SCIENTIFIC OPINION

Public consultation on the review of the available description and categorization of small scale farms in support of the ongoing scientific opinion on "Assessment of dairy cow welfare in small scale farming systems"[1]

EFSA Panel on Animal Health and Animal Welfare (AHAW)[2, 3]

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ABSTRACT

Within the scope of this public consultation, we wish to consult interested parties about the proposed definition and description into few categories of small scale farms in Europe. This draft document addresses the first term of reference of the mandate received from the European Commission requesting EFSA for a review of the available description and categorisation of small scale farms for dairy cows.
In particular, it includes a chapter on the interpretation of the mandate by the members of the working group, an overview of the European dairy cow population and of the size of the holdings in different countries as derived from the Farm Structure Survey run by Eurostat in 2010, and finally a definition and a description into few categories of such small scale dairy farms, as derived from the development of the first two objectives of a parallel outsourced procurement project ("Preparatory work for the scientific opinion on welfare assessment of dairy cows in small scale farming systems").

KEY WORDS

(Max. seven key words)

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BACKGROUND AS PROVIDED BY THE EUROPEAN COMMISSION

Sustainability, animal welfare, environmental and climate concerns and awareness of social responsibility towards the community have increased consumers' interest in knowing how, where and by whom food is produced and handled on its way from the farm to the table. This constitutes a business opportunity for farmers as a growing number of consumers want to buy food, produced locally or regionally directly or under farm certification schemes whereby acceptable animal welfare conditions play often an important role.

Council Directive 98/58/EC lays down minimum standards for the protection of animals kept for farming purposes, including dairy cows. Whilst there are no specific EU rules on the farming of dairy cows, based on the EU Strategy for the protection and welfare of animals 2012-2015 the Commission is examining the feasibility of drafting EU guidelines for the "animal welfare friendly" keeping of dairy cows to be used voluntarily by farmers.

Farming systems for dairy cows, including housing and management conditions, are important factors affecting their health and other aspects of their welfare, partly through housing and equipment and partly through management and handling practices. There is a high variability and number of farming systems for dairy cows, ranging from grazing all of the year to remaining in a building with zero-grazing. While European dairy production is based mainly on specialized intensive farming, there is however considerable diversity in how cows are housed and managed.

Scientific work was already carried out on the welfare of dairy cows, accompanied by a number of scientific opinions adopted by the EFSA AHAW Panel. EFSA assessed the welfare risks related to the most commonly used and specialised dairy cows farming systems, integrating the use of animal-based measures to assess their consequences. Moreover, following these opinions EFSA also launched a pilot project on the "Identification, validation and collection of data on animal-based measures to create a database for quantitative assessment of the welfare of dairy cows". In order to give stakeholders better accessibility to science-based information and good practices on small scale livestock farming, a similar risk and outcome based assessment should also be carried for these types of farming systems, where such assessment and harmonized description are currently lacking.

In this context, the European Commission requested EFSA to deliver a scientific opinion to assess the welfare of dairy cows in small scale farming systems. More specifically, the European Commission considers it opportune to request EFSA moving towards a practical application of its risk assessment methodology and scientifically categorize small scale farming systems on the basis of quantified welfare risks.

Such quantification of welfare risks is to be achieved through the assessment of suitable animal-based measures. An animal-based measure (ABM) is a response of an animal - or an effect on an animal - used to assess its welfare. An animal-based measure can be taken directly on the animal or indirectly and includes the use of animal records. It can result from a specific event, e.g. an injury, or be the cumulative outcome of many days, weeks or months, e.g. body condition. The use of animal-based measures (ABMs) to assess animal welfare has been the focus of several research projects over the past five years, and ABMs are now included in various schemes (e.g. Welfare Quality®) used on the field in order to evaluate the welfare status of animals.

TERMS OF REFERENCE AS PROVIDED BY THE EUROPEAN COMMISSION

The Commission therefore requests EFSA to develop a scientific opinion on the assessment of animal welfare in small scale dairy farming systems according to the following terms of reference. In order to address the specific terms of reference, as a first step

ToR1: a review of the available description and categorization of small scale/non-conventional farms in relation to the size and types of farming systems and husbandry practices should be carried out. The

risk assessment should cover dairy cows during both lactation and dry period and it should be carried out for the following categories of small scale dairy farms (with up to 75 dairy cows on the farm):

- farms where animals are kept inside throughout the entire year;

- farms where animals are kept outside on pasture throughout the entire year;

- farms where animals are kept outside on pasture during the summer and inside during the winter;

ToR2a: To identify the main factors and welfare consequences under the above-classified farming systems and apply the risk assessment methodology for risk ranking;

ToR2b: To assess if the animal-based measures for dairy cows, identified by 2012 EFSA scientific opinion1 on the use of animal-based measures to assess welfare of dairy cows, are suitable to assess animal welfare in the above-classified farming systems;

ToR2c: To assess the impact on welfare of production diseases in small scale dairy cows farming systems. The assessment should take into account the assessments already performed by EFSA as well as the ongoing work on the welfare of dairy cows.

ASSESSMENT

1. Introduction

1.1. Interpretation of the mandate

Before describing small scale farms and carrying out risk assessment for the welfare of dairy cows, it was deemed necessary to provide a working definition of which farming systems were of interest for this opinion. Criteria to classify farms as small scale farming systems were proposed.

A set of criteria aimed at identifying farming systems which were considered as possibly fulfilling specific expectations of consumers for food produced locally or regionally directly or under farm certification schemes. These criteria were based on four dimensions 1) size, 2) the type of enterprise (ownership and workers), 3) the use of local inputs in the production process, including use of local feed and local breeds, and 4) the production type (certification schemes).

The maximum size of the herd was set to 75 cows (present as lactating or dry) by definition in the mandate. The proportion of the dairy cow population across Europe in this category was investigated, as well as the distribution of herds (and cows) by size among the small scale farms.

The mandate requests the risk assessment to be carried out for different housing and pasture management, namely: i) farms where animals are kept inside throughout the entire year, ii) farms where animals are kept outside on pasture throughout the entire year, and iii) farms where animals are kept outside on pasture during the summer and inside during the winter. The different grazing systems are not used to define the study population as all may occur. However, based on experience on farming systems in a number of European countries, the two extremes are likely to be very rare. Because the impact of the amount of grazing on welfare will be considered in the assessment, the categories of housing and pasture management were refined considering the time spent on pasture across the year.

To develop a practical application of the welfare risk assessment methodology in small scale farms, existing risk and outcome based assessment protocols were reviewed, adapted when deemed necessary and applied in a sample of farms in a standardised way in an ad hoc survey. Assessment protocols to produce data on welfare consequences and potential risk factors were applied during a visit. Due to time constraints, the farm visits had to occur in winter. The validity of the approach was evaluated in the particular farm settings in the sample and in a particular period. It was considered highly beneficial to develop and evaluate a pilot methodology in practical conditions because there is no available data specific to welfare assessment in small scale farming systems. Still, assumptions based on literature and expert opinion were reviewed and added, being aware that the conditions met in the on-farm survey cannot cover all categories of farming systems (because there is a great variety) and cannot cover all risk factors (because existing assessment protocols e.g. Welfare Quality® have been developed for in house assessment of cow welfare which means that the protocol might not be sufficient e.g. covering effects of long pasture period).

In this opinion, we don't compare welfare in small scale farms vs other systems, or between the different categories of small scale farms because it is not the aim of the mandate. Rather, we provide a tool to be used for welfare assessment that can be applied to small scale farming systems.

To assess the suitability of animal-based measures for welfare assessment in small scale farming systems, it was assumed that their outcome is similarly relevant whatever the system, but the feasibility may pose specific problems in these farming systems. Again the fact that their feasibility was evaluated during the housing period is a limitation and, based on the data collected in few farms where all year long grazing is applied, it will be discussed how animal-based measures could differ in their application at pasture.

It can be assumed that production diseases at individual level will have the same impact on cow welfare in small or large scale farms, but the prevalence might be different. Therefore, to assess the impact on welfare of production diseases, the focus is more on the specific risks leading to the disease in small scale farming systems and on the approach to the diseased animal in small farms.

1.2. Farming systems of interest for this mandate

1.2.1. Overview of dairy cow population and holdings in the EU, Norway, Switzerland, Iceland, and Montenegro

In 2010, a Farm Structure Survey (FSS)[4] was carried out by the EU-28 Member States plus Norway, Switzerland, Iceland, and Montenegro. According to the census, approximately 1,810,300 agricultural holdings[5] kept 24,378,080 dairy cows in the 32 countries. Figure 1**Error! Reference source not found.** shows the share of the dairy cow population according to each FSS country. Germany, France, Poland, United Kingdom, Italy, Netherlands and Romania had the largest populations.

