

Using the Farm Accounts Data Network (FADN) to identify the structural characteristics and economic performance of EU cattle systems

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Summary

This paper presents a method for the comparative analysis of both the structural characteristics and economic performance of cattle farms in twelve European Union Member States. This analysis is based on 1991 data from the Farm Accounts Data Network (FADN), which using 58 000 representative farms produces a comprehensive data network of 4.4 million professional farms.

The typology used covers all cattle farms over five livestock units in size, which it classifies into four types according to the type of cattle involved (dairy, suckler cows, mixed milk and beef, beef fattening). The 1.4 million European cattle farms can thus be classified as follows: 61% dairy, 23% suckler cow, 6% mixed beef and milk and 10% beef fattening. The dairy and mixed systems are specialised (the gross income from livestock (milk and beef) represents, on average, more than 70% of the farm's total gross income) whereas on suckler cow and beef fattening farms, the gross income from livestock represents just one third of the total.

The average size of European cattle farms is 37 hectares, with 62% fodder area and 40 livestock units, that is to say an average stocking density of 1.74 livestock units per hectare of fodder. Analysis of economic performance shows very important differences between Member States, which are a result of the differences in the size and specialisation of farms.

In the countries of northern Europe, economic scale, earnings and the return on capital increase as cattle production intensifies. In the countries of southern Europe (Italy, Spain, Portugal and Greece), farms are small in size, fodder area is limited and the effect of intensification on income is less marked.

Whereas dairy farms are mainly concentrated in populated areas of intensive production, suckler cow farms are found in sparsely populated regions, where the agricultural potential is limited. In all countries, suckler cow systems are generally less specialised and less profitable than dairy farms. On the other hand they have a larger fodder area and are heavily dependent on direct subsidies.

The technical and economic data which is available in the FADN has proved very useful in characterising different cattle production systems and in appraising the different effects of the proposal for CAP reform presented by the European Commission in its position paper Agenda 2000.

Introduction

Over the last three decades, the relationship between price and technical progress has led to the intensification of agricultural production (Spindler 1991 and Tirel 1991). The stocking rate, often a decisive factor in the profitability of cattle farms, was therefore a technical indicator of how far livestock systems had adapted to the grazing potential of farms (Berranger 1991). The beef structural surplus and the problems of land use have led policy makers to use stocking rate as an element of regulation in agricultural policy (Institut de L'Élevage 1992).

In this way, as part of CAP Reform, stocking rate has become one of the factors influencing the differentiated way in which public funds are allocated to cattle farms (Colson *et al* 1995). It is in order to take this new orientation into account that a study of the intensification of French cattle farms was undertaken (Colson and Chatellier, 1996) based on the FADN and subsequently extended to include every country in the European Union.

The first part of this study of European cattle farms discusses the main strengths and weaknesses of the European Farm Accounts Data Network and then the method used to classify cattle farms into four types of production system and six classes based on herbivore stocking rates. In the second part of the study the contribution of each Member State to cattle farming in the Community is analysed as well as the technical and economic characteristics of the cattle farms in each country.

The method for analysing cattle farms in the community

In order to count and characterise the cattle farms of European Union Member States, it was decided to use data from the Farm Accounts Data Network. This is a data-base representative of community agriculture, for which methods of data collection are harmonised throughout the Community and which is up-dated every year. With the aim of taking into account the entire cattle sector, a typology of cattle farms, which is not based on main activity has been constructed. This methodology distinguishes four types of production and has proved easily applicable in every country to count farms and divide them into different categories based on stocking rates.

The European FADN 1991: 1.4 million cattle farms

The main difficulty involved in carrying out a comparative analysis of groups of farms is obtaining comparable data and this is further compounded if analysis is at an international level (exchange rates, different accounting methods, differences in the definition of technical terms, etc.). In the field of agriculture the FADN, initiated in 1968 by a Community Regulation, guarantees the minimum coherence and homogeneity necessary for this type of approach.

The aim of the FADN is to show the development of farm incomes in relation to the CAP (Butault and Cyncynatus 1991). It was designed to be representative of professional agriculture in each country. From 16 000 farms at its instigation, it has since undergone several important revisions (harmonisation with new accounting methods, modernisation of data collection methods and the distribution of information) and steadily grown in size. The FADN's European survey currently

includes 58 000 farms which, after application of different extrapolation coefficients for each group of farms in the survey, are representative of 4.4 million production units.

The farms used in the Network are selected by Member States in accordance with Community standards. The number and type of farms considered varies according to region, technical and economic orientation and economic size (categories of economic size are defined according to standard gross margin)¹. The selection process aims to include a minimum representation (1% of the Eurostat survey) from each category identified in the selection. In this way the FADN covers the majority of community production.

The results of the FADN are presented in the form of farm-type averages and monetary values are expressed in ECUs. Nevertheless comparisons between Member States are subject to differences in purchasing power. The aim of this study is principally to analyse, on a country basis, the differences in characteristics and performance between cattle farms, with different stocking rates and it has not been considered necessary to calculate purchasing power equivalents. This calculation would, however, be necessary in order to compare, with greater precision, agricultural family incomes in countries with very different standards of living.

The representative nature of the FADN and the sum of information that it contains make it the most appropriate tool for this approach. Nevertheless, two important points which influence the results should be underlined: the minimum economic size of farm included in the data base and the methodology used to determine average values.

Great variation in the economic size of farms

The minimum economic size of farm used to select "professional" farms for inclusion the FADN varies according to country. In each country it corresponds approximately to the size of farm needed to generate full time employment for one person. This is very small for southern European countries (1 unit of economic size (UES) in Portugal, 2 UES in Spain, Italy, Greece and Ireland). It is small in Denmark (4 UES), average in France, Germany and the United Kingdom (8 UES), high in Belgium (12 UES) and very high in the Netherlands (16 UES).

