increase in supply and a drop in the price premium for organic products despite a strong demand (Table 5-1). Resulting output price levels are given in Table 5-2.

Table 5-2: Output price levels in Scenario I by 2008 compared to Agenda 2000 (%)

	UK	DE	DK	IT
Milk	94.7	96.1	94.0	96.1
Wheat	85.8	84.3	85.8	94.0

5.2.1 Impact on farms

The profitability of most organic farms in their original organisation seems to benefit from the developments in Scenario I (Table 5-3), with increased area payments outperforming the drop in price premia. Only in the UK, the introduction of continued organic farming support is not sufficient to make up for the assumed drop in premium prices due to a conversion boom.

The impact of increasing area payments depends on the nature of organic support schemes in each region and farm-specific factors. On farms where organic payments make a high contribution to total profit (Table 5-3), in the Agenda 2000 environment the increase in profitability is relatively high, e.g. the German dairy and arable farm. This can either result from high average area payments or from a significant dependence on subsidies due to low market revenues. If organic aid payments in Agenda 2000 are high, doubling these area payments leads to a higher absolute increase in payments than on farms with lower initial organic aid. Similarly, in the case of strong profit dependence on subsidies due to low market prices, a higher absolute increase in organic area support translates into a strong impact on profit. Setting a ceiling for total organic payments to a certain maximum amount may accentuate this effect, e.g. on the German arable farm. The initial ceiling of 24,000 € rose to 48,000 € per farm, resulting in a 370% increase in average organic support payment per ha.

Table 5-3: Organic dairy and arable farms in Scenario I (S I)

	UK		DE		DK		IT	
	A 2000	S I	A 2000	S I	A 2000	S I	A 2000	S I
	Dairy farms (€/cow)							
Total profit (€/cow)	974	1,205	469	866	866	1,147	2,399	3,218
Change in profit (%)	+24%		+85%		+32%		+34%	
Total market receipts (€/cow)	2,602	2,405	2,211	2,124	3,324	2,618	2,673	2,583
Change in market receipts (%)	-8%		-4%		-21%		-3%	
Organic support (€/cow)	0	56	231	424	126	250	422	840
Payments (%)	0%	7%	33%	73%	35%	52%	24%	30%
	Arable farms (€/ha)							
Total profit (€/ha)	179	175	438	772	350	396	102	216
Change in profit (%)	-2%		+76%		+13%		+122%	
Total market receipts (€/ha)	797	700	1,240	1,130	725	662	594	567
Change in market receipts (%)	-13%		-9%		-9%		-5%	
Organic support (€/ha)	0	68	256	509	103	205	129	245
Payments (%)	0%	39%	58%	66%	38%	52%	26%	113%

While the effect of changes in subsidy levels for organic production depends mostly on the country-specific payment levels, the effect of decreasing price premia with increasing numbers of converting farms is more related to price levels and price premia and the resulting drop in prices in this scenario (Table 5-3), e.g. the UK dairy farm. Similarly, yield levels (Table 3-27 and Table 3-30) determine the absolute impact of a drop in price premium. Farms which achieve high yield levels suffer a higher absolute drop, e.g. the Danish dairy farm, while farms with low yields suffer only minor drops in market receipts, which are fully compensated for by additional area payments, e.g. the Italian farms.

Price drops also affect the variable costs of crop and livestock production through decreasing prices for intermediate inputs of agricultural origin, e.g. concentrates. However, their effect on profit is minor compared to the effect of the development of output prices and area payments and is therefore not presented in detail here.

5.2.2 Adaptation strategies of farms

According to focus-group discussions, adaptation strategies to this scenario – in the long run – would not be fundamentally different from the adaptation strategies to Agenda 2000, as these depend largely on farm and farmer-specific factors. However, the following general trends can be expected:

Existing organic farms will benefit from the initial advantage over newly convert-ing farms. Existing infrastructures will be repaired or expanded as far as possible to strengthen their market position by avoiding costs in the future or expanding production.

Organic dairy farms will most likely strive to extensify, e.g. by reducing costs for imported feed through increased on-farm production of forage. Where necessary, dairy farms tend to invest in machinery and land, although an increased trend in contracting assistance is observed. In regions with a high share of organic area, e.g. the Danish cases, a rapid expansion in area is envisaged as farmers expect an increase in land rental prices due to the increasing regional average area payments and increasing organic area.

Organic arable farms will most likely focus on intensive value-adding strategies, such as finishing pigs, since converting farms are more likely to be extensive farm types. Furthermore, direct marketing strategies, e.g. via farm shops or box schemes, will gain importance in the attempt to maintain price premia. In the case of the Italian arable farm, this seems to be less important and a considerable growth in land area is desired. Additional processing or marketing efforts are not planned, because capital fixation resulting from investments is avoided and the knowledge needed for implementation of new farm activities is rated too high.

Generally, on both farm types, a trend towards increasing contracting assistance and reducing machinery investments with the aim of limiting capital fixation is observed. The ranking of the profitability of the strategies presented in Chapter 4 remains the same as in the Agenda 2000 environment.

5.3 Scenario II

This scenario depicts a situation where European Agricultural Policy is implemented according to the agricultural chapter of Agenda 2000, with a decrease in market protection and price support. Farm-gate prices drop and this drop is partly transferred to consumer prices. The general EU economy profits from increasing globalisation, improving consumers' confidence towards wealth and increasing their propensity to consume.

Globalisation of the market accelerates the adoption of controversial technological innovations in agriculture, such as genetically modified organisms. Food scares and environmental issues are intensely covered in the mass media. Consumers are increasingly insecure about the quality of food and its implications for their health and are willing to buy organic food and pay considerable price premia (Table 5-4). European agricultural policy protects certain products, e.g. through certification and control of organic products, and initiates a marketing campaign for organic products (Dabbert et al. 2002).

Table 5-4: Scenario II assumptions compared to Agenda 2000

	Developments
Area payments for organic farming within agri-environmental programmes...	...remain constant
Organic price premia at the producer level...	...increase by 30% until 2002, with a gradual decrease of 5% annually in the following years

Source: Own assumptions based on Zanoli et al. (2000)

Technical advice in organic farming and research focussed on technological innovations for alternative farming systems are generously supported. Higher quality products are produced in organic farming and price premia are easily justified to consumers. The processing industry becomes more interested in organic food, the range of processed products is amplified, and distribution is improved. Consumer price premia are therefore largely transferred to farm-gate prices.

