

Characterising EU livestock systems according to economic and technical indicators - The case of EU sheep farming

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Summary

Characterising livestock production systems on the basis of economic and technical indicators is a complex process, as this paper will attempt to demonstrate. This is particularly the case in the sheep sector where production systems are far from uniform across the European Union. However, before trying to characterise through economic and technical measures let us first consider why one may wish to characterise livestock systems and having done that then to consider how economic and technical measures could be used to meet these objectives. Two main reasons for characterising systems present themselves. They are, firstly as a means of targeting policy measures and secondly, to predict and evaluate the effectiveness of these policy measures against a number of criteria. Thus, it is likely that any means of characterisation will have to be easily understood, simple to operate and pan-European in scope.

Traditional economic and technical measures have been used primarily for farm management purposes. They have therefore, concentrated on performance appraisal at both the physical and economic level. However, they have not really been designed for use in policy measures. Nevertheless, this does not preclude their use although problems may arise. These problems are likely to be associated with gaining satisfactory coverage across farm types and production systems, not only within countries but also across Member States.

Overview of the EU sheep industry

By attempting to describe the sheep production systems of Europe the relevance of technical and economic measures to the characterising of systems will be identified. As Table 1 shows, sheep are found throughout the European Union. However, the size of the flocks and the importance of them to the farm economy varies greatly.

Thus, European sheep production systems cover a wide range of farming situations from land with poor grazing value to intensively managed land. Nevertheless, sheep farming does tend to be associated with the more disadvantaged areas of the European Community (Figure 1). Furthermore, within Europe, sheep are farmed across an enormous range of climatic conditions. As a consequence, sheep systems continue to be enormously rich in diversity. There is a vast range of breeds used and a wide range of management practices adopted. The breeds used, the product and the management system are all designed to suit local human social needs as well as the farmed and

natural environment. This diversity of production system is in marked contrast to many other sectors, for example the dairy industry where the breed of cow, the management systems and the feeding systems are becoming remarkably uniform across the world. It also makes it difficult to develop a characterisation system for the industry.

If we take a holistic view of sheep farming in Europe, two broad characterisations become apparent. These two categories can be broadly identified as Northern European Systems, and Southern and Mediterranean Systems. The former are categorised by significant use of grassland, by seasonal breeding with lambing between January and May and by production of heavy lamb. They are found in Eire, UK, Belgium, Holland, Luxembourg, Denmark, Germany, Sweden, Finland, and Central and Northern France. Southern European systems cover the countries of Portugal, Spain, Italy and Greece and are similar to the systems used in Southern France. The range of systems in these countries is more complex than for Northern European systems. There are systems producing both

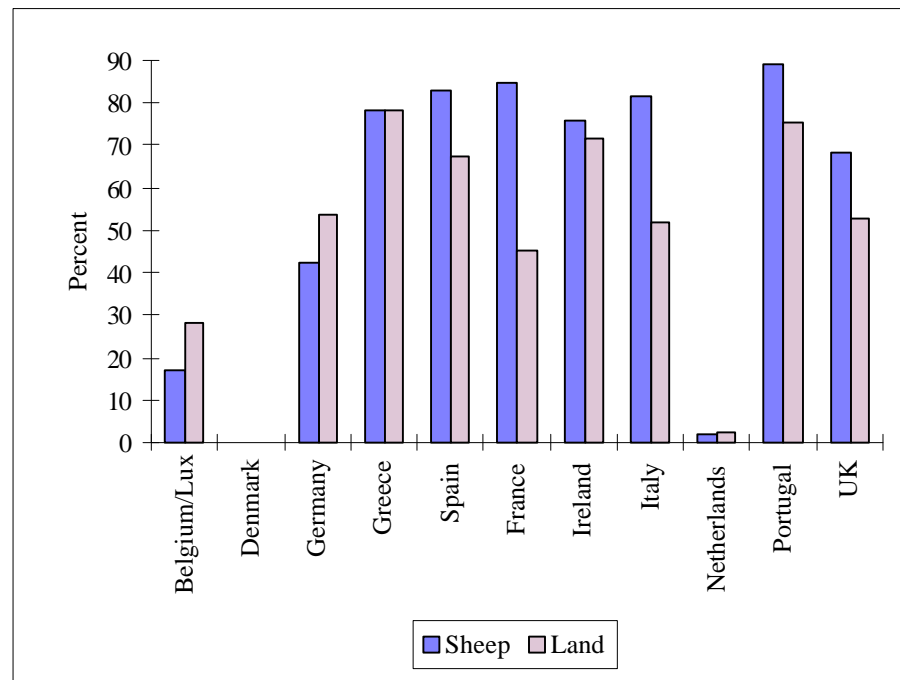
Table 1. Structure of EU sheep industry 1993

