

RISK AND RISK MANAGEMENT IN ORGANIC AND CONVENTIONAL DAIRY FARMING: EMPIRICAL RESULTS FROM NORWAY

Gudbrand Lien, Ola Flaten, Martha Ebbesvik, Matthias Koesling & Paul Steinar Valle

Abstract

The objective of this study was to provide empirical insight into dairy farmers' goals, relative risk attitude, sources of risk and risk management responses. The study also examines whether organic dairy farming, leads to important risk sources not experienced in conventional farming and, if so, how those extra risks is managed. The data originate from a questionnaire survey of conventional (n=370) and organic (n = 160) dairy farmers in Norway. The results show that organic farmers have somewhat different goals than conventional farmers, and that the average organic farmer is less risk averse. Institutional risk was perceived as the most important source of risk, independently of conventional or organic production system, while organic farmers indicated greater concern about forage yield risk. Keeping cash on hand was the most important strategy to manage risk for all dairy farmers. Diversification and different kinds of flexibility was regarded as a more important risk management strategies among organic than conventional farmers.

Introduction

Farmers' perceptions of and responses to risk are important in understanding their risk behaviour. In the literature much normative analysis (with mathematical programming etc.) has been done to show how farmers should behave under uncertainty (e.g. Hardaker et al., 1997). But surprisingly little work is done to examine how farmers perceive risk and risk management in practice.

There is a general believe, apparently not supported by empirical evidence, that organic farming is more risky than conventional farming, partly because it is vulnerable to additional and different sources of risk. Restrictions on pesticide use, fertilisers, synthetic medicines, purchase of feeds etc. are presumed to influence exposure to production risk. Smaller organic markets may mean greater price fluctuations. On the other hand, specific government payments in organic farming result in greater income stability. At the same time, and for both production types, uncertainty of future government payments (institutional risk) may be of concern to farmers. The perception of higher risk may be a potential barrier for switching to organic farming (Lampkin, 1994).

Surveys have been conducted asking about the types of risk perceived as most important by conventional farmers and about the management strategies the farmers use. Harwood et al. (1999) has summarised US studies. US farmers, included dairy farmers, are most concerned about commodity price risk, production risk, and changes in government

laws and regulations. Arizona dairy producers perceived the costs of operating inputs to be the greatest source of risk (Wilson et al., 1988). A 1996 USDA survey found that keeping cash on hand was the number one risk management strategy for every size farm, for every commodity speciality, and in every region studied. Use of derivative and insurance markets was also considered important. Huirne et al. (2000) and Meuwissen et al. (2001) found that Dutch livestock farmers considered price and production risks to be most important. Producing at lowest possible costs and insurance were the most important risk management strategies for these farmers.

In Norway, no comparable studies have been conducted among conventional or organic farmers. No such studies have been found in other countries either.

This relative lack of information about farmers' risky environment and their reactions to it means that there are few useful practical insights for policy makers and farm advisers. The objective of this paper is thus to provide empirical insight into: 1) Norwegian dairy farmers goals', risk perceptions and risk management responses; and 2) differences in risk perceptions and risk management responses between conventional and organic dairy farmers.

Materials and methods

Data originate from samples of Norwegian dairy farmers and has been gathered by a questionnaire survey. The questionnaire consisted of questions related to: 1) Farmers' perceptions of risk (including questions on sources of risk and risk attitude); 2) farmers' perceptions of various risk management strategies; 3) farmers' goals, futures plans and motivations for their farming system (organic or conventional); 4) animal disease management strategies; and 5) socio-economic characteristics of the farmers. Most questions were closed questions, many in the form of Likert-scales.

The Norwegian Agricultural Authority has a register of farmers who receive support payments (i.e. all farmers), including each farmer's stocking and cropping details. This data set was merged with the questionnaire survey.

The questionnaire was first sent out in January 2003 to 616 randomly selected conventional dairy farmers and all 245 registered organic dairy farmers. Conventional farmers were selected from the register of farmers who received support payments based on their 2001 application. Six conventional and one organic farmer informed us that they had quit farming. 370 conventional and 160 organic farmers have so far returned the questionnaire. The effective response rates for conventional and organic farmers are 60.7% and 65.3%, respectively. In Table 1 average data from respondent farms in the survey is compared with average Norwegian farms.