Figure 1: Dairy cow population proportions in the FSS countries

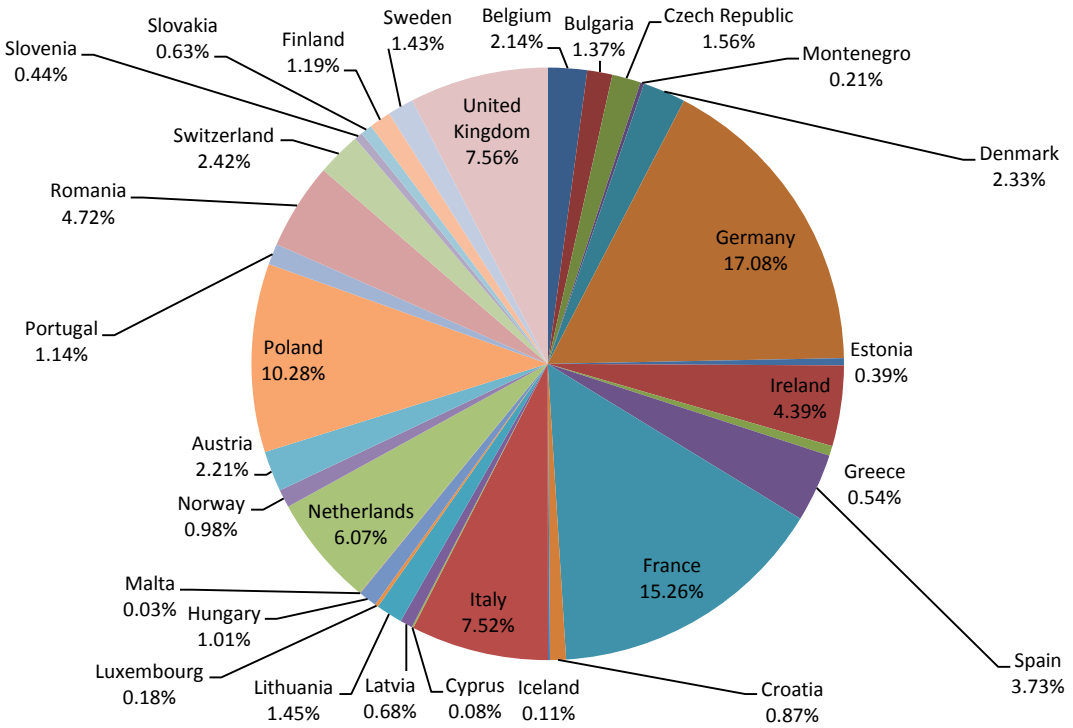


Table 1 shows the distribution and proportion of the dairy cow population in the FSS countries by agricultural holding herd size. Holdings were classified according to the number of dairy cows in order to 1) determine the most common herd size by geographical location; and 2) to reveal if there are any major differences in size within the population of small scale farms that keep up to 75 dairy cows.

[4] "The basic Farm structure survey, abbreviated as FSS and also known as Survey on the structure of agricultural holdings, is carried out by all European Union (EU) Member States. The FSS are conducted consistently throughout the EU with a common methodology at a regular base and provides therefore comparable and representative statistics across countries and time, at regional levels (down to NUTS 3 level). Every 3 or 4 years the FSS is carried out as a sample survey, and once in the ten years as a census. The 2000 census FSS covers only the EU-15 countries, while the 2010 census covers EU-27 Member States and Norway, Switzerland, Iceland, Croatia and Montenegro." http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:Farm_structure_survey_(FSS)

[5] "Agricultural holding" or "holding" means a single unit, both technically and economically, which has a single management and which undertakes agricultural activities listed in Annex I to the European Parliament and Council Regulation (EC) No 1166/2008 within the economic territory of the European Union, either as its primary or secondary activity.

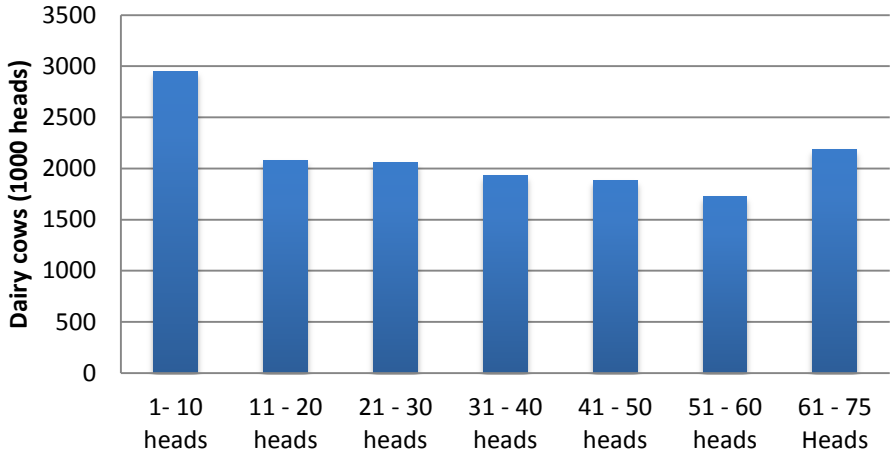
Table 1: Dairy cow population and holdings by herd size class in the FSS countries.

Holding herd size	Heads: dairy cows	% of dairy cow population	Holdings with Dairy cows	% of holdings	Average number of dairy cows per holding
1 - 5 heads	2,042,120	8%	1,249,580	69%	1.6
6-10 heads	906,540	4%	115,980	6%	7.8
Total <10 heads	2,948,660	12%	1,365,560	75%	2.2
11 - 20 heads	2,075,710	9%	137,340	8%	15.1
21 - 30 heads	2,058,590	8%	81,640	5%	25.2
31 - 40 heads	1,926,970	8%	54,510	3%	35.4
41 - 50 heads	1,877,500	8%	41,320	2%	45.4
51 - 60 heads	1,722,650	7%	31,060	2%	55.5
61 - 75 Heads	2,182,780	9%	32,280	2%	67.6
Total <75	14,792,860	61%	1,743,710	96%	8.5
> 75 heads	9,585,220	39%	66,590	4%	143.9
Total	24,378,080	100%	1,810,300	100%	13.5

Approximately 61% of the dairy cow population in the FSS countries belonged to agricultural holdings that kept less than 75 dairy cows. In total, approximately 14,792,860 dairy cows were kept on 1,743,710 agricultural holdings with herd sizes of up to 75 dairy cows.

Figure 2 shows the distribution of dairy cows on small scale holdings that keep up to 75 dairy cows, the population distribution is spread evenly across the size classes. However, holdings that kept 1-10 dairy cows had a greater share of the population than any other class. A further breakdown of this class (see Table 1) reveals that 69% of the animals belonged to holdings that kept up to 5 dairy cows, with on average 1.6 dairy cows per holding.

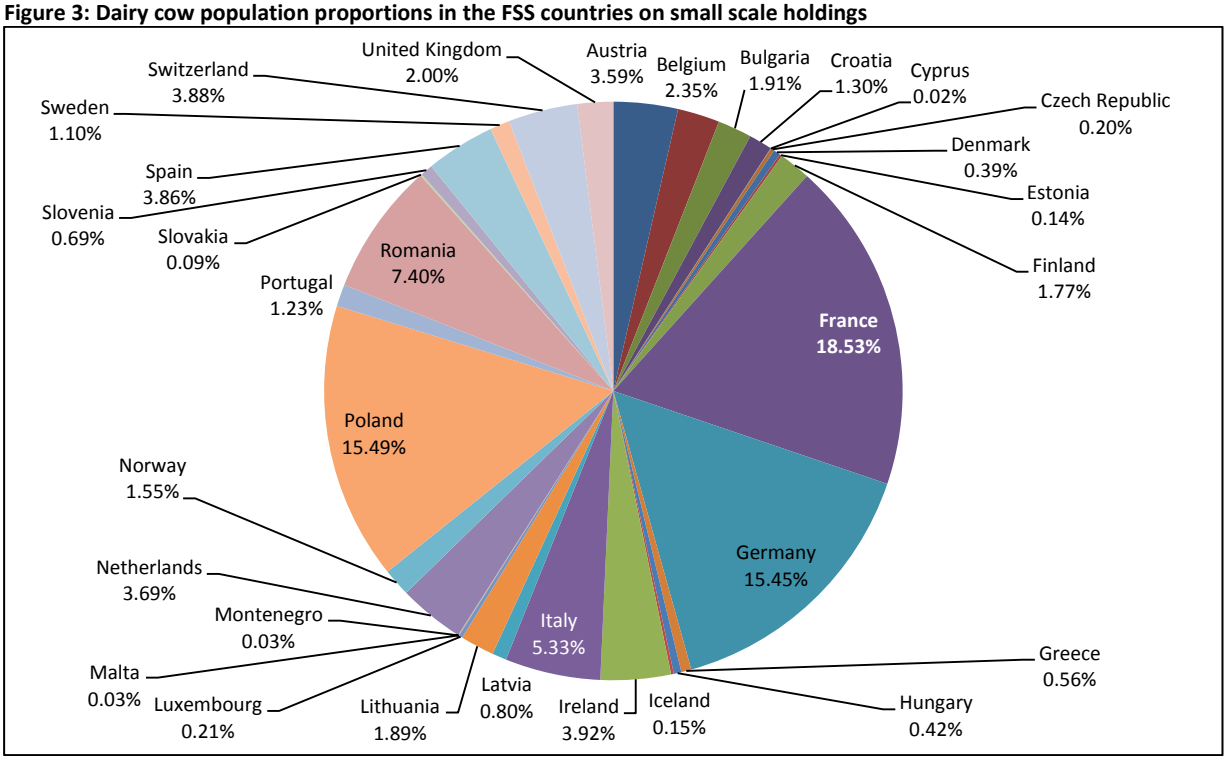
Figure 2: Distribution of dairy cow population by holding herd class



Error! Not a valid bookmark self-reference. shows the relative distribution of dairy cows kept on small scale farms across the FSS countries. France, Poland, Germany each had populations of over 2 million dairy cows in this farm size category, followed by Romania with a population of over one million.

Most countries had herd sizes of above 10 cows. However, Romania and Poland had average herd sizes of 5 and below. Romania had a particularly low average herd size of 1.75 per holding.

Figure 3: Dairy cow population proportions in the FSS countries on small scale holdings



Error! Not a valid bookmark self-reference. shows the FSS countries with the largest numbers of small scale holdings. Very high numbers of such farms were found in Romania and Poland. Again, there is some disparity between average dairy cow herd sizes per holding. Some countries have comparatively large average herd sizes, while others have very small ones.

