Assessing the sustainability of EU dairy farms with different management systems and husbandry practices

KATHARINE LEACH[1], CATHERINE GERRARD[1], ANNE BRAAD KUDAHL[2], ARJA NYKÄNEN[3], METTE VAARST[2], ROSWITHA WEISSENSTEINER[4], & SUSANNE PADEL[1]

[1]Organic Research Centre, Elm Farm, Hamstead Marshall, Newbury, Berks, UK.
www.organicresearchcentre.com, katharine.l[a]organicresearchcentre.com,
[2] Aarhus University, Denmark;
[3] MTT Agrifood Research Finland, Jokioinen, Finland;
[4] BOKU, Vienna, Austria

Abstract

The EU funded SOLID project supports research which will contribute to the competitiveness of organic and low input dairy systems, and increase their sustainability. There are many aspects of the sustainability of dairy farms, relating to economic, environmental and social dimensions, and methods of animal husbandry can affect all of these. A UK spreadsheet based tool for rapid assessment of the whole farm was adapted for application on a range of organic and low input dairy farms across the EU. This tool was used to assess approximately ten organic dairy farms in each of four EU countries. Data on farm management practices collected in face to face interviews with farmers were entered and the tool then calculated a composite score for each of 11 separate "spurs" or dimensions contributing to sustainability. The results can be used to stimulate discussion between farmers and point to areas where farm sustainability might be improved or topics that would benefit from further research.

Key words: Dairy farms, cows, sustainability; participatory research

Introduction

The EU funded SOLID project supports research which will contribute to the competitiveness of organic and low input dairy systems, and increase their sustainability. The project involves a large participatory component, in which research partners work closely with SME (Small or Medium Enterprise) partners to identify potential topics for on farm projects to achieve this goal. To support this process a rapid assessment of farm sustainability was carried out on a small number of farms, mostly members of the SME partner in the participating country. The results were used to stimulate discussion with the participating farmers, and later with others, on the research needs of organic and low input dairy farms. This paper focuses on the results from the four countries where all the farms assessed were organic farms producing milk from dairy cows. Of interest were the experiences of carrying out the rapid assessment in different countries and similarities and differences found within and between countries.

Material and methodology

During a project evaluating "public goods" in the UK (Gerrard et al. 2011) a spreadsheet based tool was created in Microsoft Excel, which records quantitative farm data and farmers' answers to questions and generates scores for different components of sustainability. The tool covers eleven aspects of sustainability (see Figure 1) and relies only on data that are likely to be available on farm, taking not more than 4 hours to complete. The original tool was adapted to be more specific to dairy farms and applicable in other EU countries. Further alterations included provision for goat farms and commonly grazed land and additions to the sections on biodiversity and animal welfare. To collect

data for the SOLID project, in each country a research organization worked in collaboration with a SME, either a farmer co-operative or a dairy company buying and selling organic milk.