A constant increase in the area of existing farms and conversion of conventional farms lead to higher supply. Price premia for organic products drop in the long term after a conversion time lag. It is assumed that, after the year 2002, organic price premia will drop by 5% per year, resulting in output price levels as given in Table 5-5 by the year 2008.

Table 5-5: Output price levels in Scenario II by 2008 compared to Agenda 2000 (%)

	UK	DE	DK	IT
Milk	98.5	98.8	98.2	98.8
Wheat	95.7	95.3	95.7	98.2

5.3.1 Impact on farms

The temporary increase in price premia with constant organic farming support, as envisaged in this scenario, will not have a significant effect on the profitability of most organic farms in the long run compared to the Agenda 2000 situation (Table 5-6), mainly because output prices will not drop by more than 5% in total (Table 5-5). The magnitude of the price drop depends on the price premia initially observed in each country. The absolute drop in market receipts is also related to the yield level of each farm (Table 3-27 and Table 3-30).

Table 5-6: Organic dairy and arable farms in Scenario II

	UK		DE		DK		IT	
	A 2000	S II	A 2000	S II	A 2000	S II	A 2000	S II
	Dairy farms (€/cow)							
Total profit (€/cow)	974	912	469	741	866	866	2,399	2,393
Change in profit (%)	-4%		+58%		0%		0%	
Total market receipts (€/cow)	2,602	2,519	2,211	2,203	3,324	2,725	2,673	2,646
Change in market receipts (%)	-3%		0%		-18%		-1%	
Organic support (€/cow)	0		231		126		422	
Payments (%)	17%	18%	137%	144%	44%	44%	27%	27%
	Arable farms (€/ha)							
Total profit (€/ha)	179	172	438	421	377	353	102	101
Change in profit (%)	-4%		-4%		-6%		-1%	
Total market receipts (€/ha)	797	773	1,240	1,207	752	726	594	586
Change in market receipts (%)	-3%		-3%		-3%		-1%	
Organic support (€/ha)	0		138		103		129	
Payments (%)	193%	201%	122%	127%	128%	137%	421%	527%

For example, the Danish dairy farm suffers the highest drop in market receipts of all farms, because the highest milk yield is observed on this farm. However, due to a similar drop in prices of intermediate products such as concentrates or seeds, reductions in output price premia are fully compensated for by a decrease in the variable costs of plant and livestock production, and the profit remains unaffected.

Similar to the developments in Scenario I, farms tend to depend increasingly on subsidy support to maintain profitability.

5.3.2 Adaptation strategies

According to focus-group discussions, an increase in price premia for organic products is expected to benefit organic farms only in the short term. A subsequent strong conversion boom is also expected due to the increasing relative profitability of organic farms compared to conventional farms.

Adaptation strategies to this scenario will not be fundamentally different from the adaptation strategies to Agenda 2000 – according to focus groups – as these depend largely on farm and farmer-specific factors. Accordingly, simulation results of the various farm strategies are not presented as the relative benefits of strategies remain the same. Nevertheless, the following general trends are expected:

Most organic farms envisage growth strategies to take advantage of the beneficial situation and invest in land and make the most of scaling effects in the future. In countries with beneficial taxation schemes, investments in machinery can be made without reducing farm income. However, where national taxation procedures favour investments on a more constant basis, as for example in Denmark, excess capital will be invested primarily in land. If sufficient land can be bought or rented to justify another full-time person on-farm, a full-time agricultural labourer is employed, especially on dairy farms. Nevertheless, the additional land area will be used mainly for intensive livestock production to avoid competition with newly converting farms, as these are expected to be more extensive farm types. With an increasing land area, more contracting assistance is sought. While dairy farms are more apt to consider intensive livestock rearing, arable farms tend to increase total land area in order to reduce livestock farming.

Although an increase in price premia seems to encourage the development of new enterprises, the aspiration to market produce directly will decline in comparison to the other scenarios as prices are already high.

If price premia drop after a conversion boom because demand has not developed to an equal extent, more effort will be made first of all with direct marketing strategies. Finally, organic farms will consider re-conversion and participation in other agri-environmental measures.

5.4 Scenario III

This scenario depicts a situation where a certain reasonable price premium is accepted by consumers, but organic support payments do not exist. The European Common Agricultural Policy adheres to Agenda 2000, as in the other scenarios. Economic stability in Europe increases, with high welfare and a propensity to consume. Quality of life, including food and environmental quality issues, receives increasing attention by a wide range of consumers. The range of processed products on offer increases, and the market for organic food has developed to an extent where price premia can be fully transferred to farmers. New consumers tend to be more price-sensitive and the interest in organic products arises mainly among a spectrum of consumers who would only buy organic products at lower premia. Market research has demonstrated that only 10-20% of consumers are willing to pay a price premium of 30%, while a 10% price premium is accepted by 40-50% of consumers (Bruhn 2002; Schaer 2001; Wirthgen et al. 1999). This is could be taken into account when defining organic support schemes.

In this scenario, we assume an organic consumer price premium of 25% that is fully transferred to producer prices, and that area payments are abandoned. The impact of this scenario on the profitability of organic farms is given in Table 5-7.

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Table 5-7: Organic dairy and arable farms' profitability in Scenario III (SIII)

	UK		DE		DK		IT	
	A 2000	S III	A 2000	S III	A 2000	S III	A 2000	S III
	Profit							
Dairy farms (€/cow)	974	-519	469	-299	866	857	2399	2152
Arable farms (€/ha)	179	-1010	438	-997	350	431	108	-193

The necessary organic support payment levels to achieve farm incomes equivalent to those in the Agenda 2000 environment are shown in Table 5-8.

Table 5-8: Organic support payments required to achieve profitability of Agenda 2000 in Scenario III

	UK	DE	DK	IT
Dairy farms (€/cow)	1,493	537	+9	+247
Dairy farms (€/ha)	1,518	602	+8	-165
Arable farms (€/ha)	1,189	1,435	81	301

In most cases, a 25% price premium for agricultural produce is not sufficient to conserve farm profitability. Most farms require considerable support payments, except in Denmark and Italy where the initially observed organic price premia were lower than 25% for some products (Table 5-9). Thus a rise to 25% price premia results in higher profits despite the abandonment of area payments. Therefore, area payments for organic production could be lower than in Agenda 2000 in Denmark if a 25% price premium were achieved for all products. This applies especially to the dairy sector. Price premia for arable crops are higher in the Agenda 2000 scenario, and the Danish arable farm therefore requires additional organic area support of 97 €/ha, or a total of 200 €/ha.

