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Technology transfer in extensive ovine systems in the Southwest of Spain

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SUMMARY - Grazing has a great influence on the production costs of ovine extensive systems in the Spanish Southwest. This influence is greatly affected by climatic factors. Maintenance of these systems requires the organization of appropriate management strategies and this involves the technology transfer (T). The coordinated management strategies factors are the following: (i) adjustment of nutrient requirements to natural pasture availability (T: lambing seasons; use of forage crops for critical periods; body condition); (ii) production diversity (T: Meat-cheese) and type of products (feedlot or pasture + suckling lambs; hard or soft cheese); and (iii) re-utilization of manpower (T: milking machine; coop cheese production).

Key words: Sheep, extensive production, technology transfer, Extremadura.

RESUME - "Transfert de technologie dans les systèmes ovins extensifs du Sud-Ouest de l'Espagne". Le pâturage a une grande influence sur les coûts de production des systèmes extensifs ovins dans le sud-ouest de l'Espagne. Cette influence dépend fortement des conditions climatiques. La persistance de ces systèmes demande des stratégies de conduite appropriée ; ce qui implique des transferts de technologie (T). Les facteurs liés aux stratégies de conduite coordonnée sont les suivants : (i) l'ajustement des besoins nutritionnels aux disponibilités des pâtures naturelles (T : saison d'agnelage, utilisation de fourrages cultivés aux périodes critiques, état corporel) ; (ii) diversité de la production (T : viande-fromage) et type de produits (feedlot ou pâturage + agneau allaité par la mère ; fromages doux ou forts) ; et (iii) réutilisation de la main-d'oeuvre (T : machine à traire, production de fromages affinés).

Mots-clés : Systèmes extensifs, production ovine, transfert de technologie, Estrémadure.

Introduction

In Extremadura (Southwest of Spain) there are three million of breeding ewes and a total of about four million of sheep (the 18% of the Spanish sheep and the 4% of the communitarian sheep) whose value of production is superior to 20 thousand million of pts. (López Gallego *et al.*, 1996a).

Extensive ovine systems are characterized by the rational exploitation of natural resources and the adequate management of other productive factors, which imply the use of technologies that are compatible with a sustainable development of the environment.

The Merino breed and related varieties show a good adaptation to the climatic conditions of aridity which provide a seasonal forage production. By the way, this adaptation of the breed to the environment permits to diversify the production (meat, cheese, wool), using producing a greater diversity of products (lambs fed with grass or forage, cheeses proceeding from sheep fed with grass or forage).

Proposals of the technological transfer

Technological improvements of extensive explotations

An adjustment between the nutritional requirements of livestock and the exploitation of the available pasture resources is required (Espejo Díaz and López Gallego, 1994). This can be reached by applying the three following technics.

Organization of lambings

According to the natural resources and the sort of exploitation, one lambing in spring or three lambing in two years could be planned; setting the births in spring, summer and autumn. In this case, certain feeding improvements and management are required (Table 1).

Table 1. Productions, body conditions and annual supplement in the ovine Extensive Systems

Experimental groups [†]		Lamb weight (kg/ha)	Milk product. (kg/ha)	Note B.C. (X _{±s})	Supplement (kg/ha)	
Milking	Reproduct. system				Concentrate (Sheep+lamb)	Hay (Sheep)
-	1	138 ^a	-	3.22±0.54 ^a	200 ^a	-
0	1	136 ^a	128 ^a	2.94±0.75 ^b	310 ^b	-
-	3	192 ^b	-	2.89±0.83 ^b	300 ^b	71 ^a
0	3	185 ^b	170 ^b	2.73±0.90 ^c	365 ^c	74 ^a

[†]1: Annual birth (January); 01: Annual birth with milking (spring); 3: 3 births/2 years (January, May, September); 03: 3 births/2 years with milking (spring, autumn)

Source: Project 7650

From stoking rate (4 sheep per ha) and phosphoric fertilization of pastures (25 units P205 per ha), from one lambing a year to three births every two years an increase of 35% in meat production is noticed. This increase can be of 30% in cheese production (López Gallego *et al.*, 1994b).

These increases of productions require supplement improvements and sheep management overall in every aspect related to the use of the body conditions.

Feeding Rationalization on the basis of the increase of available grazing resources at critical moments

The exploitation should get the greatest level of self-sufficiency with the resources obtained from the extensive system. This can be achieved by putting in practice the following technics:

(i) Organize a timetable of births according to the grazing production. The growing of the grass under Mediterranean conditions provides a large availability of pastures in spring.

(ii) Complementing the grazing at the critical moments (winter and summer) with fodder for grazing consumption, in winter gramineae (ray-grass and triticale) and leguminosae (lupin) in summer (López Gallego *et al.*, 1995); and therefore decreasing the costs of the required supplement of concentrates (Table 2). From a basic grazing to a grazing improved with fodder (ray-grass, lupin, etc.) there is an increase of the 15% of the meat production, and of the 20% in the milk production.