Table 2: Countries with the largest populations of small scale holdings

Country	Holdings	Heads: Dairy cows	Average dairy cows per holding
Romania	624,660	1,091,840	1.75
Poland	424,580	2,284,240	5.38
Bulgaria	85,620	280,990	3.28
Lithuania	84,660	279,020	3.30
Germany	77,080	2,279,120	29.57
France	72,540	2,733,260	37.68
Austria	47,630	529,820	11.12
Italy	45,690	786,390.	17.21
Croatia	41,250	191,810	4.65
Switzerland	31,970	571,830	17.89
Latvia	29,800	118,240	3.97
Spain	27,100	569,440	21.01
Montenegro	23,770	50,680	2.13

The previous figures and tables in this section demonstrate that there are some clear differences between small scale holdings across the 32 FSS countries. Such findings are consistent with the general picture of farming across Europe. That is, there are clear differences between small scale farmers in Eastern Europe and those located in the rest of Europe with markedly smaller holdings in the Eastern European countries.

In terms of agricultural holding types, most dairy cows were kept on agricultural holdings that specialise in dairying (71.28%). Agricultural holdings specialising in dairying tend to keep larger herds. Those which do not specialise in dairying (other) tend to have smaller herd sizes, most of the dairy cow population in this group falls into the 1-5 heads herd size class.

1.3. Addressing Term of Reference 1: a review of the available description and categorization of small scale farms in relation to the size and types of farming systems and husbandry practices

1.3.1. Materials and methods

In order to obtain an overview of the current European situation regarding small scale dairy farms, several sources were investigated concerning current descriptions and categorisations of small scale dairy farms. The first approach was using data from Eurostat and precisely from the Farm Structure Survey carried out in 2010. However this was limited to data on herd size structure which provided a useful overview of the EU dairy cow population size per country though (see previous chapter 1.2.1) but did not provide for data related to the farming systems and husbandry practices that could be used to further describe and categorize the farms. The second approach was through a call for data from umbrella organisations achieved through a procurement project. This project ("Preparatory work for the scientific opinion on welfare assessment of dairy cows in small scale farming systems"; in Appendix A, details of the objectives of the Procurement are given) has been outsourced to a consortium composed by INRA (Institut National de la Recherche Agronomique, France), IRTA (Institute of Agrifood Research and Technology, Spain), UNIMI (University of Milan, Italy), BOKU (Universität für Bodenkultur Wien, Austria), IDELE (Institut de l'Elevage, France) and the organisation SlowFood with support of the Food and Agriculture Organisation of the United nations (FAO) as sub-contractor. The completion of ToR 1 of the mandate is supported by Objective 1 and Objective 2 of the procurement project. In short, Objective 1 comprises the collection of information from umbrella organisations or farmer associations that may already have a structured set of criteria for small scale farming. Objective 2 aims at collecting information about the criteria for small scale farming identified under Objective 1 and collating such criteria to information found from other sources such as literature review, national databases, sources of raw data (e.g. PhD theses, surveys etc), or key experts with a knowledge on small scale farming systems. As mentioned before, the overall aim of these two objectives is to support the working group in completing ToR 1, namely to propose a classification for the most relevant categories of small scale farms. For a more detailed characterisation of these farms, an on-farm survey and welfare data collection will be run as part of this procurement project. The aim of this is to provide details for the description of the farming systems and to evaluate the welfare assessment methods in small scale farms (see objectives 3, 4 and 5 of the procurement project and ToR2 of the mandate). The on-farm survey will be run in four EU countries which have a variety of farming systems (see next chapters).

1.3.1.1. Identification of the organisations

The organizations were identified by gathering information from the Slow Food and FAO network and from the other project partners and, to ensure transparency and inclusiveness, through the publication of a call on the partners' websites and on the EFSA and European Commission websites. For this purpose, FAO and Slow Food developed an online questionnaire, shared with all the project's partners for a broader distribution, with the aim of attracting organizations that represent small-scale dairy

cattle farms (e.g. associations or networks of dairy farmers). The questionnaire was introduced by a call which outlined the project's objective and how interested associations, organizations or networks of farmers could participate. During this phase, applications were not accepted from individual farmers. The aim of the questionnaire was to put together a representative sample of the small-scale farming sector and to collect information about the size and type of farms represented. This information will then be used to select the small-scale farms to involve in later stages of the project. It was decided to include only a limited number of simple questions, so as to be able to quickly gather the data useful for the project's aims. Some of the questions were obligatory, and if these questions (indicated with an asterisk) were not answered, it was not possible to complete or submit the questionnaire. The data collected from the questionnaire were used to further refine the definition of the criteria that characterize "small-scale farms" (the aim of Objective 2).

1.3.1.2. Questionnaire structure and content

The questionnaire involved an initial series of items, which aimed at collecting information and contact details from the associations/organizations. A second series of questions focused on the characteristics of the associations/organizations and their activities, as well as their members general characteristics (Table 3).

Table 3. Questions relating to information about the characteristics of the associations/organizations and of their members.

Does the association/organization: • represent and support farmers on a regional basis? • protect and promote dairy products with a geographical or typical indication (e.g. PDO, Slow Food Presidia, etc.)? • promote the protection and conservation of indigenous (local) breeds? • promote animal welfare and/or help its farmers implement animal welfare practices? • provide inspection of products or production certification (e.g. organic, biodynamic, etc.)? • include among its members small-scale farmers (specifying the %)? • include among its members organic or biodynamic farms (specifying the %)? • include among its members dairy processors (cheese, yogurt, butter) (specifying the %)?
How many farmers are members of the association/organization?
How many of the association/organization's member farmers have fewer than 75 cows (lactating and dry)?
How many farmers/producers use pasture or grazing for at least four months per year?
Are there farmers/producers who breed rare or indigenous (local) cattle breeds?
Has the association/organization already participated in or implemented projects or training activities on animal welfare?

The final part explained that replying to the questionnaire meant applying to join the project, and eventually committing to later supplying lists of the members with the characteristics required by the project, and requesting the contact details of one person (name, phone, email) in order to establish direct contact in the future with the researchers who will be carrying out farm visits.

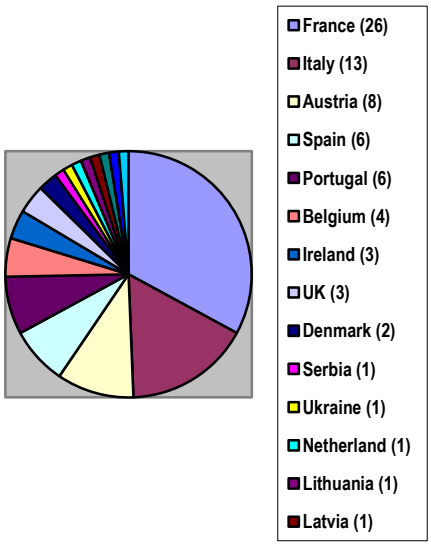
1.3.1.3. Questionnaire distribution method

To guarantee a wide distribution, simple access and ease of data processing, it was decided to use the Google Documents web platform. To make the information about the project accessible and facilitate the questionnaire's completion, the texts were made available in six languages: French, English, Italian, Spanish, Portuguese and German. The questionnaire was activated on 8 October, 2014, and the deadline was set to 31 October, 2014. All project partners posted a "Public Call for Information" on their websites and sent an email presenting the project to their networks. The email contained the link to the questionnaire. As an example, Slow Food involved its 38 Presidia linked to dairy cattle (protecting native dairy cattle breeds or high-quality, traditional cheeses) in two of the four countries in which the project is being run, namely Italy and France. The call was also sent through FAO's networks reaching more than 6000 contacts. The call was also sent by IRTA directly to 68 associations, by the University of Natural Resources and Life Science (BOKU) directly to 49 associations, by INRA directly to 11 associations and by the French Livestock Institute (IDELE) directly to 15 associations. The call was also sent to several Portuguese organisations, including some in the Azores islands.

1.3.1.4. Results

A total of 140 associations/organizations that represent dairy cattle farmers from around the world filled in the questionnaire (79 from Europe, 28 from Africa, 19 from Asia, 12 from America and 2 from Oceania; details can be found in Appendix C). The responses from Europe came from 17 countries (Figure 4).

Figure 4: Distribution of responses from EU countries



A total of 53 responses were obtained from the four countries where on-farm visits will be carried out as part of the project (see Objective 3, 4, 5 and 6 of the procurement project in Appendix A): France (26), Italy (13), Austria (8) and Spain (6). Many of the associations consulted in these four countries promote the use of native breeds, or represent farmers who use grazing for at least four months a year. They all include among their members small-scale farmers and many also have organically certified member farmers. Some of the associations represent only organic producers. Looking more in detail at

the most significant characteristics for a future selection of farmers to visit in the four countries being researched, we can note the following:

- All responding organisations of each country include small scale farmers. For example, 95% of these have less than 75 cows in Austria, 87% in France, 96% in Italy and 79% in Spain.
- All organisations of each country represent farmers on a regional basis.
- 83-100% of the respondents have members who use pasture or grazing for at least four months per year.
- 100% of the French and Austrian respondent organisations include organic or biodynamic farms among their members, but this percentage is markedly lower in Italy and Spain.
- In two countries, Italy and Austria, almost all respondent organisations (77% and 75% respectively) promote the protection and conservation of indigenous / local breeds while this number is lower for the other countries.
- The highest percentage of organisations which provide inspection and products or production certifications is found in Austria (75%), followed by France and Italy.
- In two countries, France and Austria, almost all respondent organisations (77% and 75% respectively) promote animal welfare and provide assistance to the farmers to implement animal welfare practices.

Table 4 contains a summary of the responses to the items in the questionnaire for the countries where the survey will take place.