Table 1 Comparison of dairy farms in survey with average dairy farms in Norway

Characteristics	Conventional	Organic
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	Average farm in survey (n=370)	Average farm in Norway	Average farm in survey (n=160)	Average farm in Norway
Number of dairy cows	15.9	14.7	16.4	15.9
Farmland (ha)	24.7	22.1	29.4	28.1
Labour units (man-year)	2.1	-	2.1	-
Education ¹ (%)	17 / 70 / 10 /	-	6 / 56 / 21 /	-
Agricult. education (%)	3	-	17	-
	59		77	

¹ Primary school / high school / BSc / MSc

Farms for both groups in the analysis are slightly larger on average than the averages in Norway. Organic dairy farmers have more farmland and use most farmland producing forage. But because of lower yields they have on average only a few more cows than a conventional average farm. Labour input is equal between average conventional and organic farms. Organic farmers have generally had more years of schooling than conventional farmers and more of them have some agricultural education. Most of the farms surveyed are family farms: 94% of conventional and 93% of organic farms. Joint operations occur on 6% (4%) of conventional (organic) dairy farms.

In this paper only simple descriptive statistical analyses are used to study the research questions.

Results

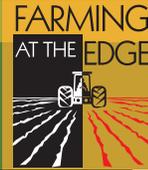
Dairy farmers' goals

The questionnaire contained a list of 14 often-expressed goals among farmers. Farmers were asked to select from the list the five most important goals. Table 2 shows per cent of responses recorded for each goal.

Table 2 Dairy farmers' goals. Percentage of responses ranking each goal among the top five goals (Rank in parentheses)

Farmers' goal	Conventional	Organic
Certain and stable income	76.8 (1)	59.4 (3)
Produce high quality food	76.5 (2)	77.5 (2)
Independence	51.4 (3)	45.0 (5)
Time for family living, concerns for children	49.7 (4)	55.0 (4)
Improve the farm for next generation	45.1 (5)	35.6 (7)
Have possibility to some leisure	36.5 (7)	23.8 (8)

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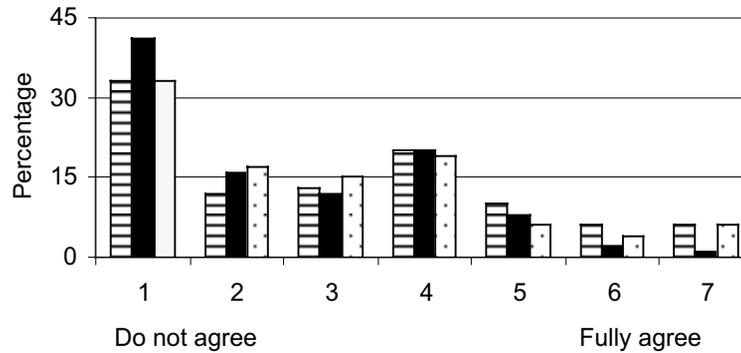
Sustainable and environment-friendly farming	36.5 (6)	80.0 (1)
Reduce debt, become free of debt	32.2 (8)	23.1 (10)
Continue to be a farmer	25.4 (9)	23.8 (9)
Maximise profit	24.6 (10)	13.8 (11)
Work with animals/crops	23.2 (11)	36.9 (6)
Social contacts	5.7 (12)	10.6 (12)
Increase equity	4.6 (13)	5.6 (13)
Higher private consumption	3.5 (14)	3.1 (14)

Most organic farmers rank sustainable and environmentally friendly farming among their top five goals. Conventional farmers' ranking for this goal is much lower. Instead, they give highest priority to income stability on average. Producing high quality food is ranked second on average by both groups. Independence and time for family living are other relatively highly ranked goals. As often found in studies of farmer' goals, profit maximisation is ranked rather low – and lowest among organic farmers. These results, support earlier studies (e.g. Gasson et al., 1988) reporting that farmers has several goals – not only one.