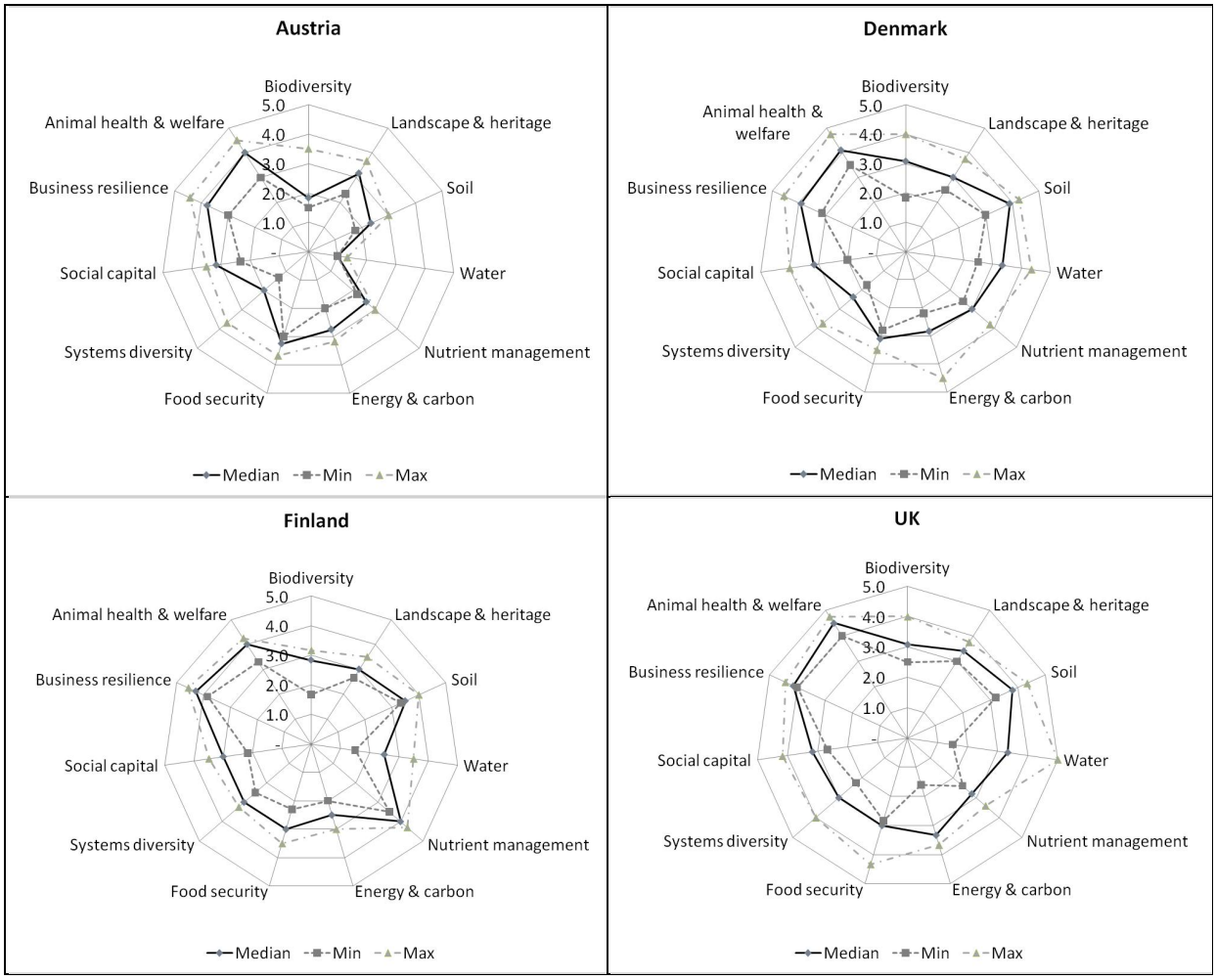

Figure 1. Median, minimum and maximum scores for sustainability for dairy farms in four EU countries (higher score suggests more sustainability)

The objective was not to carry out representative statistical analysis, but to provide a description of a selected group of farms. Austrian farms were all members of a small cheese-making co-operative located in the mountains. UK farms were largely members of OMSCo, the largest organic milk supply co-operative in the country. Finnish farms comprised all seven members of Juvan Luomu Ltd, the only totally organic dairy in Finland. Danish farms were members of the Thise Dairy Company, a pioneer of organic milk production in the country. Seven to twelve farms were selected that reflected the range of farm types working with each SME, and were considered potential farms for becoming involved in participatory research. Farms needed to have good records, and a willingness to engage. It should be noted that this does not constitute a representative sample of all organic dairy farms in the country, or even in the SME.

A researcher, sometimes accompanied by a representative of the dairy company, visited each farm and conducted an interview and data collection exercise which took approximately three hours. Data were immediately entered into the tool, which automatically generated the scores for each aspect or "spur" of the assessment. The diagrams produced (as in Figure 1) were used to discuss the concept of sustainability with the farmer.

The overall scores for the different spurs were summarized within countries using descriptive statistics of median and range, since the scores are ordered categorical data (Figure 1). Some performance data describing the group of farms in each country are also presented, to illustrate the similarities and differences of the farms studied. Since data generally had high variance, the median and range were also used to describe these parameters.

