Productive and economic parameters in semi-extensive sheep flocks in the west of La Culebra (Zamora)

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SUMMARY – A study designed to evaluate productive and economic parameters of 20 sheep flock operations was carried out in the region of Aliste (Zamora, Spain). All the flocks were managed by shepherding them out in the country (semi-extensive), aiming at the production of low-weight lambs. Differences in the availability of complementary feeding and the relative incidence of labour costs upon the total costs are decisive aspects leading to large differences in profitability. If these costs are important, the farms will not have any future without European Union aid, and many of such operations will become unfeasible in the short term without these grants.

Keywords: Sheep, semi-extensive, profitability.

RESUME – *"Paramètres productifs et économiques chez les troupeaux ovins semi-extensifs dans la zone ouest de La Culebra (Zamora)". Une étude pour évaluer des paramètres productifs et économiques de 20 troupeaux de brebis a été réalisée dans la région d'Aliste (Zamora, Espagne). Tous les troupeaux appartiennent à des systèmes semi-extensifs orientés à la production d'agneaux de faible poids. Les différences sur les coûts des aliments qui complémentent le pâturage et sur les frais de main d'oeuvre ont eu des conséquences importantes sur la rentabilité. Si ces frais sont importants, à l'avenir, les exploitations ne seront pas viables sans les aides de l'UE.*

Mots-clés : *Brebis, semi-extensif, rentabilité.*

Introduction

Within Spain (the country with the second highest census of sheep in the EU), the region of Castilla-Leon is especially remarkable since it accounts for 3.8 million ewes. Most of these sheep are milked and this represents more than 50% of the country production. Nevertheless, within the region there are also an important number of flocks aiming at the production of lambs. The present study is a preliminary characterization of this later type of operations. The study was carried out during the year 2002 in the region of Aliste, which is placed between the border with Portugal and the La Culebra range (Fig. 1). The region is characterised by a non abrupt relief and Atlantic climate with 950 mm annual rainfall and average temperatures of 15ºC. The primary objective of the study was to get information about the productive conditions and limitations that might orientate future lines in productivity improvement under changing market scenes. Only in this way, may production of lamb meat be attractive enough for producers and thus to retain population in the region.

Materials and methods

Operational and economic data were obtained from 20 flocks ranging from 300 to 900 ewes of the "Castellana" breed which is the major breed in the zone. All of them were based on free range grazing and oriented to the production of low weight lambs. The owners belonged either to a cooperative or to an Association for Sanitary Defence (ADS in Spanish). Data were obtained within the framework of a local programme orientated to increase collaboration for better management of flocks among stock farmers. The information was obtained by direct interviews to the farmers. Descriptive statistics as well as regression plots and graphs were generated using the Excel® 2003 spreadsheet (Microsoft, USA).

Fig. 1. Geographical location of the flocks used in the study.

Results

Descriptive data and productive indicators of the ovine operations are shown in Tables 1 to 4, while economic indicators are detailed in Table 5. In all cases the average value ± SD of the variable, as well as range in values are detailed.

Table 1. Description of the territories used as feed bases by the studied sheep flocks

Available territory (ha)	Average ± SD	Max.	Min.
Total surface	2,829± 1.225	6,264	1,357
Non arable land	1,335 ± 577	3,000	650
Pastures	539 ± 233	1,200	260
Cultivated grass for direct consumption	821 ± 363	1,800	390
Cultivated grass for conservation	2.0 ± 2.1	3.0	-
Fallow lands	9.0 ± 5.9	25.0	-
Cereal cultures	12.0 ± 7.3	34.0	-
Non arable land/ewe	3.0 ± 1.1	5.6	1.2
Pasture/ewe	1.0 ± 0.5	2.2	0.5
Cultivated grass/ewe	2.0 ± 0.7	3.3	0.7
Total surface/ewe	6.0 ± 2.3	11.1	2.5

Table 2. Reproductive parameters in the studied sheep flocks

Indicator	Average ± SD	Max.	Min.
Number of ewes	519 ± 194	977	229
Fertility	104.0 ± 9.5	119.8	89.0
Prolificity	1.3 ± 0.1	1.4	1.2
Fecundity	1.3 ± 0.1	1.6	1.1
Ewes/ram	85.0 ± 30.0	163.1	46.9
Replacement of rams (%)	36.0 ± 22.6	83.3	-
Replacement of ewes (%)	13.4 ± 4.0	25.7	6.9
Mortality of lambs (%)	2.5 ± 0.9	4.2	1.1
Aborted (%)	2.3 ±1.8	9.2	-
Dead lambs of lambs born (%)	0.9 ± 0.3	2.1	0.7
Mortality of ewes (%)	3.6 ± 2.4	10.5	1.1
Disposed for age(%)	9.0 ± 2.9	16.1	3.1