	% of holdings with a sheep flock	Average flock size	Sheep production as % of final agricultural production
EU (12)	12	113	2.1
Belgium	8	20	0.2
Denmark	7	17	0.1
Germany	7	55	0.4
Greece	18	67	6.5
Spain	9	198	4.8
France	16	84	1.3
Ireland	34	112	5.0
Italy	10	70	0.7
Lux.	6	35	0.0
Netherlands	21	51	0.5
Portugal	17	39	3.4
United Kingdom	39	307	5.4

Source: Eurostat (1997)

heavy and light carcasses with a much greater seasonal spread of lambing dates than in the north. A greater use of arable by products is made and the feeding of housed sheep compound feeds is much more common. Dairy systems are also very important.

Figure 1. Distribution of sheep and land in the Less Favoured Areas of EU Member States



Source: CEC (1993, 1995)

In arriving at this characterisation a number of easily measurable parameters have been considered. Most obviously these are:

- Type of product sold;
- Date and spread of lambing; and
- Importance of grass and forage in the diet compared to compound feeds and arable by-products in the diet.

However, although we can broadly characterise sheep production into Northern European systems and Mediterranean systems, this is perhaps of little use in a policy context. This requires a more spatial pan-European characterisation, particularly if targeting and evaluation of policy is a key objective of the categorisation. Thus, a further consideration of the production systems around Europe leads to the conclusion that although variations in land, climate and cultures lead to many variations in breeds and production systems across Europe, three principal characterisations can be identified:

- i. systems principally aimed at producing meat;
- ii. systems principally aimed at producing milk and dairy products; and
- iii. systems principally aimed at producing wool and fine fibres.

The primary output from the meat production systems is usually heavy lamb, although a minority of meat producers produce light-weight lambs. For systems geared towards milk production, significant by-products are lambs that are sold at weaning, usually for slaughter, at live-weights of less than 25 kg, and are defined as light lambs. However, a common variation on the basic milk production system is for the lambs to be weaned

and intensively reared to heavier weights which allows the producer to be classed as a heavy lamb producer. In this situation, given current sheep policy, the producer gains an added economic benefit, in that he qualifies for the full rate of annual ewe premium. Thus, a sub-characterisation for meat producers becomes apparent; namely, those producing heavy lamb and those producing light lamb. Equally, we may have a characterisation of mixed farming with significant income coming from meat and milk. Systems for which wool and fibre production is the primary motivation are extremely rare within the EU.

However, a more in-depth analysis of sheep production systems in individual Member States reveals a number of enterprises that do not fit into the characterisations just identified. Thus, in the United Kingdom in particular, there are a number of sheep farming businesses that sell very few meat lambs for slaughter. Instead, because of the land resource available to them they sell lambs to other producers for fattening and final sale to the consumer, or for use as breeding stock by other producers. Consequently there may also be sheep systems which do not have any breeding ewes. On these systems, producers buy “store lambs” and fatten them in a one of two ways. One alternative is to house the lambs and feed them compound feeds and arable by-products. A second alternative is to allow the lambs to graze grass or arable by-products *in situ*. Equally, consideration of sheep production systems in the Southern European Member States reveals that a number of producers use transhumance in their production systems.