Table 4: Overview on the responses obtained from associations in Austria, France, Italy and Spain

How many organisations among the respondents…..?	Austria	France	Italy	Spain
Total number of responses	8	26	13	6
Include among its members small-scale and/or non conventional farmers (percentage)	8 (100%)	26 (100%)	13 (100%)	6 (100%)
Total number of members/farmers of the associations (average)	38016 (4752)	6318 (243)	2418 (186)	10812 (1802)
Total number (percentage) of members/farmers which have less than 75 cow	36000 (95%)	5500 (87%)	2330 (96%)	8500 (79%)
Number (percentage) of organisations that have members who use pasture or grazing for at least four months per year	7 (87%)	26 (100%)	11 (85%)	5 (83%)
Include among its members organic or biodynamic farms (percentage)	8 (100%)	26 (100%)	4 (31%)	4 (67%)
Include among its members dairy producers (percentage)	8 (100%)	25 (96%)	10 (77%)	5 (83%)
Represent and support farmers on a regional basis (percentage)	8 (100%)	26 (100%)	13 (100%)	6 (100%)

Promote the protection and conservation of indigenous (local) breeds (percentage)	6 (75%)	11 (42%)	10 (77%)	3 (50%)
Provide inspection and products or production certification (e.g. organic, biodynamic, etc.) (percentage)	6 (75%)	8 (31%)	3 (23%)	-
Promote animal welfare and/or assist its farmers to implement animal welfare practices (percentage)	6 (75%)	20 (77%)	6 (46%)	1 (17%)

In appendix D, the detail of the responses of each association, divided by country, are reported.

1.3.1.5. Methodology for the identification of criteria for describing and categorising small scale dairy farms

The first step for the identification of the criteria for describing and characterising small scale dairy farms, a literature review was carried out in order to integrate the findings on the criteria currently used by the umbrella organisations identified under Objective 1 of the procurement project.
The literature review starting point was the description provided by the EFSA working group together with additional preconditions set in agreement with the working group and information collected from relevant organisations and publications. In order to scan the publications and all the material needed for this review, the search terms to fulfil the inclusion criteria was done through general search engines. The construction of the list of criteria was primarily based on i) herd size, ii) farming system and iii) husbandry practices, as requested from the mandate, and therefore the terms were selected to cover these three fields. In particular, the terms used were ((small OR non-conventional) AND farm AND (family-based OR family workforce OR LU/AWU OR family incomes-subsidies) OR (low-input OR restricted to Earth's resources) AND (arable land use OR non-arable land use OR meadows) AND (sustainable OR organic farming OR biodynamic farming OR permaculture) OR (local breed OR (rustic dairy breeds OR low-input breeds OR free-range) AND (short marketing chains OR farm direct selling) AND (natural pasture OR integrated system) AND (stock density OR farm surface area) AND (productivity per ha OR) OR (smaller herd size) AND (seasonal calving OR grassland farms OR mountain farms).
A total of 54 peer-reviewed publications (45 papers in scientific journals, 1 doctoral thesis, 8 deliverables of EU projects), 35 technical papers and 6 books were handled.

1.3.1.6. Criterion 1: Herd size

The mandate specifies a threshold value of less than 75 cows (including both dry and lactating cows). However, in the literature a clear threshold value cannot be found. A threshold value of 75 cows was also considered by the study in the Netherlands performed by Reijs et al. (2013), even though the average of the analysed small farms was 45-55 cows. On the contrary, in the context of Nicaragua, Ecuador and Paraguay, FAO (2012) as a relevant umbrella organization stated that the herd size may not exceed 50 cattle to be considered as small scale farming. These figures agree with data from Perea et al. (2010) and Mata (2011) where organic dairy farms in northern Spain kept on average 46 cows ± 8.7, and concluding that a profitable herd size is at least 40 cows.

In the EU funded Sustainable Organic and Low Input Dairy Systems project (SOLID) the average number of cows in the participating dairy farms was 67, but the survey only included three EU countries (UK, Spain, Romania) (Moakes et al., 2012). The official statistics say that the average herd size in Austria is 29 cattle per farm. This corresponds to 15.9 dairy cows/farm and 11 dairy cows for organic farms (Grüner Bericht, 2012). In France, the Institut de l'elevage published in 2011 that 16 % of the farms have less than 20 dairy cows, 13% between 20 and 29, 18% between 30 and 39, 17%

between 40 and 19 and 36% more than 50 dairy cows (Institut de l'Elevage, 2012). In Portugal the average number of cows per farm is 28.6 (INE, 2009, official statistics).

The minimum herd size as a criteria selection for professionalism of the farms reported by RENGRATI (National Typical Farm Network, part of the International Farm Comparison Network; 2012) was 15 cows.

1.3.1.7. Criterion 2: Husbandry practices (Total grazing time - hours per cow and year)

The amount of time dairy cows are permitted to graze varies a lot across Europe and depends on edaphoclimatic conditions, land availability, animals' nutritional needs, farm management, socio-economic factors and cultural aspects. Intensification and changes in high yield dairy cows' nutrition has led to a decline in grazing that is expected to continue.
Reijs et al., (2013) reports grazing duration in the North-west European countries to vary between 30% in Denmark and 100% in Ireland. In contrast, in many farms across South and Eastern Europe zero grazing is still the mainstream. On the other hand there are farms in which dairy cattle only graze during specific parts of the production cycle – animals before first calving and/or when not milking.
Apart from the time spent grazing, pasture management is very important to adjust the stocking rate to the farm capacity. Furthermore, reproductive performance, the level and duration of supplementary feeding required to meet seasonal feed shortages under different stocking rate regimes are among the key economic parameters which influence grazing output (Catrileo et al., 2009).
For the categorisation of farms as to the duration of the grazing period throughout the year the working group decided to adapt and extend the published classification that has been suggested to the north-western European countries (Reijs et al. 2013):

All-year-grazing: Access to pastures between 300-365 days/year. Cows will have access to pasture almost all year round. During a small period of no more than two months animals may be housed if climatic conditions are very harsh or pasture is too poor. All year grazing occurs, for example, on most dairy farms in Ireland, Azores (Portugal) and south of Italy.
Extended-grazing: Access to pasture between 120 and 300 days/year. This is the case of farms that allow for grazing during the spring and summer months but are forced to stable cows during the cold seasons. This is the situation in most northern countries (UK, Sweden, Denmark, Netherlands, Germany, France…)
Restricted grazing: Pasture is used from 15 to 120 days/year. This is typically the situation found in mountain dairy farms (Austria, Switzerland, France or Italy) or for dry cows in farms where the milking herd is permanently housed.
Zero grazing: Access to pasture is null or very exceptional. This happens all round Europe in some farms. Cows may be housed in straw yards, cubicle housing or tie-stalls. Some may have paddocks or even fields for exercise, but these should not be considered similar to "access to pasture".

1.3.1.8. Criterion 3: Sources of work

The type of enterprise includes that holdings usually have a **family based enterprise** nature (workforce mainly from family members (full or part-time). It was agreed that the minimum percentage of **family workforce** should be above **80 %** to comply with the criterion. In a study performed in the Spanish organic dairy system, Perea et al. (2010) reported an average of 89 % familiar workforce. The **Dutch NTA8080**[6] states, that two thirds of the work force must be composed of family members. Additional help is usually hired either in the form of seasonal workers for arable and grass tasks.

[6] NTA 8080 certification system recognized as European scheme for demonstrating sustainability of biofuels. It is refered to agriculture in general.

1.3.1.9. Criterion 4: Level of input

As described by Pointereau et al. (2012), low input farm systems could be defined as a way to optimise the management and use of internal production inputs and to minimise the use of exterior production inputs, wherever and whenever feasible and practicable (see Figure 5), i.e. purchased concentrate, fertilisers and pesticides. This could lead to lower production costs and reduction in surface and groundwater pollution, pesticide residues in food and farmer's overall risk, resulting in both short -and long-term farm profitability increase.

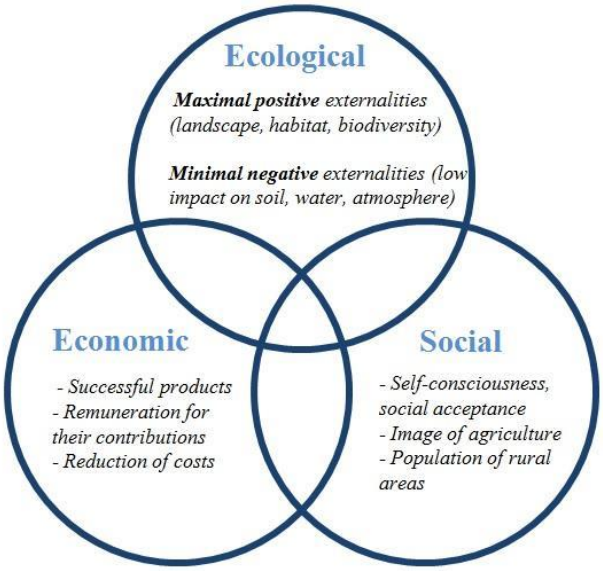


Figure 5: Conception and main criteria of low input farming systems (adapted from Poetsch, 2007).

The level of input can be defined in many ways. For each farming system, it is possible to calculate the level of input used per hectare (intensity) or per quantity of product (efficiency) (Pointereau et al., 2012). A number of basic elements and considerations that have been described by Poetsch (2007) (see Table 5), which were remarkable items for the potential association between low input factors and animal welfare in small scale dairy farms.

Table 5. Basic elements of low input farming systems (adapted from: Poetsch, 2007)

Elements	Considerations
Reduction of external resources (concentrates, mineral fertilisers, fossil energy)	Improve forage quality, legume based forage systems, enhance manure efficiency, mechanical and biological weed control, use of renewable energy
Maximisation of grazing	**Full grazing systems, harmonization lactation time with vegetation period**, improve forage conversion efficiency, synchronisation of calving, animal welfare and health; reduce forage conservation costs, natural hay drying systems, no maize (or little)
Optimized animal husbandry	**Low replacement rate (dairy cows), high life-performance (balanced yield and longevity), site adapted local breeds - lightweight animals to avoid sward damage**
Cheap and labour extensive animal housing systems	**Free-range husbandry,** wooden barn structures and farm buildings, stable co-operations
Reduction of costs for farm machinery and other farm equipment	**Inter-farm co-operations,** use of machinery rings, management co-operations for larger areas (valleys)

In the SOLID project, three farm categories were defined: Low Input (LI), Medium Input (MI) and High Input (HI) (Moaks et al., 2012). The LI indicator chosen by SOLID refers to the total farm expenditure for purchased feed (for grazing livestock), fertilizers, crop protection and energy, expressed as € per Grazing Livestock Unit (€/GLU). Farm types were defined as: **Low-input** farms spending less than 80 €/ha per year on fertilisers, crop protection and concentrated feedstuff. **Medium-input** farms from 80 and 250 €/ha per year for the mentioned costs and **High-input** farms reaching 250 €/ha per year on these inputs (EEA, 2005).