The differences in minimum economic size considered for inclusion in the FADN influence the average results obtained for each category of farm and as a result comparisons between countries should be undertaken with caution (Caraes 1995). To understand the extent of these differences, the classification of cattle farms into three different categories of economic size has been carried out. In France these are very small (less than 16 (UES)), medium (16 to 40 UES) and large farms (more than 40 UES).

¹ A farm's standard gross margin is an estimation of its potential value added. It is measured in units of economic size (1 UES is equivalent to 1 200ECUs or 1.5 hectares of wheat equivalent) and is derived by applying coefficients, which vary between regions, to physical units of production (agricultural area and number of cattle). Using the standard gross margin enables comparative analysis of farms with different types of production and from different regions to be undertaken.

As shown in Table 1, it appears that almost half the cattle farms in Europe have a structure of less than 16 UES. This proportion is in excess of 90% in Spain, Portugal and Greece, whereas in Germany, France, Denmark, the Netherlands and the United Kingdom it is less than 30%.

Table 1. The division of cattle farms in the countries of the EU into three categories of economic size (in %)

	Size Categories (units of economic size based on standard gross margin)			Total
	16 <	16 - 40	> 40	
Germany	32%	53 %	15 %	100 %
Belgium + Lux.	12 %	58 %	30 %	100 %
Denmark	21 %	41 %	38 %	100 %
Spain	92 %	7 %	1 %	100 %
France	27 %	55 %	18 %	100 %
Greece	94 %	6 %	0 %	100 %
Ireland	73 %	21 %	6 %	100 %
Italy	60 %	28 %	12 %	100 %
Netherlands	0 %	41 %	59 %	100 %
Portugal	93 %	5 %	2 %	100 %
UK	20 %	35 %	45 %	100 %
EU (12)	46 %	37 %	17 %	100 %

Source: FADN - EEC 1991 - DG VI / A-3 / INRA - ESR - Nantes

Italy lies in between with 60% of cattle farms falling into this category. As far as those farms with a structure of over 40 UES are concerned (17% at a European level), the Netherlands and Denmark stand out with 59% and 38% of farms respectively. By contrast in Ireland, Spain and Portugal these represent less than 10% of farms.

Typology of cattle farms

The methodology used to define cattle farms is intended to take into account all cattle farmers, including those for whom cattle farming is a secondary activity (Chatellier *et al* 1997). Every farm with over five cattle livestock units is therefore considered as a "cattle farm" for the purposes of this study.

This typology identifies nearly 1.4 million of the 4.4 million farms in the European FADN as cattle farms. Analysis of their geographical distribution reveals that more than half of these are situated in just three countries: France, which has almost a quarter, ahead of Germany (18%) and Italy (15%). Spain (9%), Ireland (9%) and the United Kingdom (7%) occupy intermediate positions in front of the Netherlands (4%), Denmark (3%) and Belgium (2%).

This typology is based on farm types. Based on proportion of standard gross margin, the FADN farm types classify specialised farms according to their *main activity*. The main disadvantage of farm types is the way they categorise non-specialised cattle farms, some of which are very large. As a result a study based solely on specialist farm types (dairy, beef fattening, mixed dairy and beef) would, at a European level, only take into account 77% of dairy cows and 65% of suckler cows. Taking as a minimum requirement five cattle livestock units, this typology, by contrast, enables almost the entire cattle sector (98% of dairy cows and 95% of suckler cows) to be classified as well as 85% of total fodder area.

The combination of this cattle typology and the FADN farm types enables certain differences between countries to be identified (Table 2). For countries with a large number of small farms (Italy, Spain and Portugal), taking five cattle livestock units as a minimum requirement overlooks the smallest production units and means that part of the cattle sector and part of the total fodder area are not included in the analysis (14% of suckler cows and 42% of fodder area in Italy, 12% of suckler cows and 52% of fodder area in Spain). On the other hand this is not the case for the majority of countries in Northern Europe, where the cattle typology covers the entire cattle sector and more than four fifths of the total fodder area.

Table 2. A comparison between the typology of cattle farms and FADN farm types (41+42+43+44)² for the cattle sector and total fodder area

	Dairy cows		Suckler cows		Area of fodder area	
	Cattle Typology	FADN farm type	Cattle Typology	FADN farm type	Cattle Typology	FADN farm type
Germany	99 %	75 %	ns ³	ns	97 %	67 %
Belgium+Lux	100 %	69 %	100 %	57 %	99 %	69 %
Denmark	100 %	71 %	ns	ns	91 %	71 %
Spain	95 %	77 %	88 %	81 %	48 %	77 %
France	99 %	74 %	100 %	63 %	92 %	74 %
Greece	ns	Ns	ns	ns	ns	ns
Ireland	100 %	98 %	99 %	95 %	97 %	98 %
Italy	95 %	72 %	86 %	49 %	58 %	72 %
Netherlands	100 %	90 %	ns	ns	97 %	90 %
Portugal	76 %	59 %	ns	ns	48 %	59 %
UK	100 %	83 %	100 %	70 %	93 %	83 %
EU (12)	98 %	77 %	95 %	65 %	85 %	77 %

Source: FADN - EEC 1991 - DG VI / A-3 / INRA - ESR - Nantes

The types of production defined here include more, but also less specialised farms than FADN farm types. The farm type "dairy" at a European level includes 860 000 livestock production units, which on average account for 71% of income. The FADN farm type "dairy", however, includes 586 300 farms with a much greater cattle

² **FADN Farm Types:** 41 Cattle dairying, 42 Cattle rearing/fattening, 43 Cattle mixed (431 dairying with cattle rearing/fattening and 432 cattle rearing/fattening with dairying), 44 grazing livestock other (441 sheep, 442 cattle and sheep, 443 grazing livestock, various)

³ ns = not significant

specialisation (85%). The average difference in the size of farms using these two different typologies is greatest in Italy, where dairy farms are not very specialised (53% of them having a gross income from livestock of less than two thirds of total income). The difference is least in Ireland, where dairy farms are very specialised (10% have a gross income from livestock of less than two thirds of total income).