By seeking to describe the various production systems in operation throughout the European Union it is possible to arrive at a minimum of nine sheep production systems. By recognising transhumant systems and non-transhumant systems the number of production systems would increase. The nine systems can be characterised as:

- buying store lambs and finishing them in houses;
- buying store lambs and finishing them on forage or arable residues *in situ*;
- producing store lambs;
- producing breeding sheep;
- producing heavy-weight finished lambs;
- producing light-weight finished lambs;
- producing dairy products and meat;
- producing dairy products; and
- producing wool and fibres.

These characterisations have been arrived at by deriving a number of simple technical and economic parameters, primarily:

- proportion of income derived from different products sold;
- average weight of finished lambs sold; and
- technical description of resources used in keeping sheep

These parameters can only be collected by surveying producers in order to collect basic economic and technical information. Nevertheless, this information can be collected for other purposes, for example for the Farm Accounts Data Network or for

enterprise management purposes. Furthermore, some arbitrary decision has to be made about what constitutes systems producing store lambs, finished lambs etc. for example, should more than 50% of sales revenue from a single product category be the defining measure? Nevertheless, this analysis has the strength of being easily transferable across Member States as shown from the analysis in Table 2 derived from a number of publications from different Member States.

**Table 2. Analysis of income derived from product sales
(proportion of income excluding subsidies (%))**

	UK (1)	UK (1)	UK (2)	Spain (3)	Spain (3)	Ireland (4)
Milk				60		
Store lamb	38	41	63			
Finished lamb	58	55	27	38	96	97
Wool and other	4	4	8	2	4	3

Source:

1. MLC (1997)
2. SAC (1997)
3. Lavín *et al* (1997).
4. The Irish Food Board (1996)

The weakness of this type of characterisation is that it takes no account of a number of issues that may be important for policy analysis. In particular, characterisation on the basis of location and land use may be important for policy purposes. Classifications incorporating these considerations may be desirable in the context of socio-economic and environmental policies respectively. Thus, are there other ways of characterising sheep production systems using economic or technical data?

In the United Kingdom there is a well-recognised stratification to the sheep industry based on the geographical location of the sheep flock (which often reflects the sheep breeds used), the historic management practises used and the products sold. This classification of flocks points towards a number of technical parameters that could be used for characterisation purposes. These include:

- Sheep breed used;
- Date of lambing and lambing percentages;
- Land quality;
- Stocking density;
- Compound feed use;
- Fertiliser use; and
- Product sold.

Appendix 1 details some characteristics of the three categories of production system identified in the United Kingdom and are shown in Figure 2. Table three shows data from flocks recorded by the United Kingdom Meat and Livestock Commission (MLC)

for the lowland and upland systems. In both cases, these are for systems with crossbred ewes bred to terminal sire rams i.e. with all lambs intended for slaughter. This data indicates that the lowland flocks have a higher stocking density, nitrogenous fertiliser use and compound feed use than the upland flocks. Unfortunately, no corresponding values are available for hill farmers, although experience would suggest even lower stocking rates, nitrogen use and compound feed use. However, because of the variance in these parameters they have also been combined with land capability characteristics and sheep breed characteristics to derive a more robust methodology to establish the broad characterisations of hill, upland and lowland. Thus, the data does point in the direction of a characterisation based on a number of technical parameters being achievable.

Table 3. Inputs and Intensity in Lowland and Upland Sheep Systems

	1979	1985	1990	1995
Lowland				
Stocking rate (ewe/ha)	11.7	12.0	12.7	11.4
N application (kg/ha)	138	160	145	82
Feed per ewe (kg)	56	61	68	63
Upland				
Stocking rate (ewe/ha)	10.0	10.1	10.6	9.2
N application (kg/ha)	86	90	84	35
Feed per ewe (kg)	39	41	49	49

Source: MLC Sheep Yearbooks

However, while such a means of characterisation may be possible in the United Kingdom, is it transferable to other Member States? Where similarity in production systems exists (in Northern Europe) then the characterisations are likely to be transferable. In Southern Europe, where production systems are significantly different, further characterisations may need to be defined.