Table 5-9: Average organic producer price premia (%)

	UK	DE	DK	IT
Milk	66	38	20	20
Beef	60	60	20	0
Potatoes	113	83	8	n.a.
Oats	115	150	120	n.a.
Barley	140	150	110	0
Winter wheat	170	150	115	80

Source: Own data & BML (1999, 2000)

Equally, the Italian dairy farm would benefit from an increasing organic price premium for milk and area payments could be reduced, while organic arable farms in Italy would need either higher price premia or additional area payments to conserve farm profitability. Quite the opposite development is observed in the UK and Germany. Here, price premia observed in the reference scenario are much higher (Table 5-9) than 25% and considerable area payments would be necessary to (Table 5-8) conserve profitability.

Farm adaptation strategies are not provided for this scenario, as it was not discussed with focus groups. At the time of the focus-group discussions, scenarios were limited to those provided by Zanoli et al. (2000) to comply with project requirements.

5.5 Summary

The impact of the policy scenarios analysed on the profitability of organic farms in the EU differs widely between scenarios and farms (Table 5-10). Three scenarios were analysed, namely a supply policy-driven scenario (I) with increasing direct payments for organic production, a demand-induced situation with temporarily high price premia (Scenario II), and Scenario III, in which a 25% price premium is paid for organic products at the farm level.

Table 5-10: Expected farm profits in Agenda 2000 and Scenarios I, II and III by 2008 compared to profits of conventional comparison groups*

Profit (€/ha)	UK	DE	DK	IT
		Dairy farms		
Agenda 2000	990	413	258	1,599
Scenario I	1,226	598	1,043	2,146
Scenario II	927	413	258	1,595
Scenario III	-528	-207	779	1,434
Conventional group*	525	532	1,016	1,105
		Arable farms		
Agenda 2000	179	438	350	102
Scenario I	175	772	396	216
Scenario II	172	421	353	101
Scenario III	-1010	-997	431	-193
Conventional group*	182	539	258	382

* Comparison groups specified in chapter 3: In the UK, conventional dairy farm in Wales & conventional arable farm in England (Fowler et el. 2000). In Germany, full-time dairy farms in Baden-Württemberg (MLR 2001) & cropping farm in Bavaria (StMLF 2000). For Denmark, conventional dairy & conventional cropping farms (SJFI 2000a). In Italy, average of general field cropping farms in Marche, and average of specialist dairy farms in mountainous areas in Emilia Romagna (INEA 2002).

The highest profitability is observed in Scenario I on all but the UK arable farm, the impact on dairy farms being stronger than on arable farms. On the UK farm, losses due to deteriorating price premia are greater than additional support payments, as additional area payments are lower than in the other countries.

In Scenario II, the demand-induced increase in price premia is only temporary and prices drop below the initial price levels by the end of the simulation period. However, profits are more or less conserved, the impact depending on the initial premia.

In Scenario III, all farms except the Danish farms suffer losses in profitability, the effect of Scenario III being strongest on arable farms, as price premia for crops tend to be higher than for milk. In Denmark, price premia for organic products in Agenda 2000 were lower than 25%.

The impact of the scenarios depends mainly on the initial price premia observed, the level of support payments and the nature of farms in each country. The following trends are observed:

- Farms with high yields suffer most from a reduction in price premia, e.g. the Danish dairy farm.
- In countries with high price premia, e.g. the UK, the effect of price premia drops is stronger than in countries with low price premia, i.e. Denmark.
- Similarly, price premia are a decisive factor for differences in the development of farm types, e.g. land use and products sold.
- Area payments reduce the risk of losses in profitability due to price premia reductions.

These differences give a first indication of the need for farm type-specific and regionally/nationally differentiated support strategies, not only in terms of area support but also in terms of market development.

This is further emphasised by a comparison of farms in Scenario III with conventional comparison groups, eliminating the effect of the differences in price premia paid (Table 5-10). Although these conventional comparison groups could not be selected on the basis of uniform criteria due to a lack of available comparative data, and Agenda 2000 projections cannot be taken into account, the following trends are observed:

- The highest support payments are required in the UK and in Germany to achieve farm incomes similar to conventional farms.
- In contrast, in Denmark profitability of organic arable farms outperforms that of the conventional comparison group if a 25% price premium is achieved, making support payments obsolete. The Danish organic dairy farm produces a profit that is significantly lower than the conventional comparison group, despite the increased price premium in this scenario (III), and significant support payments therefore seem necessary to avoid re-conversion of organic dairy farms in the future.

- The Italian dairy farms' profits are significantly lower than those of the conventional comparison groups. Hence, additional support for organic arable crops seem to be necessary in Marche. This is confirmed by the nature of the adaptation strategies observed on this case-study farm.
- In Denmark, incomes of organic farms are closer to those of conventional comparison groups than in any other country, although organic price premia and support payments to organic farming are low.

According to the consultative focus groups, the adaptation strategies of organic farms do not differ significantly with different scenarios. Differences observed are primarily related to farm type and to farmer-specific restrictions to production and marketing.

Generally, a trend towards greater specialisation of farms is observed in all scenarios. Farms strive to adapt to changed situations either by extensifying or intensifying production. Extensification is envisaged by considerable growth in area to take advantage of scaling effects and maximise output. This applies primarily to dairy farms in Scenario I and II and arable farms in Scenario II. Intensification, either by direct marketing or new intensive value-adding strategies, is mainly envisaged by arable farms in Scenario II.

Irrespective of further policy developments, these trends could be taken into account in the design of policy measures. Efficiency improvements will help existing organic farms to reduce costs and increase competitiveness. Diversification will help farms to survive in their specific niche, while the organic market as a whole will benefit from the supply of a wide range of products. Increased quantity and diversity of supply may foster the development of efficiency in processing and marketing as well as consumer satisfaction, and thus positively affect demand.