Four types of cattle production

Cattle farms have subsequently been divided into four production types according to their herd characteristics (Table 3). Farms with more than three suckler cows and less than three dairy cows are classified as the type "suckler cow", those with more than three dairy cows and less than three suckler cows are classified as "dairy", those with more than three suckler cows and more than three dairy cows are considered to be "mixed" and those with less than three suckler cows and less than three dairy cows belong to the type "beef fattening".

Table 3. Classification (number of farms) of cattle farms by type of production (FADN 1991)

	Type of production				Total
	Dairy	Suckler Cow	Beef fattening	Mixed	
Germany	219 400	7 400	28 300	3 800	258 900
Belgium+ Lux.	22 400	8 300	1 500	7 400	39 500
Denmark	23 000	7 200	2 100	1 200	33 500
Spain	76 400	32 100	7 500	13 200	129 000
France	181 700	113 400	14 500	28 000	337 700
Greece	21 300	4 800	500	0	26 600
Ireland	49 200	47 500	16 800	13 000	126 400
Italy	141 200	46 300	17 600	5 200	210 200
Netherlands	47 100	60	5 000	0	52 100
Portugal	41 200	21 400	21 200	1 500	85 200
UK	37 700	39 628	21 800	6 500	105 700
EU (12)	860 600	328 100	136 500	79 800	1 405 000

Source: FADN - EEC 1991 - DG VI / A-3 / INRA - ESR - Nantes

In order to avoid reducing data too much it was not considered desirable, unlike in the specific study of France (Chatellier 1997), to subdivide these four production types further. It might be possible to undertake a more technically detailed analysis of systems for the purposes of an horizontal analysis between two countries or regions, but it would be difficult to adopt this approach at the scale of twelve European countries

At community level, the division of farms between the four production types is very uneven. The type "dairy" accounts for almost 61% of cattle farms. The type "suckler cow" accounts for 23%, the type "beef fattening" 10% and the type "mixed" 6%.

In the dairy sector Germany occupies first place with a quarter of all dairy farms in the Community (Institut de L'Élevage 1993), France is in second place (21%), in front of Italy (16%) and Spain (9%). The Netherlands, where the cattle sector is orientated exclusively towards the production of milk, accounts for just 5% of European farms, but possess 9% of the 21 million dairy cows, illustrating that production units here are the largest in economic terms. Farms belonging to the type "suckler cow" are found principally in France (34%), Ireland (15%), Italy (14%) and the United Kingdom (12%). These results are similar to Community statistics on the cattle sector and show that of the 10.5 million suckler cows in the Community, nearly 4 million are found in France and 1.7 million in the United Kingdom (GEB Filières, 1993).

The farm type "mixed" is specific to certain Member States, with 80% of such farms concentrated in just four countries, which in decreasing order of importance, are: France, Ireland, Spain and Belgium. The farm type "beef fattening" comprising the specialist rearing of steers and bulls is not common in Denmark, the Netherlands and France (10%). Germany, the United Kingdom, Portugal and Italy possess two thirds of the farms in this type.

An analysis based on six different categories of stocking rate

In order to analyse cattle farms in terms of how intensively they use their fodder area, stocking rate should be calculated by relating grazing livestock units to hectares of fodder. The grazing livestock unit coefficients applied for each type of animal are the same in every Member State, unlike the definition of fodder area. The definition of fodder area includes areas of temporary fodder (rye grass, cocksfoot, etc.), areas of permanent fodder area (excluding paths, productive moors and high mountains, which constitute unmanaged poor grazing land or scrub), areas of fodder crops (beets, cabbage, swedes, etc.), maize silage and other artificial fodder.

The number of grazing livestock units per hectare of fodder, which is the technical stocking rate, enables intensity to be assessed as the relationship between the cattle and available fodder area on a farm. This indicator is, however, inadequate in assessing how fodder area is managed and what level of inputs is used (the amount of fertiliser and herbicide products applied per tonne of dry matter harvested).

Previous work has shown how difficult it is in France for any given type of production, to relate technical stocking rate, as it is defined above, to administrative stocking rate or factor of intensity as introduced in the context of CAP reform (Colson *et al* 1995). The reason for this is principally the uncertainty of predicting individual farmer's strategic choices about the planting of maize silage on land used for cereals, oilseeds and protein crops or on fodder area and the proportion of animals eligible for subsidies, which actually form the basis of a subsidy application. In this study it has been decided not to use the intensity thresholds which determine the allocation of cattle subsidies as a basis for an analysis based on stocking rate. These thresholds would only compound the formation of very unbalanced categories and in the same

way would make the comparison of results between the categories even more difficult.

Five different stocking rate levels were set (0.5, 1, 1.5, 2, 2.5 livestock units per hectare) with the aim of creating six classes between which individual farms could be divided (numbered 1 to 6 in increasing order of intensity). These particular stocking rate levels were chosen in order to overcome the representative nature of the typology, to maintain technical coherence and to ensure that the results obtained are intelligible. The aggregation of classes was undertaken at certain stages in the analysis in order to consolidate the representative nature of sample farms and to synthesise information.

An analysis of how farms are divided between these classes shows that those with a stocking rate of less than one livestock unit per hectare of fodder area represent 14% of cattle farms, whereas those with a stocking rate of more than two livestock units per hectare of fodder area represent 43%. Pursuing this line of analysis at an individual country level reveals the origin of these differences (Table 4).