Whole farm analysis

The forgoing discussion has concentrated only on classification of sheep enterprises; it has made no attempt to classify farm business in relation to the importance of the sheep enterprise to the whole farm enterprise. This issue can be particularly important to the way in which producers react to sectoral policy. The considerable growth in sheep numbers following the introduction of the EU sheep meat and goat meat regime in 1980 is well documented. However, Ashworth *et al.* (1997) show that there is considerable differences in reaction to the policy both within and between Member States. Some of this variation has occurred because of the relative importance of sheep to the whole farm enterprise.

The European Court of Auditors (CEC, 1995), drawing on data from the European

Union's Farm Accountancy Data Network for 1991/92, show that among those producers who produce sheep and goats almost 60% gain less than one third of their total agricultural production from this source (Table 4). Sheep production is therefore very much a subsidiary enterprise throughout Europe, both in the context of the value of output generated from sheep production and the number of holdings with sheep. However, regional variations do occur. In Spain the number of holdings with sheep or goats is at the EU average, however, they are much more specialised as 45% of these holdings gain more than 75% of their output from this source. This is in marked contrast to the United Kingdom and Ireland, where a considerably greater proportion of holdings have sheep flocks, but less than 10% of these holdings gain more than 75% of their agricultural output from this source.

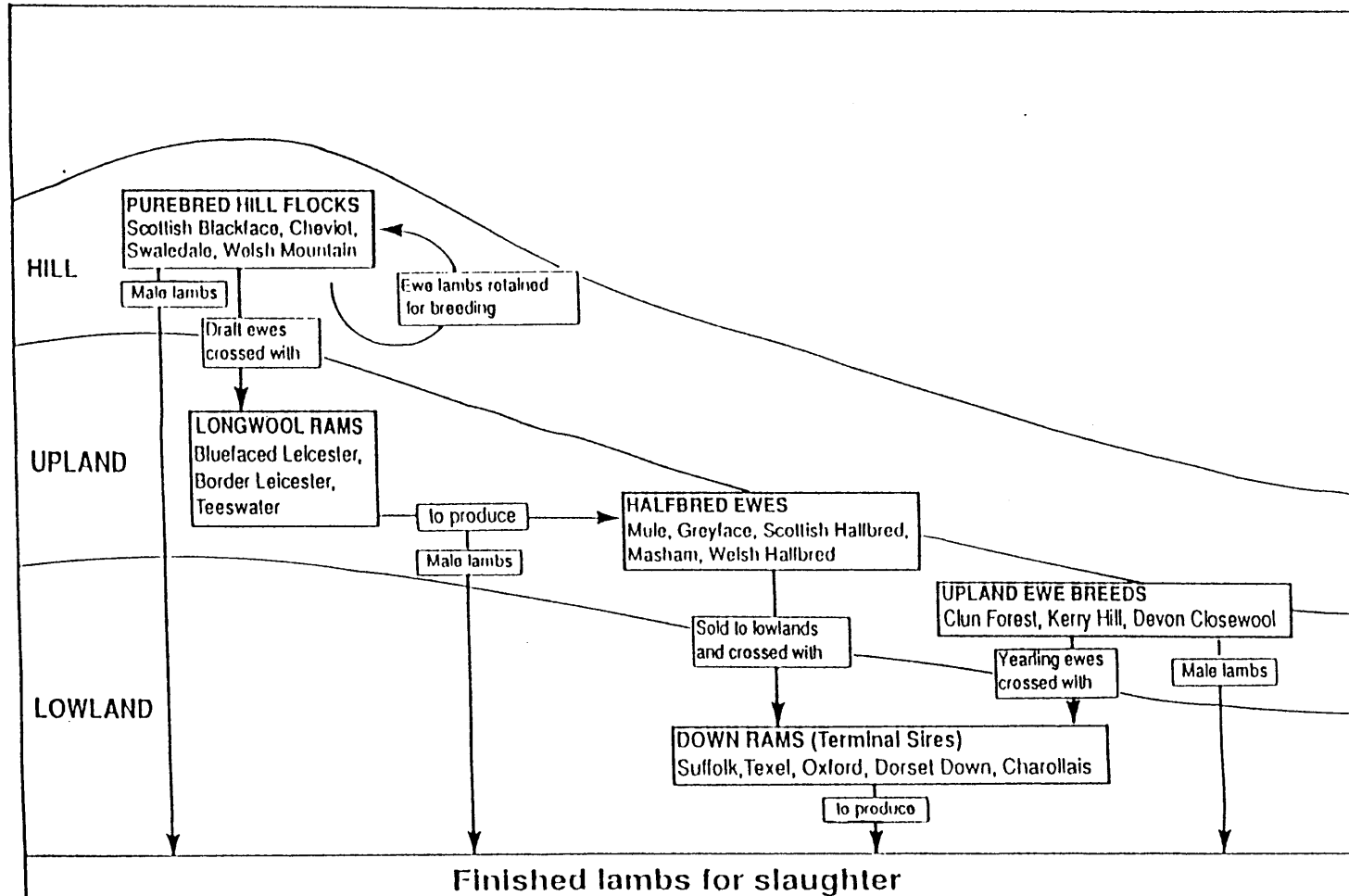
Table 4. Proportion of total agricultural output derived from sheep and goat production on those holdings with sheep and goats in 1991/92 in the six most important sheep meat and goat meat producing Member States of the EU