6 Discussion

The impact of policy options on organic farms was analysed at farm level in various European countries using an approach consisting of a mix of methodologies.

In the following section an attempt is made to evaluate the applicability and appropriateness of the methodological approach adopted for policy analysis in the organic farming sector based on the experience gathered in the course of this research.

Second, the results of the farm-level analysis will be discussed in light of the future development of the organic farming sector in the EU.

6.1 Evaluation of the used methodological approach

The methodology used is broadly based on an analytical concept for international comparative analysis of policy and technology impacts proposed by a working group of the agricultural research institute FAL (*Bundesforschungsanstalt für Landwirtschaft*) in Germany. However, this approach was further developed and substantially adapted to the specific situation of organic farms and the present research in particular. A theoretical reasoning for selecting this concept was discussed in detail in section 2.1 to 2.4. Section 2.5 describes the research process and adaptations made in detail.

What distinguishes this approach from other common approaches to farm level impact analysis is the fact that it uses a mixture of methodologies (typical farms; based on focus groups, and the simulation model TIPI-CAL©). The individual elements will be discussed in the light of criteria that are used to evaluate empirical research processes (Table 6-1).

Table 6-1: Criteria for the evaluation of empirical research processes

...applicable mainly to quantitative research	...applicable mainly to qualitative research
Reliability: Operational instructions are precise and objective, results are repeatable	**Appropriateness** of the chosen approach
Validity: Operational instructions measure those criteria that should be measured	**Sensitivity** of the chosen approach
Representativity of selection: Sample allows conclusions with regard to the whole population	**Systematic conduct** of analyses and application of criteria

Source: Kromrey (1998) based on Zetterberg (1973); Silverman (2001)

While some criteria refer mainly to the evaluation of quantitative empirical research processes others are suggested for evaluating qualitative research approaches. As appropriate, these criteria will be applied to the different methodological elements. However, only crucial criteria will be discussed in detail.

Finally, the long-term objective of the approach (IFCN), chosen, to establish an international network of representative farms, the **I**nternational **F**arm **C**omparison **N**etwork (IFCN), with the long-term objective of establishing a sustainable structure for policy and technology impact analysis, is discussed in light of the experience gathered during the research process.

6.1.1 Defining typical farms

Defining model farms is a crucial issue for farm economics and policy impact analysis, especially with regard to the representativity of selection and the possibility of generalising results to other farms in the sector.

At the time the research took place, statistics on the regional distribution of production or farm types for the organic farming sector existed in very few countries in Europe. Therefore, the regional focus of a certain organic production system or farm type could not be identified via statistical data bases. Similarly, model farms, e.g. as average farms, aggregated regional farms or single model farms, could not be defined via statistical data. Selecting model farms according to the typical farm concept therefore seemed appropriate to facilitate economic analyses of organic farms in Europe (section 2.3).

When the empirical, expert-based, research phase was completed three different databases became available, containing information that would have facilitated the selection of typical farms at the outset:

- Data on organic holdings, land use and livestock for all EU countries at the NUTS 1 or 2 level (Eurostat 2002).
- Data on organic holdings, land use and livestock at a district level for Germany (Statistische Landesämter 2003).
- Anonymous farm-specific data for all farms (approx. 3600) belonging to one of the largest organic producers' organisations in Germany for the year 1997 (Bioland 2000), covering nearly 44% of all organic farms in Germany (Foster & Lampkin 2000).

These data are now used to cross-check the reliability of farm selection with regard to:

- the regional focus of farm types within the chosen countries,
- the nature of typical farms,

and thus validate the process chosen for selecting typical model farms.

Selection of case-study regions

Regionalised data are available only for the case-study countries Germany, Italy and the UK for the year 2000, while in Denmark data is only available at the country level (Table 6-2).

In Germany, in the year 1999 more than 50% of all organic dairy cows reared in the country are located in the two southern federal states of Baden-Württemberg (25%) and Bavaria (33%), while no other federal state contributed more than 9% of all dairy cows. Similarly, high densities of organic dairy cows per total UAA are observed in Baden-Württemberg (1.5 cows/ha UAA^{-100}) and Bavaria (0.9 cows/ha UAA^{-100}).

Table 6-2: Regional distribution of organic dairy cows in the case study countries

Country	Region	Organic dairy cows (No.)	Organic dairy cows in each region as % of all organic dairy cows	Organic dairy cow density (cows/100 ha total UAA)
Denmark		**66.570**	**100%**	**2.5**
Germany		**85.250**	**100%**	0.5
	Bayern	28,130	**33%**	**0.9**
	Baden-Württemberg	21,350	**25%**	**1.5**
	Hessen	7,630	**9%**	**1.0**
	Brandenburg	6,160	7%	0.5
	Mecklenburg	5,600	7%	0.4
	Nordrhein	3,680	4%	0.2
	Niedersachsen	3,700	4%	0.1
	Schleswig Holstein	2,140	3%	0.2
	Thüringen	1,920	2%	0.2
	Sachsen	2,120	2%	0.2
	Saarland	540	1%	0.7
	Rheinland	1,030	1%	0.1
	Sachsen	1,150	1%	0.1
	Hamburg	0	0%	0.0
Italy		**87.150**	**100%**	**0.7**
	Emilia	28,790	**33%**	**2.6**
	Puglia	15,170	**17%**	**1.2**
	Lombardia	7,050	**8%**	**0.7**
	Sicilia	6,720	8%	0.5
	Piemonte	4,530	5%	0.4
	Sardegna	4,100	5%	0.4
	Lazio	3,130	4%	0.4
	Calabria	3,030	3%	0.6
	Campania	2,640	3%	0.5
	Veneto	2,750	3%	0.3
	Umbria	2,120	2%	0.6
	Marche	1,700	2%	0.3
	Toscana	1,310	2%	0.2
	Trento	750	1%	0.5
	Molise	540	1%	0.3
	Friuli	560	1%	0.2
	Bolzano	550	1%	0.2
	Basilicata	860	1%	0.2
	Liguria	370	0%	0.6
	Abruzzi	390	0%	0.1
	Valle d'Aosta	0	0%	0.0

Table 6-2: Regional distribution of organic dairy cows in the case study countries (continued)