Low concentrate use

However, for dairy farms low concentrate should be the main indicator considered, since it is objective, easily measured and well described in the literature. The working group proposed a threshold value of < 800kg/cow/year. Nevertheless, there is a broad range of values described in the literature that is related to geographical and husbandry differences. Horn et al. (2014b) considered low concentrate criteria as 279 kg Dry Matter (DM) per cow and lactation (compare to 618 kg DM/cow and lactation in the high concentrate group) in Austria. However Ferris (2014) considered 560 kg per cow and lactation as low concentrate input in the UK. In the SOLID project (Horn et al., 2014a) experiments were completed in spring 2014 and the data are currently being analysed. From the preliminary results, concentrate levels of the control and low input groups were 656 vs. 286 kg in Austria, 1657 vs. 717 kg in Northern Ireland and 2880 vs. 1359 kg in Finland. These figures differ from what has been considered extreme low-input with 200 kg DM of concentrates per cow and year and 6000 Kg of milk yield in Germany (Müller-Lindenlauf, 2008).

Other indicators of interest are the percentage of home grown concentrate use and the percentage of home grown roughage use.

1.3.1.10. Criterion 5: Breeds

Smallholders look for the optimization of the farming system, not the individual animal, in a multifunctional way (Vellinga, 2012) and many farms pursue a diversified production. Indigenous breeds, which are defined as breeds ”originating from, adapted to and utilized in a particular geographical region” (FAO, 2005) often form the basis for such production systems. Such indigenous breeds may be distinguished from ‘locally adapted’ breeds, which “have been in the country for a sufficient time to be genetically adapted to one or more of traditional production systems or environments in the country” (FAO, 2005). Indigenous breeds may also provide added value such as local breed-specific products or association with brandings like “local food”, “slow food” or others (see below: production type) (Hiemstra et al., 2010).

It is important to ensure that locally adapted breeds remain functional parts of production systems in order to maintain adaptive fitness traits, as these are genetically complex and cannot easily be achieved by selection over a short period of time (CGFRA, 2012). The factors affecting dynamics of indigenous breeds across Europe are valuable information, and should be carefully considered in conservation and development policies common to all European countries.

Examples of the most prevalent indigenous dairy breeds in Europe are: *Albanian (Albania), Grauvieh, Pinzgauer (Austria, Romania), Danish Jersey (Denmark), Angler, Murnau-Werdenfelser (Germany), Agerolese, Burlina, Reggiana (Italy), Blaarkop, Groningen (Netherlands), Canaria, Pasiega, Menorquina, Rubia gallega (Spain), Original Braunvieh, Évolène (Switzerland), Ayrshire, Dairy shorthorn (UK).*

According to Gandini et al. (2010) almost all local breeds are kept, by a certain percentage of farmers, together with other breeds. In some cases, the animals pertaining to an indigenous breed represent a small percentage of the total herd, and it can be questioned whether this type of farming is really protecting rare/local breeds or if these are just kept as hobby activity. Therefore a minimum percentage of 50% for the indigenous breed(s) at the level of adult dairy cows is suggested.

1.3.1.11. Criterion 5: Production type

The SSDF broad definition takes the production type into account, among which are included:

Organic/biodynamic production

The four IFOAM principles (principle of health, principle of ecology, principle of fairness and principle of care), are the roots from which organic agriculture grows and develops, and serve to inspire the organic movement in its full diversity (IFOAM, 2014). Organic production is an overall system of farm management and food production that seek to combine good environmental practices, a high level of biodiversity, the preservation of natural resources, the application of high animal welfare standards and a production method in line with the preference of certain consumers for products produced using natural substances and processes (834/2007/EC). Basic requirements are described in EU regulation (834/2007/EC; 889/2008/EC), and include organic feeds (at least 60% should be own production), maximum use of pastures (as long as climatic conditions allow it), limited medicine use, etc.

PDO, PGI or TSG products

Three specified production types may be mentioned here: Protected designation of origin (PDO), Protected geographical indication (PGI), and Traditional specialities guaranteed (TSG). They are included because both production and processing are linked with the territory. PDO and PGI are often related to processed products (cheese, etc), and an example of TSG is "Hay Milk".

*A **geographical indication (GI)** legally identifies and formally recognizes food products as originating from a specified territory or region, whereby the noted quality, reputation or other characteristic of the product are essentially attributable to its geographical origin and/or the human or natural factors there. Geographical indications are recognized as a unique expression of local agro-ecological and cultural characteristics and are valued as signals of high quality and local tradition in more than a hundred nations (Padel, 2010).*

For products of **protected denomination of origin (PDO)** *the denomination refers to the name of a region, of a specific place, or (in exceptional cases) of a country used to identify an agricultural product or foodstuff. The label can be used by products that originate from this specific place or country, possess the qualities essential to the product (including natural and human factors) and which are processed in the defined geographical area (Padel, 2010).*

A **protected geographical indication (PGI)** *also refers to products that are identified using the name of a geographical area (a region, a specific place or in exceptional cases a country). The product has to originate in that geographical area to which quality characteristics are essentially or exclusively attributed and production and/or processing and elaboration also take place in that specific zone (Padel, 2010).*

1.3.1.12. Other descriptive criteria

Other criteria regarding husbandry practices were found in the literature; they are presented secondly as descriptors in order to complete the overview on small scale dairy farms.

Total land (ha)

Reijs et al. (2013) considers that in North Europe small farms vary between 30 and 35 ha/farm and have different grazing systems (out of which 80-90 % corresponds to grassland). For instance, Leach (2012) found sizes ranging from 21 to 204 ha per organic farm, depending on the country studied in North Europe.

According to Perea et al. (2010), northern Spanish organic dairy farms operated less than 50 ha (88 % of farms), with an average of 44.9 ± 9.7 ha. This is similar to the Italian average (42 ha), but less than in Germany (55 ha), UK (59 ha) and Denmark (66 ha).

In the context of Latin America, FAO (2012) considered land area as a basic criterion to delimit small scale dairy farms. The maximum was established at 50 ha despite large variability between countries, and usually the values were around 20 ha.

Stocking density

Livestock Unit (LSU or LU) is a reference unit which facilitates the aggregation of livestock from various species and age as per convention, via the use of specific coefficients established initially on the basis of the nutritional or feed requirement for each type of animal. Grazing Livestock Units (GLU) are the Livestock Units of grazing livestock (cattle, sheep, horses, deer and goats). The reference unit used for the calculation of livestock units (=1 LU) is the grazing equivalent of one adult dairy cow producing 3000 kg of milk annually, without additional concentrated foodstuffs (Eurostat).

In general, this is a variable value ranging from 0.8 to 1.6 LU/ha in organic dairy farms in North Europe (Leach, 2012). For instance, northern Spanish organic dairy farms averaged 1.12 LU/ha, and Mata (2011) concluded that the technical optimal value is 1 LU/ha.

According to EU regulation 889/2008/EC, 2.0 LU/ha is the stocking rate limit imposed in organic farming.

Farming system, other indicators

Ownership of farms may be another criterion to take into account, as well as the **level of engagement** (full-time farmer, part-time farmer or opportunistic farmer).

The enterprise legal form was analyzed by Perea et al. (2010). Organic dairy farms in Spain are mostly single family farms (46.6 %), and to a lower percentage are community properties (26.6%) or mercantile associations (26.6 %).

Labour capacity: workforce

Annual work unit (AWU) corresponds to the work performed by one person who is employed on an agricultural holding on a full-time basis. Full-time means the minimum hours required by the relevant national provisions governing employment contracts. If the national provisions do not indicate the number of hours, a minimum of 1800 working hours should be taken as reference. This is equivalent to 225 working days of eight hours each (Eurostat, glossary).

In the Spanish organic dairy farms (Mata, 2011) the average was 3.21 ± 0.66 AWU at the farm, corresponding to 6.06 AWU/100 cows, or 2.2 ± 24.4 AWU according to Perea et al. (2010). A value of 6 AWU/100 cows was considered an optimal technical value.

Leach (2012) found 3.8 AWU/100 ha (Austria), 1.2 (Denmark), 2.3 (Finland), 1.9 (UK) in organic dairy farms.

The workforce of an enterprise, activity, or country etc. can then be added up and expressed also as the number of **full-time equivalent (FTE)** which is a unit to measure employed persons in a way that makes them comparable although they may work a different number of hours per week (Eurostat)..

Outputs

This criterion has to be taken with caution and in parallel with the level of input in order to be considered for the SSF categorization. For this reason it is presented as a descriptor in this review. Nevertheless, **low milk output** per hectare or per cow (kg/year or L/year) of < 6000 kg/ha is proposed in a publication from Rejis et al. (2013). Rejis et al. (2013) considered the farm unit as small if it produces <600,000 kg of total milk, oscillating between 7000-8300 kg milk /cow and year, or between 10000-15000 kg milk/ ha (data from Netherlands). Reijs et al. (2013) also found that the level of milk production varied, apparently depending on the technical skills and other factors such as biotype, management and structure.

Leach (2012) found an average milk output of 4576 L/cow/year (Austria), 6444 (Denmark), 7765 (Finland), 5603 (UK) in organic dairy farms.