	% Holdings with sheep	<33% of output from sheep	33-75% of output from sheep	>75% of output from sheep
EU (12)	13	58	25	19
United Kingdom	46	67	27	6
Spain	13	35	20	45
France	12	60	26	15
Italy	7	55	35	11
Greece	24	44	31	25
Ireland	32	72	24	4

Source: DGVI/A-3/TV OVINS94.WP (8/6/94)

This variety in production systems and economic importance leads to a significant question for the characterisation of livestock production systems; namely, how is the mixture of enterprises found in many livestock production systems in North Western Europe accommodated in the characterisation system. Throughout Europe, whole farm systems have been characterised on the basis of standard gross margins to

Figure 2. Stratification of the British Sheep Industry



Source: Cooper and Thomas (1991)

meet the requirements of the Farm Accounts Data Network as laid down in Council Decision 85/377/EEC. The Regulation concluded that the “type of farming shall be determined by the relative contribution of different enterprises to its total standard gross margin”. The EU categorisation resulted in two types of sheep farm. The first group is called specialist sheep farms where more than two thirds of the standard gross margin comes from sheep production. The second group is called sheep and cattle combined, which are defined as farms which have more than one third of the standard gross margin comes from sheep and more than one third of the gross margin comes from cattle. Nevertheless, with 60% of the European Union holdings with a sheep flock generating less than one third of their output from sheep, a considerable number of holdings with sheep are not recognised in this means of characterisation.

In the United Kingdom this characterisation has been extended to incorporate a spatial element through incorporating Less Favoured Area status into the characterisation system. The classification of a cattle and sheep farm has also been simplified to a farm where more than two thirds of the standard gross margin comes from sheep and beef together. Some economic and technical results from these Scottish farm types are shown in Table 5 for 1995.

Table 5. Some technical and economic measures of Scottish farms with significant sheep output in 1995.