Country	Region	Organic dairy cows (No.)	Organic dairy cows in each region as % of all organic dairy cows	Organic dairy cow density (cows/100 ha total UAA)
UK		**32.380**	**100%**	0,2
	South	12.140	**37%**	**0,7**
	Wales	3.820	**12%**	**0,3**
	Scotland	3.370	**10%**	0,1
	London	2.800	9%	**0,3**
	North West	2.720	8%	**0,3**
	West Midlands	2.400	7%	**0,3**
	East Midlands	2.180	7%	0,2
	Northern Ireland	1.480	5%	0,1
	Yorkshire and Humberside	890	3%	0,1
	Eastern	300	1%	0,0
	North East	0	0%	0,0

Source: Eurostat (2002)

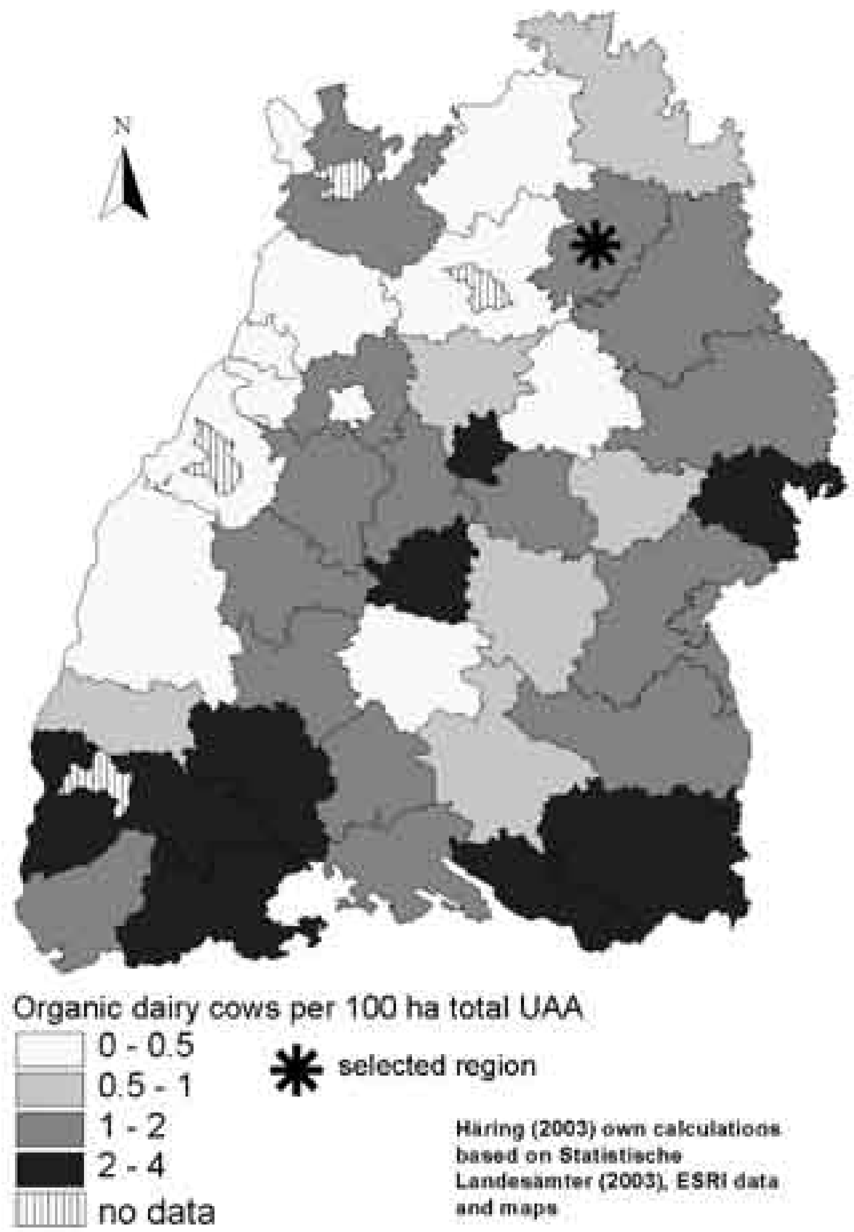
In Italy, the region with the highest number and density of organic dairy cows (33% of all Italian organic dairy cows, 2.9 cows/ha UAA^{-100}) is Emilia Romagna, the region which was chosen as case-study region at the outset of the study.

In the UK in the year 2000, nearly 50% of all organic dairy cows were located in the south-west (37%) and Wales (12%). Similarly, fairly high dairy cow densities were observed in these regions: 0.7 and 0.3 cows/ha UAA^{-100}, for the South West and Wales, respectively. During the research process, Wales was selected as the case study region despite the knowledge that the south-west would have been the more appropriate in terms of organic dairy cow density and farms. However, Wales was chosen for practical reasons (see section 1.1.13).

In summary, these examples of regions typical for organic dairy farming confirm that the chosen expert-based selection of typical case-study regions results in selection of the same case-study regions as those that would be selected on the basis of analysing statistical data.

For the German dairy farm this can even be shown at a lower level of aggregation, because additional data of high quality was available. As an example, the density of organic dairy cows is given at district level for Baden-Württemberg (Figure 6-1). This confirms that the typical farm is located in a region (Hohenlohe district) with a high density of dairy cows although higher organic cow densities are observed in other regions.