Table 3. Feed ingredients used in the sheep flocks

Ingredient	N	Average ± SD	Max.	Min.
Hay (kg/flock)	18	44,786 ± 25,147	117,000	12,000
Grains (kg/flock)	20	87,776 ± 22,794	138,000	60,000
Carrots (kg/flock)	8	76,125 ± 63,431	200,000	23,000
Commercial compound feeds	10	11,118 ±10,321	39,000	2,700
Concentrate feed/ewe (kg/ewe)	20	64 ± 17	97	33
Roughage/ewe (kg/ewe)	20	244 ± 107	504	5

Table 4. Meat production in the sheep flocks

	Average ± SD	Max.	Min.
Lambs sold/ewe	1.0 ± 0.2	1.5	1.0
kg lamb/ewe	14.0 ± 2.2	20.7	11.1
Average weight/lamb	11.0 ± 1.2	13.7	10.2

Table 5. Economical analysis of the studied sheep flocks

	Average ± SD	Max.	Min.
Income/ewe (€)			
Lambs	57 ± 10.7	88.2	42.8
Subsidy Premium	32 ± 2.0	37.3	29.0
Others	3 ± 0.9	5.7	2.4
Total incomes	92 ± 11.1	124.2	75.5
Costs/ewe (€)			
Buildings, land, etc	7 ± 2.3	14.7	3.3
Other facilities	2 ± 0.7	3.3	0.8
Machinery	4 ± 2.1	8.7	0.7
Renewals	18 ± 2.8	22.9	13.9
Total fixed costs	31 ± 3.5	35.9	23.2
Feed	23.3 ± 3.9	29.7	14.6
Salaries	2.2 ± 7.0	27.4	-
Others	23.3 ± 9.6	47.9	13.2
Total variable costs	48.8 ± 16.3	103.9	35.8
Economical indicators (€)			
Gross Margin/flock	21,488 ± 12,398	53,072	- 6,653
Net Margin/flock	5,912 ± 11,435	27,146	- 25,658
Gross Margin without premium	5,193 ± 12,029	25,258	- 26,866
Net Margin without premium	29.7 ± 2.3	- 26.8	- 36.6
Gross Margin/ewe	43.8 ± 18.4	65.5	- 11.3
Net Margin/ewe	13.2 ± 17.9	36.0	- 43.4
Gross Margin/HLU[†]	10,703 ± 5,834	23,075	- 3,326
Net Margin/HLU	2,917 ± 5.389	11,803	- 12,829

[†]Human labour unit.

Discussion

The region under study is characterized by the existence of an important diversification in livestock species, cattle, pigs and sheep being the more important. In the last few years cattle operations have lost a great part of their former prominence and goat farms have almost disappeared. In contrast, the importance of pigs and sheep farms has notably increased. The main characteristic of the area is the availability of good pastures, which are enough to cover the needs of the flocks with two production peaks at spring and autumn. Sheep flocks are still managed using quite traditional practices, such as the seasonal movement of flocks looking for the best grazing areas. Grazing is carried out through the occupation of all the available common lands in the area at a very low or almost no cost. In some cases, communal pastures must be shared with other species, and then summer pastures are saved for cattle, while small ruminants are moved during autumn. The animals are maintained on the pasture grounds even at night, in enclosures named "chiqueros" which are periodically moved to ensure homogeneous fertilization of the land.

Although the available land is scarce, all farmers have some, either owned or rented, to produce some additional feeding for the flocks (Table 1). The usual crops are wheat and rye, and to lesser extent, oat and barley. Those are provided together with straw, which is used both as feed and bedding. Extra feed is provided mainly to lactating ewes and sometimes to all the animals when the nutritive value of pastures is poor. Those feeds are prepared by the farmers using mainly cereal grains but sometimes commercial compound feed is provided to lambs. Nevertheless, the high cost of such feed determines that lambs are usually only fed on milk, being weaned at an average weight of 11 kg. Although they are usually slaughtered at this size, a certain number of them go to intensive fattening on farms out of the region.