Results

Structural and performance characteristics of the farms studied are summarized in Table 1. These illustrate the wide variation in the types of farm and systems producing organic milk in these four countries. Herd sizes ranged from the smallest in Austria, across wider ranges in the remaining countries, particularly in the Danish group, to the largest in the UK. The Austrian farms chosen were small and generally had several different enterprises, usually including forestry.

Table 1. Characteristics of farms included in the sustainability assessment in each country – median and (range)

	Unit	Austria	Denmark	Finland	UK
Number of Farms	No	12	10	7	10
SOLID SME Partner organisation		Sennerei Hatzenstädt	Thise Dairy	Juvan Luomu	OMSCO
Time in organic farming	Years	20 (20-39)	16 (12 – 28)	17 (10 – 22)	11 (3 – 17)
Farm size	ha	19 (12 – 31)	194 (50 – 512)	139 (18 – 414)	268 (46 – 422)
Herd size (adult cows)	No	13 (10 - 17)	123 (36 – 480)	28 (9 – 124)	192 (72 – 378)
Stocking rate and land use					
GLU per total forage area (incl. common)	GLU/ha	0.9 (0.6 – 1.4)	1.5 (0.9 – 2.3)	0.7 (0.5 – 1.20	1.4 (1.1 – 2.1)
Proportion of area in arable	%	0	26 (11-44)	25 (6 – 44)	6 (0 – 21)
Proportion of area in permanent pasture	%	100 (62 – 100)	11 (2 – 22)	0 (0 – 16)	28 (4 – 93)
Milk production					
Milk sales	litres/cow/year	4523 (2352 – 6375)	6313 (4554 – 8750)	7306 (6400 – 10071)	5857 (4145 – 6711)
Purchased concentrate per litre	kg/litre	0.05 (0 – 0.38)	0.15 (0.01 – 0.33)	0.10 (0.06 – 0.36)	0.16 (0.02 – 0.27)
Purchased concentrate per milking animal	t/head	0.3 (0 – 1.5)	0.9 (0.04 – 2.9)	0.9 (0.4 – 2.3)	0.9 (0.1 – 1.7)
Animal housing					
Percentage of farms where cows go outdoors day and night during the grazing season	%	33	80	28	100
Percentage of herds kept tethered	%	50	0	14	0
Percentage of herds kept in straw yards (loose housing)	%	0	70	14	33
Percentage of herds kept in cubicles	%	50	30	72	66
Labour input					
Annual Labour Units (ALU)	ALU/100 ha	3.8 (2.0 – 6.9)	1.0 (0.6 – 2.3)	2.1 (0.6 – 5.5)	1.6 (0.4 – 6.5)
Milking cows per Annual Labour Unit	No/ALU	20 (12 – 30)	69 (36 – 105)	17 (9 – 53)	52 (24 – 119)

No farms in the Austrian group had any arable land, but Finnish, Danish and UK farms had varying amounts, with least in the UK where a considerable proportion of the arable land was in short term grass leys three years old or younger. On the Austrian mountain farms the majority of grass was permanent pasture, while this was much less common in Denmark and Finland. Most UK farms had some permanent pasture, but this comprised a lower proportion of each farm than in Austria. Stoking rate of the forage area was highest for the UK and Denmark and lowest for Austria and Finland.

The level of milk production also varied, the median being lowest in the Austrian group, followed by the UK, Denmark, and then Finland. Austrian farms consistently used little or no purchased concentrates while levels varied at a higher level in each of the other three groups.Finnish farms thus included some that were relatively small in size but high in purchased feed inputs, in contrast to the Austrian farms which were all small and low input. The majority of the Finnish and Austrian herds only grazed during the day, and three Finnish farms had a grazing season of less than six months, whereas for all other farms in the study the grazing season was six months or more.

Labour input per cow was very high in Austria and Finland, compared with Denmark and UK (although interpretation of the question may have resulted in overestimation of the value of farms with other sources of income, or many different enterprises).

Overall, all countries scored well on animal health and welfare, and relatively highly on farm business resilience (Figure 1). Other spurs showed greater variation.