Table 4. The division of cattle farms (percentage of farms) into classes based on stocking rate (grazing livestock units per hectare of fodder area)

	Stocking rate (livestock units per hectare of fodder area)						Total
	0,5 < [1]	0,5 - 1 [2]	1 - 1,5 [3]	1,5 - 2 [4]	2 - 2,5 [5]	> 2,5 [6]	
Germany	1 %	4 %	20 %	29 %	24 %	22 %	100 %
Belgium + Lux.	0 %	1 %	7 %	21 %	22 %	49 %	100 %
Denmark	0 %	4 %	6 %	10 %	20 %	60 %	100 %
Spain	4 %	10 %	12 %	13 %	10 %	52 %	100 %
France	1 %	20 %	38 %	24 %	10 %	7 %	100 %
Greece	0 %	0 %	3 %	3 %	1 %	93 %	100 %
Ireland	3 %	13 %	34 %	29 %	13 %	8 %	100 %
Italy	4 %	13 %	14 %	14 %	10 %	45 %	100 %
Netherlands	0 %	1 %	4 %	10 %	28 %	57 %	100 %
Portugal	8 %	13 %	18 %	8 %	9 %	44 %	100 %
UK	1 %	8 %	20 %	29 %	21 %	21 %	100 %
EU (12)	2 %	12 %	22 %	21 %	15 %	28 %	100 %

Source: FADN - EEC 1991 - DG VI / A-3 / INRA - ESR - Nantes

The first point to note from the way farms are divided between these classes in each country is the particular nature of cattle farms in Greece, 93% of which are listed as being in class 6. This is explained not only by intensive production methods, but also by the fact that the method used here to determine fodder area does not include poor

fodder areas or scrub, which make up an important part of the agricultural land on Greek farms. Analysis based on stocking rate would therefore not be considered meaningful for Greece. This is not a problem as Greece accounts for less than 1% of total European beef production. (GEB Filières 1993).

The proportion of cattle farms in classes 5 and 6 is particularly high in the Netherlands (85%), Denmark (80%) and in Belgium (71%). It is relatively high in Spain (62%) and Italy (55%) and close to the Community average in the United Kingdom and Germany. France (17%) and Ireland (21%) are characterised by less intensive production and by a more even division of farms between the six different stocking rate classes.

This division of farms into classes was undertaken for all cattle farms and therefore needs to be qualified by taking into consideration the relative importance of different types of cattle production in each country. The imbalances in the data in each of the six classes, has sometimes led to results not being analysed (where data is termed "not significant") or to classes being regrouped. This was especially true when looking at one of the four types of production.⁴

Table 5. The average stocking rate on cattle farms

	Types of production				Total
	Suckler	Dairy	Mixed	Beef fattening	
Germany	1,53	1,90	1,71	2,16	1,90
Belgium + Lux.	2,50	2,36	2,38	4,43	2,41
Denmark	2,30	2,87	2,71	2,89	2,80
Spain	1,14	2,57	2,01	3,26	1,89
France	1,23	1,43	1,34	1,74	1,36
Ireland	1,34	1,71	1,75	1,28	1,54
Italy	1,25	2,21	2,10	2,52	1,96
Netherlands	ns	2,71	ns	5,23	2,81
Portugal	0,97	1,98	1,20	1,88	1,47
UK	1,91	2,07	2,02	1,64	1,94
EU (12)	1,45	1,92	1,69	1,85	1,74

Source: FADN - EEC 1991 - DG VI / A-3 / INRA - ESR - Nantes

The average stocking rate on European cattle farms is 1.74 grazing livestock units per hectare of fodder area. However, this varies considerably according to the type of production. With a stocking rate of 1.45 livestock units per ha of fodder the "suckler cow" type is the most extensive, above types "mixed" (1.69), "beef fattening" (1.85)

⁴ One of the conditions imposed by the rules for using FADN data at a Community level, and which is also adopted in this study, is that of not using the results of a particular production type derived from less than fifteen actual farms, from which data is requested.

and "dairy" (1.92). There are also significant differences between countries, even when the same production type is being considered. The average stocking rate on French dairy farms is for example, 1.43 livestock units per ha of fodder, whereas this is higher at 2.5 livestock units in Spain, Denmark and the Netherlands (Table 5).

The average results obtained from combining the cattle typology and stocking rate classes mask the effects of specialisation in cattle production and economic size. Cattle farms with a high degree of specialisation have more cattle and a more efficient means of production than cattle farms which are less specialised. On the other hand less specialised farms have less land, a lower turnover and a more limited income. Economically, large cattle farms are characterised by having very large areas of land and very large numbers of cattle. They are less specialised in cattle production, have a higher stocking rate and a level of income clearly above that of small production units.

Cattle farms in Member States

This comparative study of beef farms started by measuring the importance of cattle farms in terms of land use and economic activity in each country and then analysing the structural characteristics and economic performance of beef farms followed by dairy and suckler cow farms.

The agricultural importance of cattle production in each Member State

Table 6. The means of production (percentage of total in the EU on farms in the FADN by EU Member State

	Agricultural area	Area of fodder area	Grazing livestock units	Dairy cows	Suckler cows
Germany	11,1 %	14,3 %	15,8 %	21,0 %	1,6 %
Belgium+ Lux.	1,5 %	2,3 %	3,3 %	3,9 %	4,2 %
Denmark	2,8 %	1,7 %	2,6 %	3,6 %	1,1 %
Spain	14,4 %	5,6 %	5,9 %	4,4 %	8,3 %
France	25,6 %	31,1 %	24,6 %	23,8 %	40,8 %
Greece	3,2 %	0,7 %	2,8 %	1,0 %	1,8 %
Ireland	4,9 %	9,2 %	8,5 %	6,7 %	9,5 %
Italy	13,7 %	11,7 %	9,7 %	11,1 %	8,0 %
Netherlands	2,1 %	3,6 %	5,8 %	9,0 %	0,1 %
Portugal	5,3 %	4,1 %	3,0 %	2,2 %	5,2 %
UK	15,4 %	15,7 %	18,0 %	13,3 %	19,4 %
EU (12)	100,0 %	100,0 %	100,0 %	100,0 %	100,0 %

Source : FADN - 1991 - DG VI / A-3 / INRA - ESR - Nantes

As shown in Table 6, which refers to all farms (including all types of production) France is the European country which produces the most suckler cows and which has the most cattle. The large area of fodder (31.1% of the Community's fodder area)

means that cattle rearing in France is more specialised in nature and more extensive than in most other Member States.

