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Evolution of ewe body condition and the production of lamb and milk in different productive strategies

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SUMMARY - The autochthonous Merino ewe in extensive systems plays an important role in Southwest Spain. The seasonal variation in food availability in these areas produces changes in the body condition score of ewes. It needs different grazing strategies to cover the sheep requirements, according to the production levels. Some of these strategies are studied in a factorial design where the variation factors are reproductive rhythm and seasonal milking. The evolution of body reserves during the year shows different variance ranks depending on the reproductive rhythm, but no significant differences were caused by the milking effect. Feed requirements were increased when the lambing schedule was accelerated. In contrast, milking did not require more feeding in the ewe. The conclusions are: (i) the results obtained in the extensive management systems of the Merino sheep show that intensification increases the total production and the supplementation, but it decreases the body condition score; and (ii) it is possible to set up three global intensification levels.

Key words: Body condition, strategies, Merino.

RESUME - "Evolution de l'état corporel des brebis et production d'agneaux et de lait pour différentes stratégies de production". Les brebis Merino locales jouent un rôle important dans les systèmes extensifs du sud-ouest de l'Espagne. Les variations saisonnières de la disponibilité alimentaire dans ces régions produisent une fluctuation de l'état corporel des brebis. Différentes stratégies d'affouragement sont demandées pour couvrir les besoins des ovins avec des niveaux de production satisfaisants. Quelques-unes de ces stratégies ont été étudiées dans un schéma factoriel, où les facteurs de variation sont le rythme de reproduction et la saison de lactation. L'évolution des réserves corporelles durant l'année montre différentes gammes de variation qui dépendent du rythme de reproduction, mais il n'y a pas assez de différences significatives à cause de l'effet de la lactation. Les besoins alimentaires augmentent lorsque le rythme des agnelages est accéléré, cependant, la lactation ne requiert pas plus d'alimentation pour la brebis. Les conclusions sont : (i) les résultats obtenus dans les systèmes de production extensifs des ovins Merino, montrent que l'intensification augmente la production totale ainsi que la supplémentation ; mais elle déprime l'état corporel ; et (ii) il est possible de mettre en place trois niveaux généraux d'intensification.

Mots-clés : Etat corporel, stratégies, Merino.

Introduction

Extremadura is situated in the southwest of Spain. Two million sheep are used in extensive system, most of them of Merino breed. The merino breed, as an autochthonous one, is well adapted to the exploitation of natural resources through mobilization of its corporal energetic reserves (López, 1988).

At the moment, the most important productive orientation of this breed is meat production, but milk is often used to make cheese too (as a productive strategy). Therefore, the strongest constraints on the system are both, reproductive rhythm and milking the sheep (López, 1990). This work was carried out during 1988, 1989 and 1990.

The effect of accelerated lambing (three lambings in two years) and milking on the body condition of ewes managed extensively in Extremadura has not been documented. This knowledge is essential

if these two new practices are to be introduced, since they may be adopted only at low input cost, that is, if ewes can buffer dietary deficit by depot mobilization.

The aim of this study was to evaluate the effect of reproductive rhythm and milking on the body condition and productive performance of Merino ewes grazing extensive pasture in Extremadura.

Materials and methods

Animals

We have made four experimental lots and two repetitions, each one has 15 or 30 Merino sheep according to its reproductive rhythms, (one lambing per year or three lambings in two years). The parental genotypes were Ile de France and Merino.

Experimental lot

The experimental lot is a typical "dehesa" of southwest Spain, which belongs to the "Junta de Extremadura", covered with *Quercus rotundifolia* L. and annual herbaceous species (mainly grasses, legumes and compositae). The soil is acid and rainfall averages 400 mm per year. The average availability of pasture was about 2.200 kg/dry matter in springtime, 1.600 in summer and 580 in fall-winter. Stocking rate was 4 ewes per ha. Phosphate fertilisation was applied (25 in P₂O₅ per ha).

Feeding

The flock was grazing permanently and supplemented with concentrates only when body condition fell under 2.5. The lambs were grazing pasture or intensively fattened with concentrates.

Reproductive rhythm

Ewes lambing once yearly lambed in January. The ewes managed in accelerated lambing lambed in January, May and September.

Weaning was 45 days *post partum*.

Milking

Milking time was carried out manually in spring and fall after weaning for a duration of 65 and 45 days, respectively.