The size of the flocks (Table 2) is very variable showing two trends in their evolution: an extensive management of a high number of animals and, on the opposite, an intensive management on a reduced number of animals. Both systems are limited by different problems: the extensive system by the availability of pastures or wolf attacks, the intensive one by improper management practices. In relation to reproductive management, rams and ewes are maintained together all the year. Only in those flocks making long flock transfers to other pastures, are the males separated from ewes to avoid parturition during the stay on mountain pastures. Oestrus synchronization by hormonal methods is rarely used. The relatively poor reproductive indexes are mainly related to the low number of rams maintained in the flock, which are not able to cover the needs arising from a concentrated mating season. In addition, the very late lambing season (preventing a second mating just prior to the seasonal anoestrus) and the model used for ewes replacement, characterised by a delayed first mating, also determines the low productivity observed.

Some significant correlations between reproductive features and some other characteristics of the operations were found. For example, the number of abortions was positively correlated to the size of the flock, while this was correlated to the number of lambs produced by each ewe only up to a certain point (Fig 2). This indicates that as the size of the flock becomes greater, general management becomes poorer and productivity decreases. The existence of an optimum flock size managed under the conditions described is deduced. The impact of lamb mortality in profitability has been stressed by other authors (Pardos and Oliván, 2000; González *et al.*, 2000)
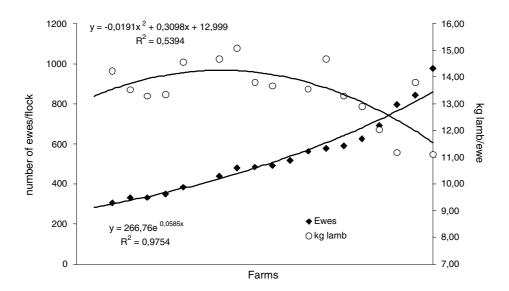

Fig. 2. Relation between the size of the flock and lamb productivity (farms ranked according to ewes/flock from left to right).

Although incomes are derived both from selling lambs and the EU premium, a great variability in the profitability of the operations was observed (Table 5). Considering that fixed costs/ewe are quite similar, total costs are mainly influenced by variable costs, with values that in some cases were three times greater than the minimum. This determines that only a 20% of the sheep farming operations can be considered profitable, while the rest are greatly dependent on the grants. Even with high premiums, they have a negative economic balance. This is better demonstrated by comparing economic indicators calculated for the 20% best and the 20% worst operations (Table 6). From the results in this table, it is deduced that the main costs affecting profitability are supplementary feed and labour. In fact, two main problems are identified in maintaining this type of operations: on the one hand the problems to obtain enough pastures, on the other, the availability of manual workers, which is probably the decisive factor affecting economical benefits. All farmers employ family members in their operations but such people are getting older, and are ineffective in relation to the size of flocks and the benefits obtained. Nevertheless, it is difficult for the farmer to find people out of his local area who have the skills needed for the management of flocks under these conditions.

Table 6. Comparison between the best and worst ovine operations from an economic perspective

Economical indicators (€)[†]	Top 20%	Bottom 20%
Total incomes/ewe	96.91	91.45
Total fixed costs/ewe	29.74	29.96
Total variable costs/ewe	19.36	47.63
GM/ewe	78	44
NM/ewe	48	14
GM/HLU	21,951	10,929
NM/HLU	13,621	2,866

[†]GM: gross margin; NM: Net margin; HLU: human labour unit.

Conclusions

The future of the sheep meat sector in this area is uncertain and relies on the possibility of maintaining low costs of feeding, by the use of pastures, and optimising human labour. Productivity of ewes could be increased through a better feed supplementation, modification of the lambing season for a better fit to high market prices (see Fig. 3) or increasing the size of the flock to decrease the relative cost of human labour per sheep head.
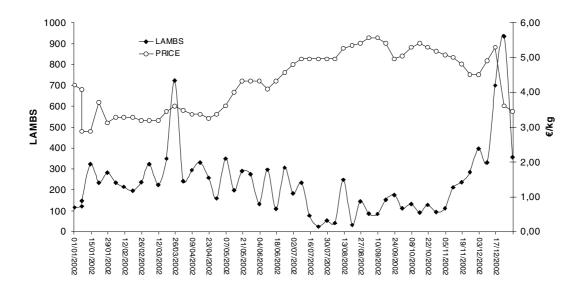

Fig. 3. Seasonal variation in the production and prices of lambs.

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