The production of beef and milk, practised on one third of farms in the Community, actively contributes to agricultural employment and land use (Chotteau 1995). Cattle farms are proportionally more numerous in northern Europe where they represent nine out of ten farms in Ireland, seven out of ten in Germany and Belgium and six out of ten in France and the Netherlands. By contrast, cattle farms, as defined here, are very rare in Greece and represent less than one in five farms in Italy, Spain and Portugal.⁵

As shown in Table 7, cattle farms are capable of occupying large areas of land (Cavailhès 1993). They cover more than half the agricultural land in the Community and 85% of fodder area. The 15% of fodder area remaining is used essentially for specialist sheep production, in particular in southern European countries, Greece, Spain, Portugal and to a lesser extent Italy.

The role of cattle farms in land use is particularly important in the countries of northern Europe (two thirds of agricultural land in France and the Netherlands and three quarters of agricultural land in Germany and the United Kingdom).

Table 7. The agricultural importance of cattle production

	% of farms with cattle	% of total agricultural area utilised by cattle	% of fodder area utilised by cattle	% of grazing livestock units accounted for by cattle
Germany	70 %	75 %	97 %	99 %
Belgium + Lux	74 %	88 %	99 %	99 %
Denmark	42 %	47 %	91 %	98 %
Spain	18 %	12 %	48 %	51 %
France	60 %	65 %	92 %	94 %
Greece	5 %	7 %	18 %	26 %
Ireland	90 %	92 %	97 %	97 %
Italy	15 %	32 %	58 %	83 %
Netherlands	56 %	68 %	97 %	99 %
Portugal	19 %	33 %	48 %	56 %
UK	76 %	78 %	93 %	95 %
EU (12)	32 %	54 %	85 %	90 %

Sources: FADN - EU 1991 - DG VI / A-3 / INRA - ESR - Nantes

Structural characteristics of dairy and suckler cow farms

With 860 000 dairy farms and 328 000 suckler cow farms this study covers almost 85% of all European cattle farms, such as they are defined here. As shown in the first part of this paper, the uneven distribution of suckler cow farms in Europe, means that

⁵ Of the total number of male calves born each year in the European Union, 20% are destined for the production of veal, 20% are castrated and then fattened into beef and 60% become prime beef.

results for the Netherlands will not be analysed and that results for Greece, Denmark, Belgium and Germany should be treated with caution.

Areas of agricultural land and fodder area on suckler cow farms.

The average area of agricultural land occupied by a suckler cow farm in Europe is 53 hectares, compared to only 30 hectares for dairy farms (Table 8). This difference is found in varying degrees in all European Union countries, with the exception of Denmark and Greece where there are very few suckler cow farms (less than 4% of all suckler cow farms in the Community). It is particularly pronounced in the United Kingdom where suckler cow farms, which are equal in number to dairy farms, have on average 153 hectares compared to 81 hectares for dairy farms. In France the difference is less pronounced with suckler cow farms having on average 54 hectares, compared to 42 for dairy farms.

The fodder area is proportionally greater on dairy farms, where it constitutes 70% of the agricultural land as opposed to 51% on suckler cow farms, which nevertheless have a larger total fodder area (27 ha. as opposed to 21 ha.). Suckler cow farms can be identified, above all, by the fact that the area of cereals and other crops is far more significant (26 ha. as opposed to just 9 ha.). Whereas the fodder area on suckler cow farms in the UK represents just one third of the total agricultural area of the farm, it represents nearly two thirds in France and Ireland.

Table 8. Agricultural area and fodder area (ha/farm)

	Dairy farms			Suckler cow farms		
	Agricultural area (ha)	Fodder area (ha)	Fodder area / Agricultural area (%)	Agricultural area (ha)	Fodder area (ha)	Fodder area / Agricultural area (%)
Germany	31	21	67 %	36	16	46 %
Belgium + Lux	28	21	76 %	34	18	53 %
Denmark	40	21	53 %	32	8	25 %
Spain	11	6	52 %	19	14	77 %
France	42	30	71 %	54	34	63 %
Greece	9	ns	ns	7	ns	ns
Ireland	30	26	85 %	35	23	64 %
Italy	18	12	67 %	28	15	53 %
Netherlands	28	26	95 %	ns	ns	ns
Portugal	12	7	57 %	40	16	40 %
UK	81	57	70 %	153	55	36 %
EU (12)	30	21	70 %	53	27	51 %

Source: FADN - EEC 1991 - DG VI / A-3 / INRA - ESR - Nantes

Grazing livestock units on dairy and suckler cow farms

Table 9 shows the number of total grazing livestock units, cow livestock units and livestock units of male calves over one year old on dairy and suckler cow farms. The

average number of grazing livestock units per dairy farm is almost identical to that per suckler cow farm (40 units being the European average). However, the types of cattle are not the same. On average European dairy farms have 25 dairy cows and four male calves over a year old, whereas suckler cow farms have 20 cows and six male calves over one year old. Dairy farms consist almost exclusively of cattle, whereas suckler cow farms also have other types of herbivore (sheep, goats, etc.), which make up almost one fifth of the total number of livestock units on the farm. The rearing of several different types of animal within the same farm is found in Ireland and Portugal, but above all in the United Kingdom, where on average, only 61 of the 105 grazing livestock units per suckler cow farm are cattle.

Table 9. Grazing livestock units (LU) on dairy and suckler cow farms

	Dairy farms			Suckler cow farms		
	Grazing LU	Dairy cow LU	Male calves > 1 year LU	Grazing LU	Suckler cow LU	Male calves > 1 year LU
Germany	40	22	4	25	12	10
Belgium + Lux	51	31	4	45	25	6
Denmark	61	35	2	18	10	3
Spain	15	11	1	16	15	1
France	43	27	3	42	25	6
Greece	13	9	2	32	26	2
Ireland	44	24	6	30	12	9
Italy	27	17	4	19	11	3
Netherlands	72	45	1	ns	ns	0
Portugal	13	10	1	15	10	1
UK	118	72	10	105	36	14
EU (12)	40	25	4	39	20	6

Source: FADN - EEC 1991 - DG VI / A-3 / INRA - ESR - Nantes

Suckler cow farms in Ireland and the United Kingdom are similar to the farm type "breeder-fattener" in which the majority of male calves born are fattened on the farm for subsequent sale as prime beef or beef. Over the last ten years beef production in traditional areas of production has tended to decline to the advantage of prime beef production which lends itself to intensive production methods based on maize and is most adapted to Italian and Spanish consumer tastes (Guesdon *et al.* 1995).