Economic size

European size unit (**ESU**) is a standard gross margin of EUR 1200 that is used to express the economic size of an agricultural holding or farm. For each activity (or 'enterprise') on a farm, the standard gross margin (SGM) is estimated based on the area used for the particular activity (or the number of heads of livestock) and a regional coefficient. The sum of all such margins derived from activities on a particular farm is its economic size, which is then expressed in European size units (by dividing the total SGM in Euro by 1200, thus converting it to ESU) (Eurostat).

Skarżyńska (2013) considered less than 8 ESU very small, 8-16 medium-small, 16-40 medium-large and more than 40 large dairy farms.

The system distinguished six classes of farm size, i.e. very small farms (0–4 ESU), small farms (4–8), medium-sized farms (8–16), large farms (16–40), very large farms (40–100) and the biggest farms (over 100 ESU) (Błażejczyk-Majka et al., 2011).

Commercialization

There are quite a lot of criteria related to the commercialisation of the products that are very interesting, although currently there is not information available regarding reference standards. It would include:

- Type of circuit: before it gets to the hands of consumers, milk goes through the following main channels:
    - Traditional circuit or long channel (wholesale): Milk collected through this circuit is used for the production of pasteurized milk and milk derivatives, which is ensured by industrial units and privately owned dairy cooperatives (Bensaha, 2014). It includes conventional supermarkets, big store, supercenters, mass merchandiser (Dimitri, 2007).
    - Parallel circuit or short channel (retail): This is the case of farmers who sell milk directly to consumers or after transformation into various products in a controlled manner (Bensaha, 2014). Consists of natural products supermarket chains, independent stores, and health food stores (Dimitri, 2007).

  Pastoralists tend to be connected to more informal dairy chains, and commercial farming to more licensed formal dairy chains (Van der Lee et al., 2014)

- Type of industry: development of traditional industries, conventional, % transformation of the product. For the local breed, on average most (39.9 percent) of the production is sold to industry, followed by local markets (25.4 percent), on farm as raw material (9.6 percent), and on farm as processed material (5.9 percent) (Gandini et al., 2010).
- Type of sale: percentage of direct sales and percentage of milk delivered to the dairy industry.

1.3.2. Outcomes

1.3.2.1. Criteria for categorisation of small scale dairy farms

Based on the literature review described above, six criteria and respective thresholds were defined for the categorisation of small-scale farms (Table 6). They include the herd size, the amount of access to pasture, the type of enterprise, the amount of input in terms of concentrate use, the use of local breeds and the production type.

Additionally, data from the questionnaire (see chapter 1.3.1.4) were used to cross-check that the criteria may be fulfilled by members of the umbrella organisations as far as possible. Other descriptors which have been mentioned in the literature in connection with small-scale farming, but which have not been selected for categorisation are dealt with in Table 7.

The upper limit regarding herd size of 75 cows had already been defined by the mandate. However, it is well in the range of the values found in the literature to categorize small-scale farms. Also the

analysis of farm structure data confirmed that a considerable proportion of European dairy farms will be eligible when applying this criterion.

Management strategies regarding pasture use are highly variable in Europe. Access to pasture may provide benefits for animal welfare and is also often connected with a less intensive production, while zero-grazing has become increasingly common with the intensification of dairy farming. Permanent, all-year-round access to pasture is rather uncommon in Europe, but levels of pasturing in terms of proportion of the vegetation period may vary. Therefore an additional category of access to pasture (i.e. only part of the vegetation period vs. majority of the vegetation period) has been introduced.

With regard to the categorisation as small-scale farm, four other criteria have been identified from the literature. These include the source of workforce, the level of input in terms of concentrate use, the use of indigenous breeds and the production type in terms of affiliation with a number of certified programmes. However, it appeared too strict to use all four criteria as inclusion criterion. Instead, taking the high variability of European dairy farming systems into account, the fulfilment of two out of the four criteria may be regarded sufficient (e.g. family-run AND organic farm, or low concentrate use AND Traditional specialities guaranteed). Regarding the thresholds, again the diversity of farming systems and local conditions across Europe was taken into account. E.g. in terms of concentrate use, the threshold was adjusted to the median lower limit as identified from the literature in order to avoid being too strict.

Table 6. Criteria for small scale dairy farm description and categorisation

CRITERIA FOR SMALL SCALE DAIRY FARM DESCRIPTION AND CATEGORISATION			
Criteria	**Sub-criteria**	**Threshold value**	**Short description**
Herd size	-	**< 75 cows**	Cows including dry cows and lactating. ***Reference for 75 cows: Reijs et al. (2013)***
Total grazing time	-	**Between 300 days and 365 days/year** **Between 300 and 120 days/year** **Between 15 and 120 days/year** **Under 15 days/year**	All-year-grazing extended-grazing restricted-grazing zero-grazing
Sources of work	**Family-workforce**	***> 80 %***	Percentage of workforce from family members (full or part-time).
Level of input	**Concentrate use**	***800 kg/cow/year***	Lower limits for low-input regarding concentrate use range from 200 (Ireland) to almost 1400 kg/cow*year (Finland) (Horn et al. 2014a). The suggested threshold of 800 kg/cow*year is considered to be close to the median of what is considered low-input concentrate use in Europe and will thus include most of the low input farms.

Breeds	**Indigenous breeds**	***Semi-quantitative data (at least 50% of the herd belong to local breed)***	It includes farms that keep indigenous, mostly dual purpose breeds, which is often associated with trends like "local food", or others (see more under products type) (Hiemstra et al., 2010). See a list of breeds in section 1.3.1.7.
Production type	**Production type (certification for marketing purposes)**	***Qualitative data***	Organic production Biodynamic production Protected designation of origin (PDO) Protected geographical indication (PGI) Traditional specialities guaranteed (TSG)

636

637 Beyond the criteria defined in Table 6, further aspects have been identified from the literature that may
638 be used to categorise the farms. These descriptors are reported in Table 7. They comprise information
639 which was not regarded as crucial to distinguish farm categories, but may be used to further
640 characterise the farms and will therefore be assessed during the on-farm survey as far as possible.

641 **Table 7. Additional descriptors for small scale dairy farm description and categorisation**

ADDITIONAL DESCRIPTORS FOR SMALL SCALE DAIRY FARM DESCRIPTION AND CATEGORISATION				
Descriptor	**Sub-descriptor**	**Reference value**	**Reference**	**Short description**
Land and land use	**Total farm land area**	< 50 ha	FAO (2012)	In Europe, total farm size is very variable between farms and countries. This also applies to organic farms, with an average ranging from 21 ha to 204 ha Leach (2012).
	Stocking density	< 1.2 LU/ha Range (0.8-1.6 LU/ha)	Leach (2012)	Livestock Unit (LU) is a reference unit which facilitates the aggregation of livestock from various species and age as per convention, via the use of specific coefficients established initially on the basis of the nutritional or feed requirement of each type of animal (Eurostat).
Ownership	**Other indicators**	*Qualitative data*	-	Ownership of farms Level of engagement (full-time farmer, part-time farmer or opportunistic farmer) Enterprise legal form

Labour capacity	**Workforce**	1.2–3.8 AWU/100 ha 2.2-3.2 AWU	Leach (2012) Mata (2011) Perea et al. (2010)	Annual work unit (AWU) corresponds to the work performed by one person who is occupied on an agricultural holding on a full-time basis (that means the minimum hours required by the relevant national provisions governing contracts of employment). If the national provisions do not indicate the number of hours, then 1800 hours are taken to be the minimum annual working hours: equivalent to 225 working days of eight hours each (Eurostat).
Outputs	**Milk output**	< 6000 kg milk/ha Range (4576-7765 L/cow/year or 7000-8300 Kg/cow/year)	Reijs et al. (2013) Leach (2012)	Milk yield is highly variable both at cow level and on a per hectare basis, also in organic farms. The range shown are from organic dairy farms in Northern Europe.
Economic aspects	**Economic size**	< 16 ESU (<8 very small)	Skarżyńska (2013) Błażejczyk-Majka (2011)	European size unit (ESU) is a standard gross margin of EUR 1200 that is used to express the economic size of an agricultural holding or farm (Eurostat).
	Other indicators	*Qualitative data*	-	Net margin per area (€/ha) (see also Low Input section 1.2.2.). Salaries, Subsidies, Sources of income
Commercialisation	**Commercialization**	*Qualitative data*	-	Short chain: farms that sell their products directly to the consumers. Long chain: farms that bring their milk to the collection point and from there to the dairy industry.

1.3.2.2. Definition of small scale dairy farms

The small scale dairy farms are farms with different managerial and structural characteristics that have a herd size of up to 75 cows, apply different grazing systems and fulfil two criteria out of the following: i) more than 80% of the workforce provided by family members; ii) less than 800 kg of concentrate per cow per year; iii) use of indigenous breeds and iv) belonging to a certification scheme (organic production, biodynamic production, protected designation of origin, protected geographical indication, traditional specialities guaranteed).

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APPENDICES

Appendix A. Objectives of the Procurement project

The aim of the procurement procedure is to conclude a direct service contract for a data collection for the description of European small-scale farms (SSF) based on size, farming system and husbandry practices and categorisation of SSF based on quantified welfare risks.
Target population are dairy cows kept in SSF of less than 75 cows including both lactating and dry cows. The three types of farming systems have to be considered:

i) zero-grazing (cows kept inside all year long),

ii) all year grazing (cows kept outside all year long),

iii) mixed (cows kept inside in winter, outside in summer).