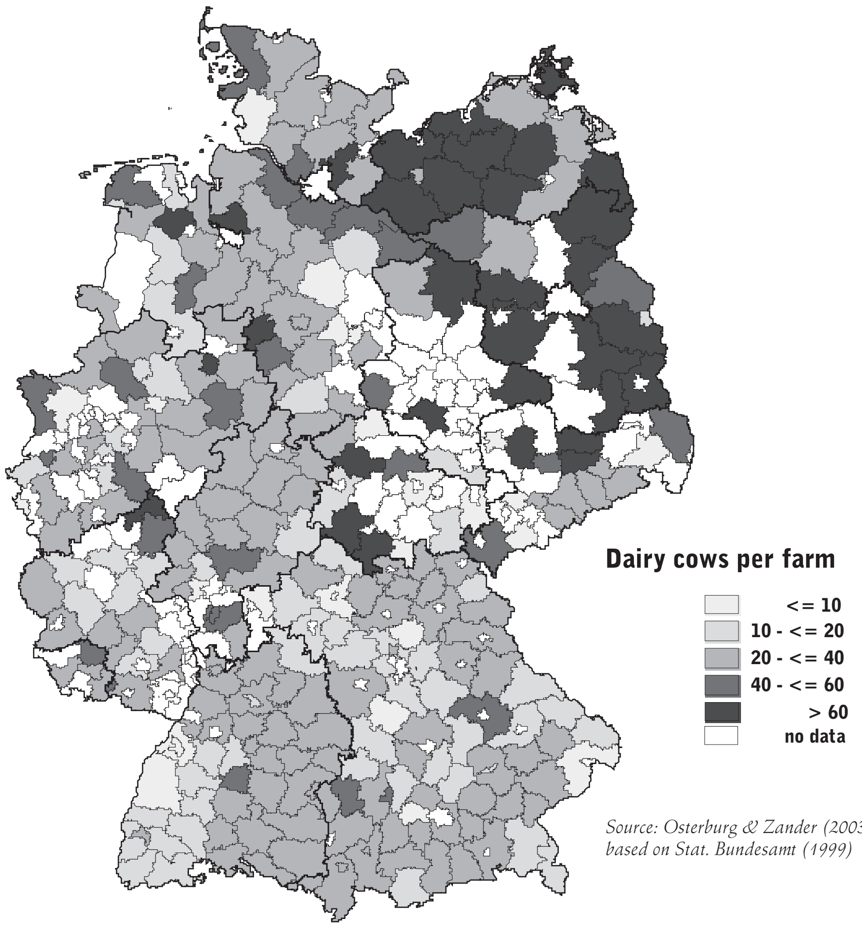
Figure 6-1: Density of organic dairy cows per district in Baden-Württemberg in 1999 (dairy cows per 100 ha)



Typical farm selection & definition of production system

The representativity of the chosen typical farm in terms of farm size and land use was cross-checked via two sources: the data-base containing farm-level data of all Bioland farms (Bioland 2000) and data on organic holdings, land use and livestock at a district level for Germany (Statistische Landesämter 2003). The latter show that the most common average organic dairy herd size in Germany is 20 to 40 cows (Figure 6-2), while the farm-specific data further confirms the correct choice of typical farm (Table 6-3). With the exception of total UAA, this database would have resulted in a „typical farm“ similar to the one selected by focus groups (Table 6-3).

Figure 6-2: Number of cows on organic farms per district in Germany



Source: Osterburg & Zander (2003) based on Stat. Bundesamt (1999)

Table 6-3: Typical farms defined via a database and focus groups in comparison*

	Bioland database 1997	Focus group selection
Dairy cows (no.)	35-40	38
Average FCM (kg)	4,500-5,000	5,062
UAA (ha)	30-35	55
...of which grassland (ha)	25-30	28

* Assumption: Changes in farming structure are only minor in two years. Both selection processes applied the following criteria: i) full-time organic dairy farm, ii) with a minimum of 20 dairy cows, and iii) a minimum average milk yield of 4500 kg/year. These criteria applied to 237 farms.

Source: Own data, based on Bioland (2000)

Although data of sufficient quality for cross-checking at various level of aggregation was only available in one of the eight cases studied, these results nevertheless give a first indication of the validity of the chosen expert-based method for defining farms. The resulting typical farms would have been similar if quantitative data had been available at the time of research.

However, the chosen approach relies on a wide range of experts in the field, and the time required is considerable. Nevertheless, in data-poor sectors, such as the organic farming sector, the approach discussed can be an indispensable tool to facilitate the definition of model farms, applying clear criteria in the selection process.

Additionally, if data on production processes needs to be compiled, either due to a lack of available data or because available data might not fit the „typical farm“, input by focus group becomes indispensable.

Furthermore, farm definition by focus groups facilitates a rapid up-date of typical farms on a regular basis. Statistical data-bases usually lag behind by several years. Focus groups enable farm data to be updated at any point in time.

In conclusion, both the process of selecting case-study regions via diverse experts in the field and by means of defining typical model farms gave the same results that would have been provided by classical, quantitative approaches. Nevertheless, extrapolation of the results should be carefully evaluated.

However, the time required for expert-based approaches is considerable. Thus, for the selection of case-study regions, typical farm size and land use, such approaches are only the preferred method where no data is available. Detailed definition of typical farm data and production processes is more satisfactorily defined via focus groups. This way the time required for the selection of case-study regions, typical farms and data on production processes can be reduced in the future.

6.1.2 Adaptation strategies and policy impacts

Adaptation strategies & policy impact discussion via focus groups

Based on the demand for analysing policy objectives and measures together with those directly affected (Köhne 1998), focus groups were tested as a means to depict the multiple goals of farmers decision making in the analysis of policy impacts on organic farms. A theoretical reasoning for choosing such an approach was discussed in section 2.2.1.

In this research, focus groups showed considerable facility in proposing a range of possible adaptation strategies of farms to current or close policy environments. Strategies developed by focus groups seem to be based on an excellent information pool as the group takes more factors into account than a single individual would be capable of doing. The most important factors in this respect seem to be the participation of particularly interested individuals, group results and the additional input given by an advisor knowledgeable in the field.

Nevertheless, the quality of decisions on the strategic development of farms may be poor due to a lack of overview of all influencing factors and the complexity of such decisions: farm strategies proposed by focus groups were declared to be expected to bring about an improvement in farm profitability in the long term - except a few retirement strategies (see Chapter 4). However, Table 6-4 shows that only some of the envisaged farm adaptation strategies (12 out of 31 modelled strategies) can - according to the modelling results - be expected actually to improve profitability in the long term.

Table 6-4: Strategies and their success by 2008 compared to the base farm

Farms	UK	DE	DK	IT
Dairy	Extensification	Herd reduction	Minor herd expansion	Herd expansion
	Herd expansion	Milk yield increase	Major herd expansion	Cereal seeds
	Rear stores	Herd expansion	Field vegetables	Direct market meat
	Field vegetables	Finish steers	Finish pigs	Herd reduction
Arable	Field vegetables	Cereal seeds	Finish pigs	Medicinal plants/ seeds
	Direct market meat	Field vegetables	Seeds	Fruit
	Breeding sows	Laying hens	Field vegetables	Direct market fruit
	Landlording	Finish pigs	n.a.	Reforestation

Successful strategy: profit per FWU by 2008 a minimum of 5% higher than the base farm by 2008 — Best strategy

There may be two reasons for this. On the one hand, focus groups might not have been able to consider several factors simultaneously, although all assumptions on prices, yields, required investments etc. for farm strategy simulations were known and discussed by focus group sessions. Simulation modelling may take more factors into account and thus produce other results. On the other hand, the contrasting results of modelling and focus-group expectations could be due to „intrinsic“ factors that were not taken into account in modelling procedures but might counteract profit maximisation, either because they are not declared by focus groups or because they cannot be depicted in modelling procedures.