	Farm type			
	LFA Sheep	LFA cattle and sheep	LFA Cattle	Lowland cattle and sheep
% of total full-time holdings	10	16	19	3
Total sheep output as % total farm output	80	42	14	15
% of land in rough grazing	95	75	32	5
% of land in improved grassland	5	22	60	67
% of land in arable crops	0	3	8	28
Breeding sheep as % of total breeding grazing livestock units	91	55	21	44

Source: SOAEFD (1996)

Table 5 clearly shows the increasing importance of sheep production to Scottish farm viability as the production system moves towards the most disadvantaged land, as represented by the LFA sheep production system. Not only is the total agricultural output heavily dependent upon sheep production, but the net farm income is heavily dependent upon the receipt of direct income payments. Thus, it is important to be able

to recognise these businesses in a characterisation system designed to inform policy debate and target policy decisions.

I do not wish to extend the discussion of this means of classification as this topic is presented in more detail, in relation to bovine production systems, in Colson *et al.* (this volume). Nevertheless, it is likely to be important for policy analysts to recognise a dual system of characterisation that incorporates both the production system and the importance of the enterprise to the whole farm business. This may be particularly important in relation to the socio-economic impact of production and policy decisions.

Conclusion

This paper has sought to debate the use of technical and economic parameters as a means of characterising EU sheep systems. It has identified a number of ways in which sheep enterprises may be categorised using economic and technical parameters and shown that, in general, a pan-European classification system can potentially be established, although the diversity of sheep systems used within Europe make characterising production systems complex. Using economic and technical indicators has the strength that the parameters being used are, generally, easily understood by producers and consequently, collectable with minimal difficulty. The parameters are also transferable between Member States.

Nevertheless, by recognising the relative importance of the sheep enterprise to the whole farm system, this paper highlights the importance of considering whole farm systems as well as enterprise categorisations in establishing a framework for use in agricultural, environmental and rural community policy analysis and development. This theme highlights a weakness of characterisations based on individual enterprise systems as a tool for policy analysis; namely the potential for interactions between enterprise mixes on holdings in response to policy changes. Equally, it points towards a weakness in the accuracy and validity of some technical parameters, for example fertiliser use, on mixed enterprise businesses. However, characterisations based on economic measures of output do present a robust means of characterising livestock systems.

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Appendix 1. Summary of British Systems and some definitions

	System	Definition	Main Products
Hill Systems (LFA land)	Hill ewes producing pure-bred lambs	Bound acclimatised stock on a high proportion of semi-natural pasture producing pure-bred lambs	Store lambs Pure-bred fat lambs (14-18 kg) Pure-bred fat lamb (8-12 kg) for export Draft ewes
	Hill ewes producing some crossbred lambs	Bound stock, possibly partially dehefted from hill. Usually a higher proportion of inbye (improved) land.	As above but draft ewe sales reduced and crossbred male and female lambs sold
	Crofting	Small scale producer but often with larger sheep 'farmers' using bulk of land	Mainly store lambs as value of draft ewes is low
Upland (LFA Land)	Draft hill ewes producing crossbred lambs - 'classic' middle tier ewe in Figure 1.12	Unbound flock brought onto unit - grazing mainly sown pastures and fenced hill areas LFA land	Crossbred ewe lambs for breeding and slaughter Crossbred male lambs for slaughter
	Crossbred ewe mated to terminal sire (lowest tier ewe in Figure 1.12)	Unbound flock brought onto unit - grazing only sown pastures and fenced hill areas	3 way cross lambs for slaughter usually of a terminal sire breed (Suffolk/Texel/Charollais dominate) (17-21 kg)
Lowland	Crossbred ewe mated to terminal sire	- Grassland farm - Mixed farm - Arable unit	3 way cross lambs for slaughter usually terminal sire breed (Suffolk/Texel/Charollais dominate) (17-21 kg)
	Pure-bred lowland breeds	Pure-bred stock producing some crossbred lambs - grazing low quality, uncultivated land	Pure-bred lambs for breeding and some crossbred lambs for slaughter
	Dorset and Dorset Horn for early lamb production	Specialist producers	Lamb for spring market born in late December