For the development of this project, strict collaboration with the EFSA working group on "Assessment of dairy cow welfare in small scale farming systems" is foreseen in a step-wise process where the WG will provide the Contractor with the background information for the development of the different objectives of this project and the feedback on the project deliverables which need to be followed by the Contractor. Objectives are listed here below:

Objectives:

The objectives of the contract resulting from the present procurement procedure are as follows:

1. **Objective 1**. To identify the existing umbrella organisations with criteria for small scale farms. In particular, the Contractor will:

    - propose a methodology to identify the existing organisations with criteria for small scale farms e.g. associations or networks of dairy farmers and other sources of information on criteria for small scale farms such as national databases, sources of raw data (e.g. PhD thesis, surveys etc), key experts with a knowledge on existent small scale farms. Criteria for small scale farming should include size of the farm, farming system and husbandry practices.
    - It is important that the combination of identified umbrella organisations include farms of the three types of farming systems (zero-grazing, all year grazing and mixed)
    - provide feedback to EFSA and agree with EFSA on the methodology proposed for the identification of such organisations

2. **Objective 2**. To collect and collate information about the identified criteria for small scale farming and propose a classification for few relevant categories of small scale farms, also including information about the main risk factors that can be encountered in such farms. In particular, the Contractor will:

    - create a list of those criteria that are used to describe small scale farms in terms of size, farming system, husbandry practices
    - agree with EFSA about the criteria that can be used for describing small scale farms
    - based on a list of risk factors[7] for conventional farming (extracted from the EFSA scientific opinions of 2009[8] and 2012[9]) that will be provided to the Contractor by the Working Group, the Contractor will have to select those that apply to the small scale farms as well as eventually identify new risk factors that only apply to the latter.

7 Risk factor = in this context is a factor with the potential to cause poor welfare
8 "Effect of farming systems on the welfare and health of dairy cows" (EFSA, 2009)
9 "The use of animal-based measures to assess welfare of dairy cows" (EFSA, 2012)

- propose a classification for relevant categories of small scale farms based on size, farming system and husbandry practices and provide a short description for each category including information on the risk factors that are present in each category.
- the proposed relevant categories of small scale farms will be discussed and agreed with the working group as a basis for the next objectives.

3. **Objective 3**. Based on the outcomes of objective 2, the Contractor will propose a draft protocol for the farm-based survey on risk factors and animal-based measures in small scale farms. In particular:

   - The protocol for the farm-based survey will be similar to the one included in the EFSA scientific opinion on "Multifactorial approach for pig welfare assessment"[10]. The information to be collected in the survey will include:

     a. a checklist of risk factors based on the criteria defined under Objective 2 plus other risk factors recommended by the working group (examples include classification of housing, flooring and bedding used on farm breed, herd size and stocking density, outside access and days at pasture, water and feed provision, days in milk, parity, management and biosecurity, access to veterinary services and treatments, training and practices of stockhandlers, dehorning and tail docking)
     b. a checklist of animal-based measures (ABMs) based on the Welfare Quality protocol for dairy cattle and recommendations by the working group (examples include body condition score, lameness, milk somatic cell count, mortality, dystocia, downer cows, clinical observations and surface lesions)

   - A pragmatic approach should be followed to guarantee proper assessment of risk factors provided in the protocol for the data collection. For both risk factors and ABMs a detailed description of how the observation should measured and recorded is required to ensure comparability of results between observers. The protocol shall be agreed with the working group prior to starting the survey under objective 5.

   - The Contractor will discuss the draft protocol and agree on a final protocol for the farm-based survey with the Working Group on "Assessment of dairy cow welfare in small scale farming systems".

4. **Objective 4**. To prepare a draft sampling plan for the visits to the farms for the farm-based survey on risk factors and animal-based measures following the protocol agreed under Objective 3. In particular, the Contractor will:

   - propose a draft sampling plan ensuring that:
     - a minimum of 120 (a hundred and twenty) farms are surveyed
     - the umbrella organisations identified and contacted under Objective 1 that ensure farms in more than one country are included in the plan
     - the farms are selected from the memberships of the umbrella organisations upon agreement of the farmers
     - the farms to be surveyed are evenly split between the umbrella organisations identified under Objective 1 within the farms of the categories identified in Objective 2.
     - a minimum of 5 farms per each category and per each organisation proposed under objective 2 are surveyed.

   - agree with EFSA about the final sampling plan (the Assistance and Methodology Unit of EFSA will provide support for the revision of the sampling plan)

10 "Multifactorial approach on the use of animal and non-animal based measures to assess the welfare of pigs " (EFSA, 2014)

5. **Objective 5**. The Contractor will perform the farm-based survey about risk factors and animal-based measures in small scale farms using the protocol agreed under objective 3. The objective of the farm-based survey is to understand if the small farm criteria proposed under Objective 2 provides a suitable categorisation/association to the risk factors and animal based measures observed on farm. In particular:

    - The protocol should be tested on at least one farm from each category and each organisation. The Observer(s) performing the farm-based survey should take note of any issue in taking the observations and the protocol should be revised in discussion with the working group before starting the full farm-based survey.
    - Submission of first test data via DCF (after testing the protocol on at least one farm from each organisation) and agreement on farm-based survey modifications
    - All observers participating in the survey should be trained in the correct application of the protocol prior to starting the survey.
    - visit the number of farms agreed under Objective 3 and collect data according to the agreed protocol
    - all farm visits should be completed within a 2 month period from agreement of the revised protocol that may follow the first visits
    - During the survey, issues related to the measurement and recording of the ABMs and risk factors, issues related to the survey protocol and reasons for non-participation should be described and recommendations to improve the survey provided in the final report.

6. **Objective 6.** Submit data via the EFSA Data Collection Framework (DCF)[11] and, in the final report, submit recommendations based on the experience for implementation and application of the survey. The data models and validation procedures to be used for the submission of data via the DCF will be agreed with the contractor during the interim meeting 1.

Note: each appendix should start on a new page.

[11] DCF is a web interface accessible by most common web browsers through which data providers can submit data files.

Appendix B. List of organisations contacted by the consortium partners

Slow Food has involved its Presidia, projects that are aimed at protecting and promoting traditional food products at risk of extinction. There are 400 Slow Food Presidia around the world, and 38 linked to dairy cattle (protecting native dairy cattle breeds or high-quality, traditional cheeses) in two of the four countries in which the project is being run, namely Italy and France. Slow Food has no dairy cattle projects in Spain and Austria. They unite 160 farmers. In particular, as well as receiving the news via the newsletter, the representatives of the Presidia producers were contacted directly, by phone, to ensure that the most receptive producers, and those most representative of a small-scale model, would participate in the project. Small-scale producers tend to rarely be online, and can often be more easily reached by telephone. Some of them registered their associations, while others offered their individual availability. Attachment 2 is a list of producers who have already said they are willing to participate in the project.

The call was also sent through all FAO's networks reaching more than 6000 contacts, including:

- FAO relevant websites and portals
- FAO networks (Animal welfare; Private Sector, Producers, Civil Society and Academic Partners; Dairy Outlook; Domestic Animal Diversity Information System - DAD-IS; Animal feeding and Nutrition, etc.)
- Gateway to Farm Animal Welfare
- International Dairy Federation (IDF)
- European Dairy Association
- European Dairy Farmers
- Assolatte (Italian Dairy Association)
- Coldiretti (Italian Farmer Association)
- World Farmer Association (WFA)
- International Farm Comparison Network (IFCN)
- Pan-American Dairy Federation (FEPALE)
- International Federation of Organic Agriculture Movements (IFOAM)

The call was also sent by IRTA directly to 68 associations, including:

- CONAFE: Confederation of Spanish Holstein Friesian Associations
- Regional Federations for milk control / Friesian Associations
- Regulatory councils of Spanish organic farming
- Slow food-Spain
- European Grassland Federation
- Biodinamic Associations

- Family farming associations
- PDO/PGI spanish products. Cow's milk cheese
- Native breeds
- Integrated Breeds

The call was also sent by University of Natural Resources and Life Science (BOKU) directly to 49 associations, including:

- Organic Association
- Organic Dairys
- Special Feeding
- Formularende
- Regions
- Other
- Breeding Associations

The call was also sent by INRA directly to these 11 associations:

- Institut technique de l'agriculture biologique
- Cantal Haut herbage
- Gab 44
- Gab 56
- Web agri
- Biolait
- Corabio
- Lait bio payse de loire
- Race de France
- Fevec
- FNGDS

The call was also sent by the French Livestock Institute (IDELE) directly to these 15 associations:

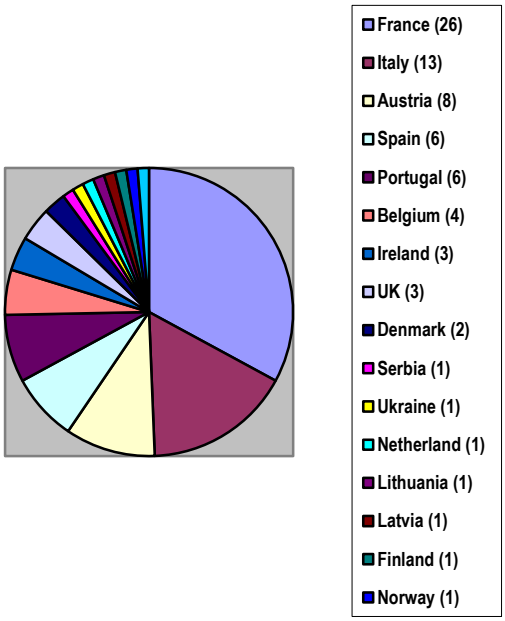
- Terroir 44
- FNPL: Fédération Nationale des Producteurs de Lait
- OPL : Organisation des producteurs de lait/ Coordination rurale

- FNCL: Fédération Nationale des Coopératives Laitières
- FNIL: Fédération Nationale des Industries Laitières
- Lactalis
- Sodiaal
- CNIEL
- Organisation des producteurs de lait : opl
- Les éleveurs laitiers du haut anjou
- Upra aubrac
- Délégués régionaux Idele (19 personnes contactées)
- ATLA
- Coop de France Ouest

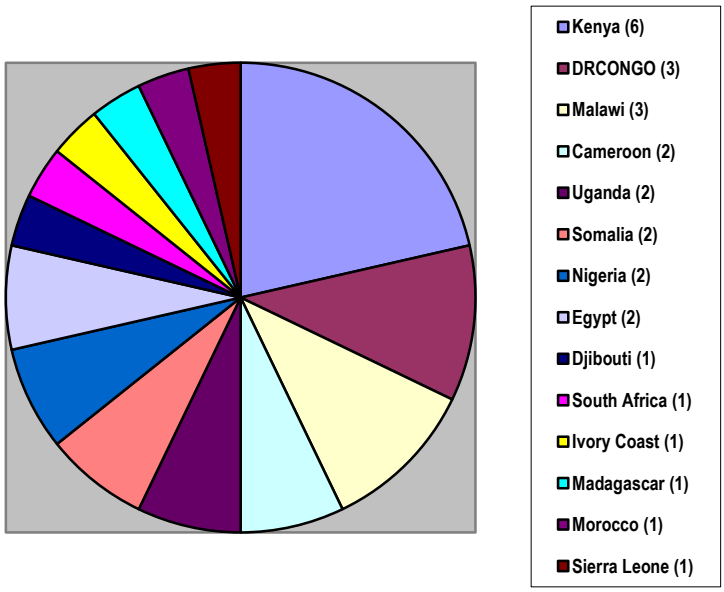
Appendix C. Results from the questionnaire

A total of 140 associations/organizations that unite dairy cattle farmers from around the world filled in the questionnaire. The responses were divided by continent as such: 79 from Europe, 28 from Africa, 19 from Asia, 12 from America and 2 from Oceania (details can be found in Appendix 2).