The first reason is especially relevant for discussion of farm adaptation strategies to potential future policy scenarios (see Chapter 5). Increasing distance in the future increases uncertainty and the ability to judge the impact of policies and envisage farm strategies. Furthermore, the ability to abstract is limited by current policy discussions. For example, at the time of focus-group meetings, there was a great deal of discussion of the EU policy package „Agenda 2000“ in the media and among farmers. It soon became obvious that farmers' underlying assumptions for proposed farm strategies were dominated by these discussions. Abstracting to the level of potential future policy scenarios therefore seemed difficult, although simple and precise scenario descriptions were presented to and discussed with the focus groups. Therefore, only very general qualitative assessment of likely farm adaptations to policy scenarios resulted from these policy discussions, and detailed farm development strategies could not be provided.

Although the quality of proposed farm adaptation strategies could not be evaluated conclusively, potential drawbacks may be compensated for by the time sensitivity of the results.

Focus groups may help to depict reactions to dynamic policy developments in a timely manner. A comprehensive evaluation must consider the combined approach with simulation modelling and compare it with other commonly used methods of forecasting farm developments. This was not possible in the framework of this research due to time constraints.

It may be concluded that groups are based on an excellent information pool but they nevertheless lack the capacity to overview all relevant factors that might be depicted by simulation models. In the future, the validity of prognoses relating to farm adaptations may be evaluated by comparing actually observed developments with forecasts.

Simulation modelling

The simulation model TIPI-CAL© is an easily understandable simulation model with a basic structure potentially applicable to many farm types. Thus, compared to optimising farm planning models, TIPI-CAL© has the advantage that it already exists and farms only have to be adapted to the model, while optimising farm planning models tend to be redesigned for each research problem and are often used only once. The use of TIPI-CAL© rather than another modelling approach was therefore expected to reduce the time required to obtain results.

At the time of the present study, available programmed elements were designed to consider dairy and arable farming activities. This limits the feasibility of using the model for organic farms because most organic farms are not limited to dairy or arable activities. Mixed farms, the most representative organic farm type, therefore had to be omitted from the research from the outset. Additional farm activities in animal production could only be introduced via the gross margin for each year. Input and output price developments and annual subsidies for these activities had to be inserted manually and could not be simulated, as were prices for other activities.

Despite its current limitations in terms of use on organic farms, TIPI-CAL© is nevertheless a valuable tool for simultaneous simulation of interacting factors influencing the farming sector (e.g. yield or price developments), which experts are not always able to depict in their full range. However, this simulation model only serves to simulate and illustrate the impact of changes in farm management and „direct“ policy impacts. It does not depict optimisation of the farm organisation and, therefore, has only limited value as a planning and forecasting tool.

6.1.3 Summary

The methodological approach adopted for this research is characterised by a mix of methodological elements (typical farms, based on focus groups, and the simulation model TIPI-CAL©). This methodological mix seems to be useful in addressing the research objectives under the constraints previously outlined at the beginning of the study.

The selection of typical farms proved to be appropriate: the representativity of the selected farms was confirmed by statistical data at a later stage, thus confirming the validity of the selection process.

The interaction of the model TIPI-CAL© and focus groups seemed appropriate to „replace“ optimising farm planning models:

- Factors which are not influenced by farmers and which are complex in their interaction for assessment by humans (e.g. simultaneous policy changes, price and yield developments) are depicted well by the simulation model TIPI-CAL©.
- Farm development and adaptation strategies to policy changes are depicted via expert assessments. This way the multiple factors of farmers' economic decision making is taken into account and a more complete assessment of policies can be given. Furthermore, the integration of focus groups in modelling procedures also provides an excellent tool for validation and evaluation of the data used and the results produced.

However, although less time is required for construction of an optimisation model, focus groups are very time-intensive – not only for the researcher, but especially for the focus groups. Compared to other approaches, the combination of the simulation model TIPI-CAL© with focus groups nevertheless represents a valuable option for compiling policy impact analysis quickly. Unfortunately, an objective cost-benefit assessment cannot be carried out due to a lack of comparative data.

6.2 IFCN a sustainable approach? Some organisational issues

This research was embedded in the International Farm Comparison Network (IFCN), an international network of agricultural scientists, advisors and farmers. The main objective of IFCN is to create and maintain a sustainable infrastructure for international comparisons of farm economic analyses.

This is an ambitious objective and shall be discussed on the basis of experiences made in the present research. A general theoretical evaluation of IFCN is given by Hemme (2000). The following discussion refers only to organisational aspects of IFCN rather than the specific organic farming perspective, as the main pitfalls were encountered in organisational aspects of IFCN.

A network like IFCN will only be sustainable if the benefits from participation trade-off the effort required to use this approach instead of another. In theory, the benefits for scientific partners lie in:

- the use of a standard methodology to facilitate international comparisons, and
- access to the results of other studies for comparison with and complementation of own research.

For advisors and farmers the benefits are:

- learning effect by discussing farm management issues with other farmers,
- access to farm level data from other regions or countries and assess own competitiveness,
- participation in policy analyses instead of only react to policy changes.

However, the use of a standard methodology does not necessarily guarantee the uniform quality of results and thus a high quality of international comparisons. Consequently, access to results of other studies within IFCN is only valuable if a high quality is guaranteed.

A correct application of the IFCN methodology and high quality of results can only be achieved by well trained scientists conducting the analyses. However, experience has shown that even profound training will not always ensure correct application and the comparability of data from different sources may be questionable, especially for international comparisons. In theory, this problem could be overcome by creating a small group of well trained scientists (from the central organisation of IFCN) participating in all research processes as a controlling element, i.e. one responsible scientist for each country or one responsible scientist for each topic or farm type. However, with increasing members of IFCN a large organisational structure would be required to maintain the desired standards. In summary, thorough training of all scientists, on-going exchange and co-operation is the only viable option to reach a common understanding of the correct application of the methodology which, however, would require significant funds.