Experimental design

The trial was conducted using a 2x2 factorial design. The first factor was reproductive rhythms, (lambing once per year (1) vs three lambing every two years (3)). The second factor was: milking (spring milking (01) vs spring and fall milking (03)).

The statistical analysis was made through variance and regression analysis. Four variables were studied: body condition score, lamb, milk and input-output in the system.

Results and discussion

Body condition score

Milking and reproduction rhythm did not affect the annual average body condition score.

The evolution of body reserves during the year shows different variances ranks depending on the reproductive rhythm, range is: 2.0-3.5 in the system 1, (Fig. 1a) and system 3 (lambing in May, Fig. 1c) and 1.0-3.5 in the system 3 (lambing in January and September, Fig. 1b), but they do not show any significative differences because of milking effect.

Changes in body reserves of Merino ewes managed extensively are therefore related to the lambing system, as found by Gibon *et al.* (1985), but milking has no effect on body score condition.

Relationships between milk production, lamb weight and body condition score

During lactation, we found positive correlation between milk production and lamb weight ($r=0.42$, $P\leq 0.05$), but not between milk production and body condition score.

The variation factors that influence litter growth and the body reserves during lactation are: milk period and lambing size, according to Molina *et al.* (1991a). Lambs weight at 45 days depends on ewe milk production and at 60 days on ewe body condition.

The variation ewe body condition during lactation was well explained by daily milk production in the first part of lactation time (60 days), and by lamb weight in the rest of the lactation (Fig. 2), as found by Molina *et al.* (1991b). The variation in lamb weight at day 45 and day 90 was explained by the following models:

$$LW/45 = 9.69 + 6.33 LS - 1.58 EP + 0.003 MP/45; R^2 = 0.57 (P \leq 0.01)$$

$$LW/90 = 23.83 + 13.8 LS - 3.62 EP - 1.4 BC/45; R^2 = 0.50 (P \leq 0.01)$$

Where LW is live weight of lamb in kg; LS is lambing size; EP is milk period in days; MP is milk production in kg; BC is body condition score

Input- Output in the systems.

The annual input per ewe (Vera, 1986) was increased due to reproductive intensification (47 and 34 kg LW/100 days/head, in system 3 and 1 respectively) but there was not relationship with the milking management. There is a relationship between the milk production and the number of milking periods as a consequence of interactions of the two factors taken into account: 42.5 kg milk in the 03 system with milking spring and fall or 32.0 kg in the 01 system with only one milking in spring (Table 1).

Feed requirements were increased when lambing schedule was accelerated (Table 1): both concentrate (24-39 kg/ewe, 1-3 system) and hay (18-0 kg/ewe, 1-3 system) provisions were argumented, as noted also by Casu (1985). In contrast, milking did not require more feeding in the ewe since it took place at the period of maximum pasture availability.