In the dairy sector, the imposition of quotas encouraged the development of additional prime beef enterprises on several dairy farms. On average the number of male cattle over a year old per farm is low, but they are concentrated on a limited number of specialised farms, which represent a significant proportion of total production.

The economic performance of dairy and suckler cow farms

The economic performance of farms is closely linked to the scale of production. The difference in standard gross margin between dairy and suckler cow systems is expressed as a difference in gross income.

Total gross income on dairy and suckler cow farms

Table 10 shows the gross income of dairy and suckler cow farms, alongside the proportion of gross income which is attributable to cattle production, which can be interpreted as a measure of specialisation.

The average total gross income of dairy farms in the whole of the European Union is 70 000 ECUs. This amount is significantly greater than that of suckler cow farms (42 000 ECUs).

In the United Kingdom, dairy farms have a total gross income significantly above that in other Member States (178 000 ECUs as opposed to 72 000 ECUs in France and Germany). This average is considerably above that achieved by suckler cow farms (77 000 ECUs), which nevertheless have of an almost equivalent number of cattle and nearly twice as much agricultural land.

In every country dairy farms make more intensive use of land. On the same area of land they produce a product worth at least twice that of suckler cow farms.

Similarly, the degree of cattle specialisation on dairy farms is greater than that on suckler cow farms and the ratio of gross income from livestock to total gross income is 71% and 38% respectively. This difference in the level of specialisation is observed in every country. It has two main origins, firstly, a significant part of the gross income from livestock on dairy farms results from the sale of milk (a European average of 77%) and secondly suckler cow farms grow larger areas of commercial cereals.

In certain countries like Ireland and Spain, suckler cow farms are highly specialised (gross income from livestock represents more than two thirds of total gross income). On British farms the high proportion of sheep in the total number of grazing livestock units limits specialisation in the cattle enterprise (32%). An analysis of how farms in different countries are divided on the basis of three categories of specialisation (Table 11) shows that, when average values are disregarded, very large differences between farms do exist in the proportion of total income attributable to cattle products.

European suckler cow farms can be divided equally between the three categories of specialisation, underlining the fact that on very many farms cattle production remains a secondary activity, in particular in Germany, France and Italy. In every country (except Greece, where there is little cattle production) dairy farms specialise to a greater extent in cattle production. On nearly two thirds of dairy farms the ratio of gross income from livestock and total gross income is over 66%. This is a characteristic, which has been accentuated, principally in France, by policies aimed at encouraging the closure of small dairy farms, following the establishment of milk quotas.

Table 10. Gross income (GI) and degree of specialisation in the cattle sector

	Dairy farms			Suckler cow farms		
	GI Total (1 000 ECUS)	GI Cattle (1 000 ECUS)	GI Cattle/ Total GI (%)	GI Total (1 000 ECUS)	GI Cattle (1 000 ECUS)	GI Cattle/ Total GI (%)
Germany	72	47	65 %	59	15	26 %
Belgium + Lux	87	58	66 %	80	29	36 %
Denmark	114	88	78 %	58	10	17 %
Spain	24	18	74 %	14	9	64 %
France	72	49	68 %	54	21	38 %
Greece	25	14	56 %	19	12	60 %
Ireland	40	35	88 %	13	9	69 %
Italy	64	42	66 %	33	12	38 %
Netherlands	127	112	72 %	ns	ns	ns
Portugal	19	14	72 %	12	4	32 %
UK	178	134	75 %	77	25	32 %
EU (12)	70	50	71 %	42	16	38 %

Source: FADN - EEC 1991 - DG VI / A-3 / INRA - ESR - Nantes

Table 11. Percentage of farms showing significant degree of specialisation (defined as the percentage of total gross income (GI) attributable to cattle production)

	Dairy farms			Suckler cow farms		
	Cattle GI / Total GI			Cattle GI / Total GI		
	33 % <	33 à 66 %	> 66 %	33 % <	33 à 66 %	> 66 %
Germany	7	35	58	59	33	8
Belgium + Lux	8	29	63	37	33	30
Denmark	1	21	78	71	20	9
Spain	1	28	71	10	41	49
France	6	25	69	40	28	31
Greece	16	54	30	19	31	50
Ireland	1	10	89	14	21	65
Italy	8	45	47	38	47	14
Netherlands	4	17	79	ns	ns	ns
Portugal	6	31	63	50	24	26
UK	3	8	89	34	37	29
EU (12)	6	30	64	34	32	34

Source: FADN - EEC 1991 - DG VI / A-3 / INRA - ESR - Nantes

Dependence on direct subsidies

On average, the amount of direct aid per farm in the European Community is nearly three times greater for suckler cow farms than for dairy farms (Table 12). This phenomenon, which is found in every country with the exception of Denmark, where the suckler cow sector is very limited, is a result of the different support mechanisms applied to the two sectors in the Community. Even before CAP reform the suckler cow sector benefited from direct support in the form of suckler cow and beef special premiums. By contrast, dairy farmers do not benefit greatly from direct aid, most of their support being in the form of market price support and milk quotas. In addition, being largely concentrated in geographically disadvantaged areas, suckler cow farmers also receive a proportionally larger share of the public funds specifically allocated to compensate for the disadvantages of these less favoured locations (Hill Livestock Compensatory Allowance).