The question of benefits for the participating advisors and farmers is more difficult to answer. Experiences of the present project show that motivation to participate in focus group meetings declines with the number of meetings, as not every meeting will bring novel information to participants although in some cases in the present research numbers increased. However, only a sustained participation of farmers and advisors will ensure the long-term feasibility of IFCN.

Firstly, the input required by each participant could be reduced, e.g. by limiting the number of focus group meetings by involving farmers only in strategy discussions based on typical farms defined by an advisor or if available statistical data, instead of defining farms from scratch in focus group meetings. Furthermore, discussions of potential policy scenarios should be avoided in focus group meetings as results have shown that the quality of assessment is not very high. Only results are presented to farmers and their reasoning for adaptation strategies is taken as an additional input to policy impact discussion.

Secondly, ways of compensating farmers and advisors other than the benefits listed above must be found. One option could be to reimburse time required for participation of farmers and advisors in focus group meetings and preparatory work. Another option would be to more strongly emphasise the advisory character of the focus groups to farmers. An alternative mechanism to compensate farmers and advisors is based on the observation that farmers seek a forum in which to actively contribute to public policy discussions instead of merely reacting to agricultural policies.

Therefore, the motivation of farmers and advisors may be increased by creating a policy advisory group with a certain „public presence“, and thus an impact on policy discussion and media. However, funds must be provided to create and maintain a publicly present forum. This would also facilitate further measures of sustainable attraction to farmers and advisors. For example, a short and concise IFCN newsletter reporting on activities and results to all participants on a regular basis, i.e. two to four editions per year. At the same time impact could be improved by reporting results regularly in relevant media, such national newspapers or farmers journals.

6.3 The future development of organic farms: policy implications

The rapid development of organic farming in the last decade is partly due to increased consideration of organic farming in policy measures. This is especially due to the fact that European agricultural policy has focused increasingly on food quality issues and on minimising the negative environmental impacts of agricultural production. Based on the assumption that policy support for organic farming is justified because it addresses a range of policy objectives (Dabbert et al. 2002), policies targeting organic farming must nevertheless be carefully designed and constantly evaluated in terms of the cost-benefit ratio of addressing policy objectives.

Regionally differentiated and farm type-specific support strategies may help to target specific regions and farm types in terms of their contribution to policy objectives. In this respect the observation that organic farms tend to convert more easily in disadvantaged rural areas where extensive farming predominates (Dabbert and Braun 1993; Osterburg et al. 1997; Hartnagel 1998; Schneeberger et al. 1997), while in regions where intensive production systems predominate, conversion is more costly for farms. A uniform support strategy for organic farms will thus most likely address mainly farms in disadvantaged areas, while farm type-specific support strategies may be able to address intensive production systems specifically (Nieberg & Strohm-Lömpcke 2001).

This could lead to the conclusion that more carefully designed farm type-specific or regionally differentiated support strategies are required to address policy objectives. At the same time, it highlights the difficulties in designing appropriate policy measures for promoting organic farming on an EU-wide basis as regards transaction costs. This study aimed to contribute to this discussion by evaluating the impact of European agricultural policy environments on organic farms.

Analysis of typical organic farms showed that the size, production structure and management of typical organic farms differ widely among the four case-study countries, the United Kingdom, Germany, Denmark and Italy. These marked differences in production systems and profitability indicate the potential for improving the organic production system in several aspects.

Furthermore, increasing market integration of organic product markets in Europe (Michelsen et al. 1999; Köhne 2000; Hamm et al. 2002) is expected to increase competition among countries. Regional price differences are expected to decline (Offermann 2003) and national and regional differences in production costs will become more important in the future. This is expected to lead to greater specialisation of farms and regionally more differentiated organic production. Hence, optimising production and reducing production costs without jeopardising organic process quality will remain an important task in the future.

Observed national and regional differences in financial support for organic farms may add to the regional differentiation. However, as regards environmental benefits, which are the most important justification for supporting organic farms, (Stolze et al. 2000; Häring et al. 2001), greater regionalisation of production might be counterproductive.

Careful design of policy measures to support organic farming must take the specific market situation of the organic farming sector into account. The current practice of supporting organic farms principally via area payments for conversion and continuing organic farming is expected to increase the number of farms converting and the deterioration of producer prices. In view of the potential re-conversion of farms, support measures to help organic farms improve their production efficiency or enhance their marketing potential could contribute to consolidating the organic farming sector.

This is highlighted by the farms' range of adaptation strategies to changing policy environments. In order to adapt to Agenda 2000 and other policy frameworks, organic farms are expected to go through significant adjustment processes to further increase the profitability of their farming activities. According to focus groups, farm adaptation strategies are primarily related to farm type and farmer-specific restrictions on production and marketing. The most important trends in this respect are:

- increased specialisation and efficiency of production, or
- on-farm diversification.

These trends could be taken into account in the design of policy measures. Measures to improve the efficiency of existing organic farms might assist in reducing costs and increasing competitiveness. Measures supporting diversification might help farms to survive in their specific niche, while the organic market as a whole would benefit from the supply of a wide range of products. Increased quantity and diversity of supply might foster efficiency in processing and marketing as well as consumer satisfaction, and thus positively affect demand.

To specifically encourage diversification, alternatives to the currently predominant area payments might include:

- Support for investment in infrastructure to encourage the uptake or conversion of intensive livestock production systems such as pig or poultry rearing.
- Support for training and advisory schemes providing specific information on new organic production options and efficiency improvements might not only encourage diversification but could also help farmers improve their managerial capacities to optimise production and cope with the constantly changing policy and market environments in the future.
- Finally, old and new markets could be developed further by providing up-to-date information on developments in the organic market or training in marketing strategies.

A wide variety of support measures for organic exists in the individual countries in the EU. Generally, these measures were developed independently of each other in the individual countries and have not been harmonised well. In this respect the current effort of developing a European Action Plan for organic farming, with the objective to integrate the diverse national measures at all policy relevant levels of the organic farming sector, seems to be a promising development.

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