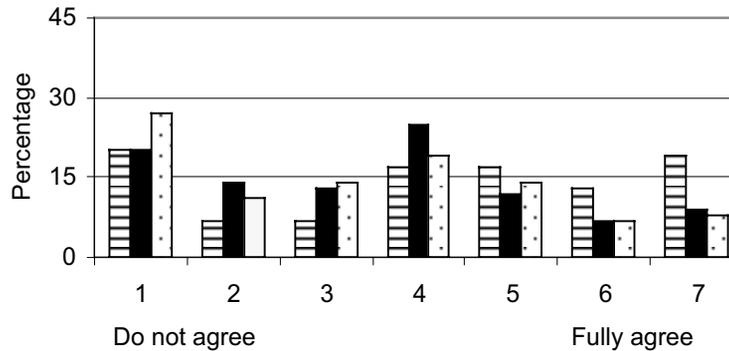
Perceptions of relative risk attitude

Farmers were asked to assess their willingness to take risk, relative to other, on Likert-type scales ranging from 1 (do not agree) to 7 (fully agree). Since statements measure attitude toward risks relative to other we use the term relative risk attitude (Patrick & Musser, 1997; Meuwissen et al., 2001). Figure 1 shows the percentage distribution of the respondents' answers, for conventional and organic dairy farmers, respectively, in relationship to following statements "I am willing to take more risk than other with respect to: 1) production; 2) marketing; and 3) finance and investment", respectively.

Conventional



Organic



... production
 ... marketing
 ... finance and investment

Figure 1 Percentage distribution of the conventional and organic dairy farmers answers to the statements "I am willing to take more risk than other with respect to: 1)

production; 2) marketing; and 3) finance and investment”, respectively. Farmers assessed their willingness to take risk on a scale ranging from 1 (do not agree) to 7 (fully agree)

Most conventional dairy farmers perceive the extent to which they take risks as less than that of others. By contrast, the figure shows that the responses of the organic dairy farmers are more symmetric distributed over the scale of relative risk attitudes, especially with respect to production risks. These results may indicate that the average organic farmer is less risk averse than his/her conventional colleagues. Organic farmers have been few in numbers and the body of experience with this form of production is somewhat restricted. Some willingness to take risk may therefore be expected among those adopting organic farming practices. Gardebroek (2002) also found, from historical data, that organic farmers are less risk averse than their non-organic colleagues.

Perceptions of sources of risk

A total of 33 sources of risk were presented to respondents in the survey. Farmers were asked to score each source of risk on a Likert-scale from 1 (no impact) to 7 (high impact) to express how significant they considered each source to be of risk in terms of its potential impact on the performance of their farm. Farmers were then asked to select and rank the three most important sources of risk (i.e. the three sources of risk they feared most). Table 3 shows average scores for important sources of risk and their frequency in farmers’ top three sources of risk.

Table 3 Dairy farmers’ perceptions of important sources of risk (Rank in parentheses)

Source of risk	Conventional		Organic	
	Average score	% in top three	Average score	% in top three
Government support payments ¹	5.92 (1)	40.5 (1)	5.56 (1)	37.5 (1)
Tax policy	5.88 (2)	15.9 (6)	4.95 (6)	9.4 (11)
Milk price	5.79 (3)	20.8 (4)	5.27 (2)	20.6 (4)
Meat prices	5.55 (4)	7.6 (10)	4.70 (10)	4.4 (14)
Milk quota policy	5.51 (5)	15.1 (7)	4.80 (9)	8.8 (12)
Animal welfare policy	5.40 (6)	34.1 (2)	4.18 (13)	19.4 (5)
Injury, illness or death of operator(s)	5.21 (7)	14.3 (8)	5.03 (5)	23.8 (2)
Input costs (capital items excluded)	5.19 (8)	5.9 (11)	3.99 (15)	1.9 (15)
Consumer preferences	5.17 (9)	17.8 (5)	5.12 (4)	11.9 (7)
Non-domestic (“exotic”) epidemic animal diseases	5.12 (10)	26.2 (3)	4.47 (12)	21.3 (3)
Domestic epidemic animal diseases	4.97 (11)	14.1 (9)	4.10 (14)	8.8 (12)
Forage yields	4.88 (12)	5.1 (12)	4.81 (8)	10.0 (9)

Additional government payments to organic farming	-	-	5.25 (3)	15.0 (6)
Price premium organic products	-	-	4.93 (7)	10.0 (9)
Organic farming regulations	-	-	4.60 (11)	11.9 (7)

¹ Specific organic farming payments excluded

Uncertainty about the continuation of general government support payments to farmers stands out as the top-rated source of risk for all dairy farms. Not surprisingly, organic farmers also gave high priority to uncertainty of specific government support payments for organic farming. For the past several years the prices of farm products in Norway have mainly been decided through annual negotiations between the two farmers' unions and the Government. As a result, prices for almost every enterprise except vegetables and fruit have been almost guaranteed. The high average rankings the farmers gave to uncertainty about milk and meat prices is therefore presumably related to farmers' fears of farm policy deregulation. Some other institutional risks are also highly ranked (tax policy, animal welfare policy, milk quota policy, and organic farming regulations). Anxiety about possible changes to animal welfare policy is less pronounced among organic farmers, presumably because of already strict organic farming directives. This source of risk ranks substantially higher in top three than as an average score indicating large variations (and may be some inconsistency) in farmers' perceptions of this source of risk.