(iii) To improve the quantity and quality of the natural pastures through the phosphoric fertilization. With the incorporation of 150 kg of superphosphato of lime per ha, the average dry materia is increased about 500 kg per ha.

Management of body condition

The greatest nutritional requirements of the livestock in the gestation-weaning and fattening should coincide with the optimum moment of availability and exploitation of pastures and forages (López Gallego, 1994a).

Table 2. Production and grazing variable in milking

Variables	Experimental lots			
	01	01M	03	03M
Grazing days				
Grass	290 ^a	250 ^b	290 ^a	225 ^b
Forages	0	40	0	65
Stubble	70	70	70	70
Supplementation days				
Concentrate ewes	35	35	178	178
Hay ewes	-	-	90	90
Concentrate lambs	35	35	142	142
Used per ha				
DM grass (kg per day [†])	4.170 ^a (14.8) ^a	3.975 ^a (15.9) ^b	3.915 ^a (14.2) ^a	3.915 ^a (17.4) ^c
Concentrate ewes (kg)	49 ^a	51 ^a	130 ^b	137 ^b
Hay ewes (kg)	0 ^a	0 ^a	123 ^c	57 ^b
Concentrate lambs (kg)	120 ^a	125 ^a	285 ^b	330 ^c
Body condition score balance ^{††}	+0.8	+1.0	-0.8/-1.3*	-0.5/+1.5*
Production per ha				
Lamb (kg)	107 ^a	123 ^b	174 ^c	196 ^d
Milk (kg)	80 ^a	132 ^b	175 ^c	212 ^d

[†] Corrected by grass growth and grazing days

^{††} Body condition score variation: Lot A (Lambing January)/Lot B (Lambing May)

1: Annual lambing (January); M: Grazing improved with forage; 3: 3 Lambing in 2 years (January, May, September, year); O: Milking (in Spring in the annual lambing; in Spring and Autumn in the one of three lambings in two years)

Source: Project 9579

Productive diversification and the products typology

Is verified the diversity of lambs obtained from extensive systems and adequate to the seasonal situation (period of time) of feeding resources offer or to the productive management (milking or lactation).

In the system of a birth in a year, the lambs which finished their process in pasture (in spring) with lactation reach at the same age weights similar to those which finish their process in feedlot (the whole year), after the weaning (45 days) involving a relevant improvement in those of the pastures, only if they count on improved pasture with forages.

Likewise, this distribution of the products in the different seasons of the year, and related to the weaning system of the lambs, let us get two different sorts of cheese, which depend on the time and the flock feeding system, on the technology of elaboration of raw milk and on the particular ripening of these cheeses (González *et al.*, 1991).

Therefore, soft creamy cheeses (named tortas) will be obtained in the cheese production of spring based on pasture. Hard cheese is obtained in the production of the rest of the year (overall in autumn and winter), based on the sheep supplement.

Manpower reutilization

The traditional system of manual milking and traditional cheese elaboration must evolve to a more functional and profitable mechanization, without forgetting the artisanal fundamentals which add quality to the cheese elaborated like that.

Application of machine milking: The step from manual milking to mechanical one is influenced by the particular morphology and physiology of the udder of this sort of sheep.

Cheese production: The physic-chemical and bacteriological conditions of the produced milk let us recommend the use of different sorts of facilities, from the artesanal one to the most sophisticated in the cheese production.

Conclusions

It is necessary to apply the depicted technologies and other complementary ones to improve the profitability of the extensive explotations in the Spanish Southwest. Such technologies will be summarized below:

(i) As much self-sufficiency as possible will have to be used in the feeding diet of the extensive exploitation of ovine. This should come from the own grass and concentrate resources. This can be focused on the following actions:

- To plan the lambing taking into account the curve of herbaceous production and the evolution of the body conditions as regard with the physiological state.
- To increase the quantity and improve the natural pasture quality with its phosphoric fertilization and the grazing management.
- To decrease the seasonal of the natural pasture production with the annual forage sowing (lupin, triticale, veza-oat, ray-grass, etc.).

(ii) To improve the ovine meat production all these point will be required:

- To get three lambing every two years.
- To improve the flock sanitary attention.
- To get, through crosses, carcasses of better quality and conformation.
- To diversify the type of lamb produced as regard with the time and the system of production.
- To increase the percentage of sheep slaughtered within the own region.

(iii) According to the milk and cheese production all these steps will have to be considered:

- To practise the mechanical milking in the Merine breed.
- To diversify the sort of cheese produced according to the time and the system production.
- To pay particular attention to the hygiene and uniformity in the production of the cheese whenever this is carried out in the own explotations.
- To canalize the production and salil through cooperatives which make easier the industrialization and commercialization of the milk and cheese.

(iv) For both solutions the label of guarantee of origin must be got (Cheese from La Serena and Lamb from Extremadura).

With all this the Gross Margin of the extensive ovine explotations in this semiarid areas would be increased, not only as regard with meat but also with milk. At the same time, we are helping to keep the balance of such a habitat contributing to the sustainable development of its natural resources.

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