Table 12. Direct Subsidies

	Dairy farms				Suckler cow farms			
	ECUs / farm	ECUs / grazing LU	ECUs / agricultural area (ha)	Subsidies as percentage of pre-tax income	ECUs / farm	ECUs / grazing LU	ECUs / agricultural area (ha)	Subsidies as percentage of pre-tax income
Germany	3 102	77	99	23	6 406	253	178	102
Belgium + Lux	1 886	37	67	7	2 703	60	80	14
Denmark	1 873	31	46	13	1 745	95	54	ns
Spain	167	11	15	2	666	41	35	10
France	2 389	55	57	15	6 105	145	113	53
Greece	1 083	80	123	8	3 461	107	493	28
Ireland	1 535	35	51	13	3 663	120	104	90
Italy	789	29	44	3	1 373	73	48	11
Netherlands	467	7	16	1	ns	ns	ns	ns
Portugal	1 315	99	112	117	2 750	178	69	74
UK	4 262	36	52	26	16 860	160	110	152
EU (12)	1 928	47	64	23	5 416	137	102	59

Source: FADN - EEC 1991 - DG VI / A-3 / INRA - ESR - Nantes

On average the amount of direct aid paid per farm varies considerably between Member States. This variation is principally a result of the size of suckler cow herd, degree of specialisation in cattle production, and for dairy farms, their economic situation in the reference year 1991. In the United Kingdom very large suckler cow herds (105 grazing livestock units) mean that on average the amount of direct aid paid per suckler cow farm (16 860 ECUs) is more than three times the European average and corresponds to the total gross income of Italian or Danish suckler cow farms.

At Community level farm subsidies, which have been greatly increased since the implementation of CAP Reform in 1992, represent 59% of the current pre-tax income on suckler cow farms and 23% for dairy farms. This significant figure, which is also the result of weak beef prices and 1991 incomes, underlines the huge degree to which suckler cow farms are dependent on public funds. Direct aid is more than the income on British and German suckler cow farms, 90% of the income on Irish farms and 50% of the income on French farms. In the dairy sector, dependence on direct aid is much less pronounced with direct aid representing less than a quarter of farm incomes in every country, except Portugal where profitability is very low.

The amount of direct aid per grazing livestock unit or per hectare of agricultural land is greater for suckler cow farms. However, taking into account a 15-20% indirect support of milk prices, the amounts of aid for both suckler cow and dairy farms are almost equivalent. For suckler cow farms, the amount of direct aid per grazing livestock unit is high in Germany, the United Kingdom and France. The reason for this is the greater proportion of suckler cows and sheep in the livestock sector and more importantly the payment of national direct aid, in addition to European support, intended to compensate for geographical or climatic disadvantages (Lherm *et al* 1994). On a per hectare basis, direct aid remains of less value to both suckler cow farmers and dairy farmers in Italy and Spain. These differences in direct aid are related to differences in the economic performance of cattle farms between Member States.

The economic efficiency of dairy and suckler cow farms

A comparison of dairy and suckler cow farms based on farm gross margin (18 000 ECUs per suckler cow farm and 29 000 ECUs per dairy farm) gives a similar result to that of a comparison based on added value. However, it is important to point out that these differences are narrowing in the majority of countries and in particular the United Kingdom, where salary costs in the dairy industry are high. On suckler cow farms gross farm margin is greater than gross value added as a result of subsidies (hill livestock compensatory allowances, suckler cow premiums and beef special premiums) and the limited use of external labour. The considerable increase in direct payments envisaged as part of CAP Reform will, however, contribute to accentuating significantly the difference between farm gross margin and value added in the beef sector.

On average, efficiency (value added / total gross income) of production in the Community (42%) is the same for suckler cow and dairy farms (Table 13). Nevertheless, when looking at the main producer countries it becomes clear that suckler cows farms are more efficient. This enables them to make up for part of the differential in production potential with their dairy enterprises. As a result the average efficiency level of enterprises in France is on average 38% in the dairy sector and 41% in the suckler cow sector and in Spain, 40% and 53% respectively.

Table 13. Added value, total gross income, efficiency of production and income

	Dairy farms				Suckler cow farms			
	Gross value added	Gross income	Total gross income / gross product (%)	Revenue	Gross value added	Gross income EBE	Gross income EBE/PB (%)	Revenue
Germany	30	28	39	13	20	21	35	6
Belgium + Lux	43	41	47	28	32	30	38	19
Denmark	49	41	36	14	18	16	28	- 4
Spain	10	10	40	8	7	8	53	6
France	31	28	38	16	22	22	41	11
Greece	12	15	61	13	11	14	71	12
Ireland	18	17	44	12	4	6	49	4
Italy	32	30	47	24	17	17	51	12
Netherlands	72	66	52	36	ns	ns	ns	ns
Portugal	8	8	39	5	5	6	48	4
UK	82	63	35	35	26	29	39	11
EU (12)	32	29	42	17	17	18	42	9

Source: FADN - EEC 1991 - DG VI / A-3 / INRA - ESR - Nantes

Having a gross margin of more than half their gross product, Dutch dairy farms are characterised by a high level of production efficiency. On average they market 250 000 litres of milk a year and in addition have the highest average yield per cow in Europe (6 400kg per cow in 1993). If there were to be a reduction in milk prices, these Dutch farms would be less vulnerable than farms in Denmark or the United Kingdom. As producers, British farms are peculiar in occupying first place in Europe with an average quota of 35 000 litres and having the lowest ratio of gross margin to gross product (35%) as a result of the high proportion of salaried labour.

In every country of the European Union, suckler cow farms had an average income significantly below that of dairy farms in 1991. Apart from obvious differences in economic scale, suckler cow farms do not succeed in making up for this handicap by greater efficiency or by a lesser degree of dependence in terms of repayments and financial charges.

A comparative analysis of structural characteristics and economic performance reveals the main differences between dairy and suckler cow farms within the European Community (Institut de L'Élevage 1994) . In terms of geographical location, dairy farms are much more heavily concentrated in populated areas, where production is intensive. Suckler cow farms, of which more than one in three is situated in France, are more often found in areas of sparse population, where agricultural potential is limited. In all the main producer countries, suckler cow farms are on average less intensive, less specialised, less profitable and have less cattle than dairy farms. On the

other hand they do have a larger area of agricultural land, a larger area of fodder area and are more dependent on direct subsidies.