Dairy farmers ranked operator's health, epidemic animal diseases and consumer preferences as other important sources of risk. Organic farmers assigned somewhat less importance to epidemic animal diseases than conventional producers.

Organic farmers indicated greater concern with forage yields as a source of risk. Conventional farmers found costs of operating inputs more important. The finding that organic farmers rank forage yields risk higher than do conventional farmers is probably a results of different management approaches of the two farming systems. The same consideration may apply to input costs, since organic farmers generally follow a more extensive input production system with lower input costs. These results support the proposition that the organic production systems have somewhat different sources of risk than those faced by conventional farmers.

Factors that scored low (and consequently were not listed in Table 3) include land rent and availability, family relations, milk yield, credit availability, non-epidemic animal diseases and uncertainty concerning hired labour.

A common classification of risk is into production, price, institutional, personal and financial risk (Hardaker et al., 1997). Within this broad classification, institutional risks dominate in the results from this survey (government support payments, taxes, animal welfare regulations, milk quota policy etc.), while production and price risk was perceived as the next most important sources of risk. The finding that institutional risk is perceived as the most important source of risk among dairy

farmers in Norway may be largely explained by the fact that the Norwegian government has assigned large subsidies to and introduced much regulation of the agriculture. Hence, the subsidy levels and regulatory schemes crucially affect farm profits. As our survey shows, organic farmers are more concerned about institutional risk than conventional farmers. This is not surprisingly since organic farmers receive specific government payments. Moreover, both national and international policies affecting agriculture change frequently and unpredictability. Since agricultural production is typically a risky business, governments around the world have mostly intervened to varying degrees to try to help farmers cope more effectively with risk. In this context it is a paradox that farmers perceive institutional risk as the most important source of risk. What can farmers do at farm level to cope with this type of risk?

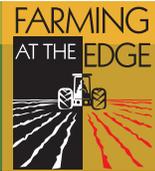
Risk management strategies among dairy farmers

Some 25 risk management strategies were presented for the farmers. Farmers indicated the importance of each strategy for them on a Likert-scale from 1 (not relevant) to 7 (very relevant). Next, they were asked to identify and rank the three most important strategies they planned to use in the future. Results are summarised in Table 4.

Table 4 Dairy farmers' perceptions of important risk management strategies (Rank in parentheses)

Risk management strategy	Conventional		Organic	
	Average score	% in top three	Average score	% in top three
Liquidity – keep cash in hand	6.49 (1)	41.1 (1)	6.18 (1)	31.3 (2)
Prevent and reduce livestock diseases	6.35 (2)	25.9 (3)	6.17 (2)	25.0 (3)
Buying business insurance	6.14 (3)	14.1 (8)	5.78 (3)	14.4 (7)
Buying personal insurance	5.93 (4)	8.6 (11)	5.50 (6)	5.6 (13)
Producing at lowest possible costs	5.93 (4)	31.9 (2)	5.59 (5)	34.4 (1)
Risk-reducing technologies	5.69 (6)	4.9 (14)	5.70 (4)	10.0 (11)
Solvency – debt management	5.64 (7)	23.0 (4)	5.16 (9)	18.1 (4)
Prevent and reduce crop diseases and pests	5.53 (8)	4.9 (14)	5.41 (7)	5.6 (13)
Use of agronomic and nutrition consultants	5.44 (9)	5.9 (13)	5.03 (10)	5.6 (13)
Small, gradual changes	5.39 (10)	15.7 (5)	5.23 (8)	11.9 (10)
Cooperative marketing	5.36 (11)	14.3 (7)	4.80 (11)	12.5 (9)
Shared ownership of equipment, joint operations	4.82 (12)	14.9 (6)	4.66 (13)	15.6 (5)
Cost flexibility	4.60 (13)	12.4 (9)	4.70 (12)	7.5 (12)

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Enterprise diversification	4.27 (14)	7.6 (12)	4.43 (14)	14.4 (7)
Off-farm work	4.04 (15)	12.2 (10)	4.01 (15)	15.6 (5)

The results show that there are many risk management strategies that farmers see as important and useful. The degree of importance assigned to various strategies differs considerably among farmers.