Three sustainability indicators with links to animal husbandry in the broadest sense are selected for description here:

Animal health and welfare

The animal health and welfare spur was scored by asking questions about animal health (eg parasite control and the incidence of lameness and mastitis), herd health plans, longevity, and aspects of housing and feeding that affect welfare. This spur scored highly across all countries but Austrian scores tended to be lower than the others. On half of Austrian farms, cows were kept tethered, which reduced the scores for housing facilities and freedom to perform natural behavior. Longevity tended to be highest in Austrian herds and lowest on Finnish farms. The number of annual labour units working with the dairy cows was also taken into consideration in this spur, and this differed widely between countries. The ratio of cows to staff hours was far lower on the Austrian and Finnish farms than in Denmark and the UK. This has implications for rural employment as well as for animal welfare. Even allowing for the fact that accounting for time spent working on farms, particularly by family labour, is notoriously difficult, there are likely to be real differences in this parameter between farms and countries. However, although there is often an assumption that animals will receive better care if there are fewer in the care of one person, there is limited evidence for this.

System diversity

System diversity was influenced by crop and livestock diversity, marketing channels and on-farm processing. Crop diversity was greatest on the Finnish farms, which had least diversity of livestock, while no Austrian farms grew crops. Although the UK farms had the highest mean proportion of the farm in arable rotation, the diversity of crops was less than in Finland. Livestock diversity was greatest on the Austrian farms, closely followed by the UK, where cross-bred cattle were often present which increased the score.

Biodiversity

In Austria and Finland, biodiversity was not a particularly high priority objective for the farmers or industry organisations, and in general achieved lower scores than in Denmark and the UK. The biodiversity spur incorporated information on the management, creation and restoration of particular habitats, the presence of rare species of fauna, and plans and awards for nature conservation. There was also a section on pesticide use, which many respondents classed as “not applicable” to organic

management. As a result of these factors, biodiversity scores were often lower than might have been expected for low input grassland based farms, where species rich grassland is likely be found. Surprisingly, Austrian farms with a large proportion of permanent mountain pasture scored lowest on biodiversity. The Finnish group's median biodiversity score was closer to those of Denmark and the UK, despite a low proportion of the farms being under permanent pasture. These three countries scored relatively highly on participation in agri-environment schemes. It is likely that the farmers underestimated and undervalued the work they did which contributed to biodiversity, if it was not recognized by being part of a supported scheme.

The results at the level of the "spurs" illustrate the variety within and between different facets of sustainability for a range of farms producing organic milk in four EU countries. However, it is necessary to look at the detailed activities within the spurs to understand why individual farms achieve different scores. The tool does not allow exploration of the interactions and relationships between different aspects of sustainability, which is a complex exercise. The mixed data types contributing to the scores and the fact that answers are influenced by farmers' personal interests mean that the numbers are not suitable for deep statistical analysis; indeed this is not the purpose of the tool. Rather, the experience of using the tool in this context has shown it to be a useful method for opening discussions with farmers.

Discussion

The rapid assessment tool detected differences in various components of sustainability between farms. It was useful in the context of generating interest in sustainability issues and collecting ideas for on-farm participatory research, both with individuals while carrying out the assessment, and by presenting the results to groups. Its framework led farmers to think about aspects which they might not otherwise consider without prompting. There are, however, some difficulties of consistency of data collection when using such a tool across a range of farming systems and countries, particularly when translation is involved.

For future use the biodiversity spur could be further refined to reflect better the variety of species in grassland, particularly permanent pasture. The extent to which animal welfare can be properly represented using this type of assessment without primary data collection is limited. However, in making further amendments, care should be taken not to increase the time required of the farmer.

Acknowledgements

We are grateful to all the farmers for participating. This publication was generated as part of the SOLID Project, agreement no. 266367 (http://www.solidairy.eu/), with financial support from the European Community under the 7th Framework Programme. The publication reflects the views of the author(s) and not those of the European Community, which is not to be held liable for any use that may be made of the information contained.

References

Gerrard, Catherine L; Smith, Laurence; Padel, Susanne; Pearce, Bruce; Hitchings, Roger; Measures, Mark and Cooper, Nick (2011) OCIS Public Goods Tool Development. Organic Research Centre, Newbury. http://orgprints.org/18518/