Conclusion

This comparative study of European cattle farms demonstrates the usefulness of the Farm Accounts Data Network in assessing the impact of the Common Agricultural Policy. The use of an indicator of how intensively fodder area is used enables the number of intensive and extensive farms within each country to be identified and sheds some light on the relationship between a farm's stocking rate and its economic performance. The typology of cattle farms, which identifies four types of production (dairy, suckler cow, mixed and beef fattening) and takes into consideration the entire cattle sector and not just the main types of production, has proved itself both effective and appropriate.

This analysis highlights the very great diversity of farms in terms of economic scale, production techniques and levels of intensification (Bourgeois 1995). Whereas dairy farms are more heavily concentrated in areas of intensive production, suckler cow farms are situated in areas of sparse population where the agricultural potential is limited (Colson and Chatellier 1997). In every country less specialised suckler cow farms are smaller in economic scale and less profitable than dairy farms. On the other hand they do have a larger area of agricultural land and fodder area and are more dependent on direct subsidies. In the countries of northern Europe the economic size, cost of labour and return on capital all increase as production intensifies. In southern European countries farms are small and area of fodder area limited and therefore the effect of intensification on income is much less apparent.

In every country cattle farming plays an important role in land use, especially in geographically disadvantaged, areas. In order to compensate for the disadvantages of these areas, targeted support measures, such as the Hill Livestock Compensatory Allowance have been implemented. With the introduction of milk quotas, the European Union sought to protect countries and areas most vulnerable to market adjustment. At the time of the 1992 CAP Reform decisions were taken aimed at strengthening the most extensive beef farms by means of a differentiated premium. On the other hand the allocation of compensatory aid for the cultivation of maize silage has had the effect of reinforcing "autonomous" fodder crop enterprises and also of creating a differential in public support in favour of very intensive farmers and users of maize silage (Colson *et al* 1997). At the beginning of a new CAP Reform (Agenda 2000), which will again increase the economic dependence of cattle farms with regard to direct subsidies (Colson *et al* 1997), a discussion of the justification of subsidies and the way in which they are allocated is called for. Nevertheless, the future of extensive cattle farms, in the dairy sector as well as in the suckler cow sector, will depend just as much on the development of milk and beef prices.

References

Berranger C., 1991. Extensification, l'évolution des réflexions : les acquis et les problèmes, séminaire "extensification", Dijon, 23 - 24 October 1990, pp 10-18.

Bourgeois L., 1995. Le RICA Une meilleure connaissance sur la diversité des exploitations agricoles. Chambres d'Agriculture n°831, Paris, March, 2-4.

Butault J. P., Cyncynatus M., 1991. Coût de production et compétitivité des agricultures européennes. Actes et Communications n°5, Paris, INRA - INSEE, 4 July, 247.

Careas D., 1995. Les résultats des exploitations agricoles françaises en 1993: comparaison avec les autres pays de la CEE. Chambres d'Agriculture n°831, Paris, March, 4-10.

Cavailhès J., 1993. Entre réforme de la PAC et entretien du territoire : quelles perspectives économiques pour les systèmes d'élevage bovin extensifs? INRA Productions animales, December, 366-374.

Chatellier V., Colson F., Arnaud F., Guesdon J.C., Kempf M., Legendre J., Perrot C., 1997. La diversité des systèmes d'élevage bovin en France et leur contribution à la production de viande bovine. In INRA Productions animales 10, 227-240.

Colson F., Chatellier V., 1996. Les exploitations bovines françaises sont parmi les plus extensives de l'Union Européenne. INRA Productions animales 9 (4), October, 273-284.

Colson F., Chatellier V., 1997. L'agriculture des pays membres de l'Union Européenne à la veille de la réforme de la PAC. Notes et Etudes économique n°5, MAPA-Paris, September, 53-99.

Colson F., Chatellier V., Boyer P., 1995. Les exploitations d'élevage bovins-viande au début de la nouvelle PAC. Actes et Communications n°13, December, 15.

Colson F. , Jacquet F., Ridier A. 1997. Aides directes et extensification de la production, modélisation des effets d'un découplage des aides sur des exploitations bovines en Pays de la Loire. Economie Rurale, p.15.

Colson F., Chatellier V., Ridier A. 1997. L'impact des propositions de réforme de la PAC (AGENDA 2000) sur les systèmes d'élevage bovin français. INRA -ONILAIT-OFIVAL, October, 52.

GEB Filières 1993 (No. 15) Institut de L'Élevage, Paris

Guesdon J. C., Chotteau P., Kempf M., 1995. Vaches d'Europe : Lait et viande, aspects économiques. Ed. economica "économie agricole et agro-alimentaire", Paris, p. 244.

Institut de L'Élevage, 1992. La viande bovine en Espagne : une production dépendante pour un marché spécifique. Le dossier du GEB n°200, January, Paris, 20.

Institut de L'Élevage, 1993. Élevage bovin : la réunification tire l'Allemagne vers le Nord. Le dossier du GEB n°221, Paris, December, 38.

Institut de L'Élevage, 1993. En Europe : la viande de boeuf, c'est d'abord du jeune bovin. Le dossier du GEB n°215, Paris, May, 12.

Institut de L'Élevage, 1994. Le troupeau allaitant dans l'union européenne après 10 ans de quotas laitiers. Le dossier du GEB n°231, Paris, November, 7.

Lherm M., Bébin D., Liénard G., 1994. Élevages allaitants charolais des zones herbagères face à la réforme de la PAC : proposition d'une typologie d'adaptations et premiers résultats 1993. INRA Productions Animales , INRA, Paris, December, 343-357.

Spindler F., 1991. Un siècle et demi d'élevage en France. Agreste Analyses et Études n°8, May, 253.

Tirel J.C., 1991. L'extensification : chance ou défi pour les exploitations agricoles. INRA Productions animales, February, pp 6-12.