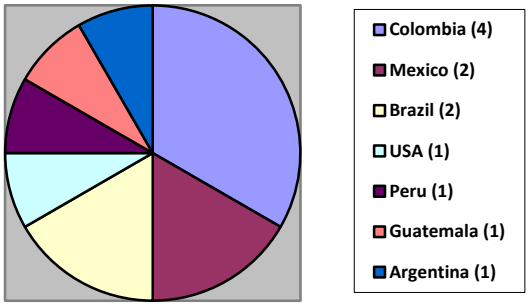
The responses from Europe came from 17 countries, divided as such:



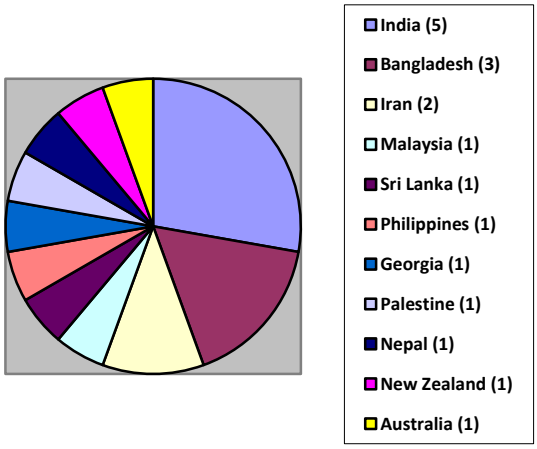
The responses from Africa came from 14 countries, divided as such:



The responses from the Americas came from 7 countries, divided as such:



The responses from Asia and Oceania came from 11 countries, divided as such:



A total of 53 responses came from countries where visits will be made as part of the project, divided as such between the four countries:

- France (26)
- Italy (13)
- Austria (8)
- Spain (6)

Appendix D. Results from the associations/organisations divided by country (for the four countries where the on-farm survey will be carried out)

RESULTS FROM ITALIAN ASSOCIATIONS/ORGANIZATIONS

Name of the Association/organization	How many farmers are member	Protect and promote dairy products with a geographical or typical indication (e.g. PDO, Slow Food Presidia,..)	Promote animal welfare and/or assist its farmers to implement animal welfare practices	Farmers who breed rare or indigenous (local) cattle breeds	Include organic or biodynamic farms	Include dairy producers	Provide inspection and products or production certification (e.g. organic, biodynamic, etc.)	Farmers who use pasture or grazing for at least 4 months per year	How many small-scale farmers in %
Cooperativa Malghesi Carnia e Valcanale	25		X	X		X		X	80%
Caseificio Val Tagliamento S.c.a	40					X		X	80%
Caseificio Alta Valsesia Società cooperative agricola	25	X	X	X		X		X	98%
Associazione Presidio del Formaggio Macagn	3	X	X	X		X	X	X	100%
Associazione per la tutela e la valorizzazione del pallone di Gravina	10	X	X		X			X	10%
Consorzio valorizzazione prodotti bovini di razza bianca valpadana modenese	19 (8 dairy)	X		X	X	X			75%
Consorzio Salvaguardia Bitto storico	12	X		X		X	X	X	100%
Consorzio di tutela della razza bovina cinisara	20	X		X	X	X		X	100%

Associazione produttori Saras del Fén delle Valli Valdesi	17	X		X		X		X	85%
Associazione Nazionale Allevatori Bovini di Razza Grigio Alpina	1486	X	X	X	X	X		X	99,9%
Razze Autoctone a Rischio di Estinzione (R.A.R.E.)	-			X		-		-	-
International Committee for Animal Recording (ICAR)	68								0%
Rosa Canina Pet Formulas	700	X	X	X	X	X	X	X	100%

TABLE 3: RESULTS FROM SPANISH ASSOCIATIONS/ORGANIZATIONS

Name of the Association/organization	How many farmers are member	Protect and promote dairy products with a geographical or typical indication (e.g. PDO, Slow Food Presidia,..)	Promote animal welfare and/or assist its farmers to implement animal welfare practices	Farmers who breed rare or indigenous (local) cattle breeds	Include organic or biodynamic farms	Include dairy producers	Provide inspection and products or production certification (e.g. organic, biodynamic, etc.)	Farmers who use pasture or grazing for at least 4 months per year	How many small-scale farmers in %
Africor Lugo	1720		X		X	X		X	80%
La Serrana Zarzalejo S.C.	570 (50 dairy)					X		X	40%

Ugam-Coag	1500	X		X	X	X		X	80%
Sindicato Labrego Galego-Comisions Labregas	2863			X	X	X		X	80%
Lursail	4000 (300 dairy)				X	X		X	67%
Asociacion Frisona Andaluza	162	X							18%

TABLE 4: RESULTS FROM AUSTRIAN ASSOCIATIONS/ORGANIZATIONS

Name of the Association/organization	How many farmers are member	Protect and promote dairy products with a geographical or typical indication (e.g. PDO, Slow Food Presidia,..)	Promote animal welfare and/or assist its farmers to implement animal welfare practices	Farmers who breed rare or indigenous (local) cattle breeds	Include organic or biodynamic farms	Include dairy producers	Provide inspection and products or production certification (e.g. organic, biodynamic, etc.)	Farmers who use pasture or grazing for at least 4 months per year	How many small-scale farmers in %
Zillertaler Heumilch-Sennerei eGen	320	X		X	X	X	X	-	100%
Bio Austria	12092	X		X	X	X	X	X	-
Biolandwirtschaft Ennstal	560	X	X	X	X	X	X	X	100%

Tiroler Grauviehzuchtverband	1300	X	X	X	X	X	X	X	100%
Demeter Österreich	180	X	X	X	X	X	X	X	95%
Zentrale Arbeitsgemeinschaft österreichischer Rinderzüchter	22500		X	X	X	X	X	X	95%
Arche Austria - Verein zur Erhaltung seltener Nutztierrassen	1000	X	X	X	X	X		-	32%
Ig ennstaler bergscheckenzüchter	70		X	X	X	X			100%

TABLE 5: RESULTS FROM FRENCH ASSOCIATIONS/ORGANIZATIONS

Name of the Association/organization	How many farmers are member	Protect and promote dairy products with a geographical or typical indication (e.g. PDO, Slow Food Presidia,..)	Promote animal welfare and/or assist its farmers to implement animal welfare practices	Farmers who breed rare or indigenous (local) cattle breeds	Include organic or biodynamic farms	Include dairy producers	Provide inspection and products or production certification (e.g. organic, biodynamic, etc.)	Farmers who use pasture or grazing for at least 4 months per year	How many small-scale farmers in %
Union Rouge Flamande	65	X		X	X	X	X	X	100 %
Fevec	825		X	X	X	X		X	85 %
Union Bleue du Nord	25	X		X	X	X		X	100 %
Biolait Sas	630	X	X	X	X	X	X	X	100%
Itab	-		X	X	X	X	X	X	non comptabilié mais une très grande majorité
Groupement des Agriculteurs Biologiques de la Manche	95		X	X	X	X		X	90%
Groupement des agriculteurs biologiques de l'orne	100		X	X	X	X		X	98%
Lait Bio 12	7			X	X	X	X	X	100%

Groupement des Agriculteurs Biologiques du Calvados	50	X	X	X	X	X		X	100%
Bio Centre	15	X	X	X	X	X		X	85%
Agrobio 35	320 (130 dairy)		X	X	X	X	X	X	98%
Agribio04/05	60	X	X	X	X	X		X	100%
Grab Hn	100			X	X	X		X	100%
Federation Nature & Progres	124	X	X	X	X	X	X	X	
Mouvement de l'Agriculture Biodynamique	50	X	X	X	X	X		X	100 %
Réseau Gab-Frab	284	X	X	X	X	X		X	100%
Sedarb	145	X	X	X	X	X		X	100 %
Confédération paysanne Bretagne	500			X	X	X		X	75%
Agribio06	20	X	X	X	X	X	X	X	
Gab 44	500		X	X	X	X		X	75%
Association de fromagers fermiers et artisanaux des Pyrenees	105	X		X	X	X		X	100%
Lait Bio de France	850	X	X	X	X	X		X	100%

Gabb Anjou : Groupement des Agriculteurs Biologistes et Biodynamistes du Maine-et-Loire	37		X	X	X	X		X	100%
Races de France	-	X	X	X	X	X		-	-
Cirad Selmet	-	X	X						-
Union des Organisations de Producteurs Aop	700	X	X	X	X	X	X	X	70%