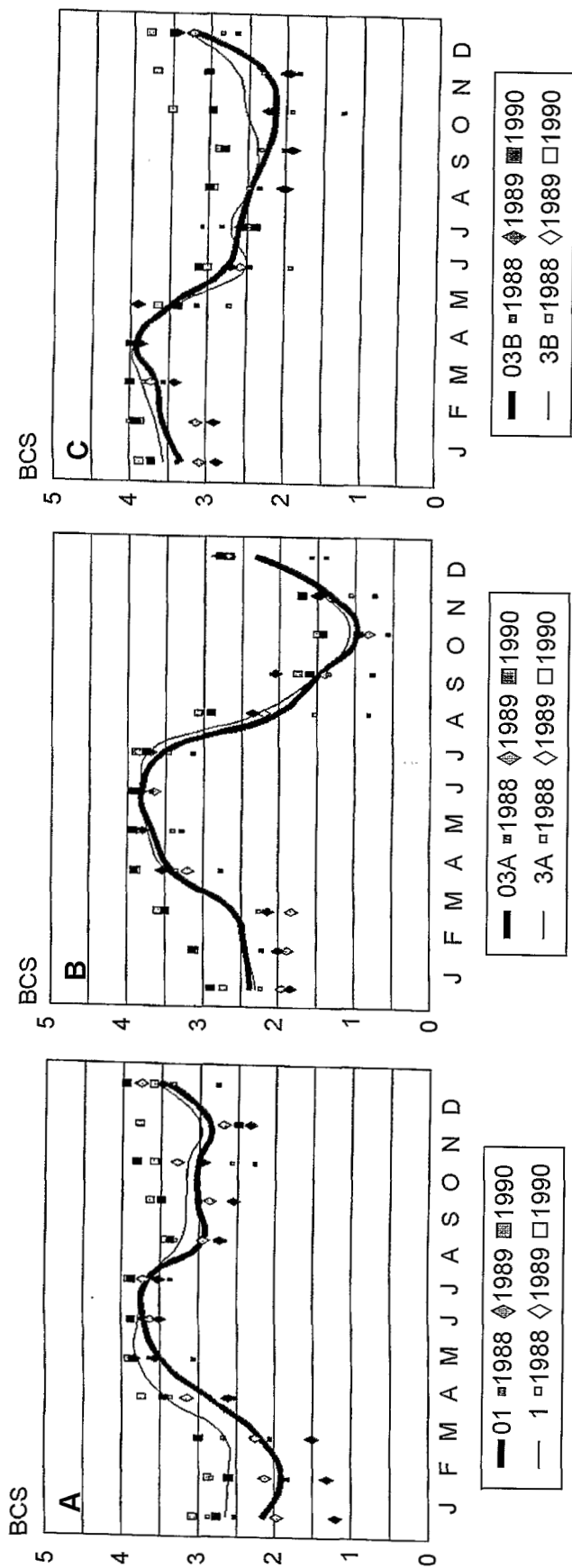


Fig. 1. Evolution of body condition. (A) 1 lambing/year (December); (B) 3 lambing/2 years (December and September); (C) 3 lambing/2 years (May)

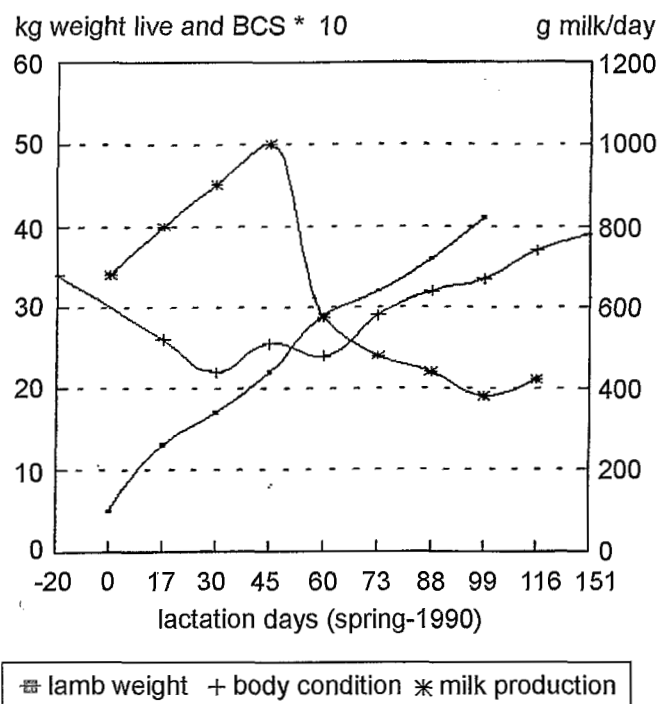


Fig. 2. The relation between lamb weight, body score and milk production.

Table 1 shows that the system of 3 lambing/2 years without milking and the system of 1 lambing/year with milking, have similar supplementation needs (76 kg of concentrate) and similar body condition score (2.9).

Table 1. Milk production at the reproduction system

Experimental group		Live weight (kg/ewe)	Milk production (kg/ewe)	Average body score ($X \pm SE$)	Supplementation (kg/ewe)		
Milking	Reproduction system				Concentrate		Hay
				Lambs		Ewe	
-	1	34.5	-	3.22 ± 0.54	22.0	21.0	-
0	1	34.0	32.2	2.94 ± 0.76	43.6	25.7	-
-	3	48.0	-	2.89 ± 0.83	29.4	36.9	71
0	3	45.7	42.5	2.73 ± 0.90	39.2	40.4	74

Conclusions

The results obtained in the extensive management systems of the Merino sheep, show that the intensification increases the total production of the system (25% in meat production and 22% in milk production), having a relationship with the supplementation, (45% increase) and with the body condition score (22% decrease).

It is possible to set up three global intensification levels of these systems with good results of the Merino sheep: Extensive (1 = one lambing without milking), Semi-intensive (milk production, 01 = one lambing with milking; or meat production, three lambing/2 years without milking) and Intensive (03 = three lambing/2 years with milking).

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