Generally, the most preferred strategies to manage risk seem to be strategies to cope with the institutional risk. Good liquidity was selected in the top three by 41% of the conventional farmers, and by a somewhat smaller proportion of organic farmers. Solvency was also ranked high. Producing at lowest possible cost was considered as the most important strategy to manage the risk by organic farmers. This risk-reducing strategy may also be a reaction to the unpredictable agricultural policy.

A strategy to prevent and/or reduce livestock diseases was ranked as one of the most important risk management strategies. This strategy also reduces the exposure to risk through monitoring and control, and is an important management strategy to deal with downside risk.

Purchasing some kind of business and personal insurance was ranked relatively highly. Insurance, together with cooperative marketing are somewhat different in nature from the other listed strategies in Table 4. They belong to a risk management category often named risk sharing strategies, while the others are on-farm strategies (Hardaker et al., 1997).

Asset flexibility, product flexibility and market flexibility, enterprise diversification and use of risk-reducing technologies are regarded as more important risk strategies by organic than by conventional dairy farmers. Collecting information has a low score, particularly among conventional farmers. This finding should be seen in the light of massive system for data recording (especially production and health information) that has long existed for Norwegian dairy herds, together with also new data collection systems (quality assurance systems) coming up. The ranking could therefore be more a negative response to the need to collect still more information than to the importance of collecting as at present.

Farmers generally did not see corporate farm organisation, off-farm investments, having idle production/machinery capacity, and the use of price contracts as important strategies (i.e., very few had selected these strategies in the top three). That use of price contracts has been assigned a low score may be because of the extensive use of cooperative marketing among Norwegian farmers. The current system of annual guarantees of product prices for almost every enterprise is no doubt also a factor that reduce the perceived need for price contracts.

Conclusions

To get empirical insight into dairy farmers' perceptions of risk exposure and risk management strategies, and differences between organic and conventional farmers, a questionnaire survey was undertaken. Because of the sampling strategy

used and the high response rate, the results are believed to be representative for conventional and organic dairy farmers, in Norway.

The results confirm previous findings that farmers have several goals. Organic dairy farmers rank sustainability and environmental farming highest, while conventional rank stable income as the most important goal. Our results may indicate that organic dairy farmers are less risk averse than their non-organic colleagues.

The most important source of risk, regardless of production system, is institutional risk and especially the risk of changes to government support payments. Organic dairy farmers are more concerned about forage yields risk, probably because yields may be less secure under this farming system.

The survey shows that there are many risk management strategies that dairy farmers see as important and useful. Generally, the strategies to manage risk that were ranked as most important were on-farm strategies to cope with the institutional risk. But risk-sharing strategies, such as purchasing business and personal insurance were also ranked highly. Flexibility and diversification were regarded as more important risk strategies among organic than by conventional dairy farmers.

Clear differences were revealed by the survey in how organic and conventional farmers perceive sources of risk and how they manage risk. Therefore policy makers, advisers and researchers should take these differences into account.

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Biographical sketch

Dr. Gudbrand Lien (36) is senior researcher within farm management and risk analysis at Norwegian Agricultural Economics Research Institute (www.nilf.no). E-mail: gudbrand.lien@nilf.no

Dr. Ola Flaten (36) is senior researcher within farm management, agricultural policy and risk analysis at Norwegian Agricultural Economics Research Institute (www.nilf.no). He has a special interest in livestock production economics. E-mail: ola.flaten@nilf.no

Martha Ebbesvik (42) is senior adviser within ecological agriculture and economy at Norwegian Centre for Ecological Agriculture (www.norsok.no). E-mail: Martha.Ebbesvik@norsok.no

Matthias Koesling (40) is researcher within organic farming systems at Norwegian Centre for Ecological Agriculture (www.norsok.no). E-mail: matthias.koesling@norsok.no

Dr. Paul Steinar Valle (41) is Chair of Institute of Livestock Medicine, The Norwegian School of Veterinary Science (www.veths.no). In his research he has special interest in veterinary epidemiology, animal health economics, systems for disease control and animal welfare. E-mail: Paul.S.Valle@veths.no