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SUMMARY – An emerging system of dairy sheep production in Southern Spain is described through the preliminary results obtained from a questionnaire-based survey answered by members of the COVAP cooperative. The intensification of merino sheep systems and the introduction of high-yielding foreign breeds are the two main practices adopted by the farmers. The technical staff of the cooperative aims to monitor the system in order to steer its development. Certain tools that have been designed for this purpose and the associated problems are also discussed.

Keywords: Dairy system, intensification, monitoring.

RESUME – *"Contrôle technique et économique des élevages semi-intensifs chez la coopérative COVAP (Espagne)". Un système émergent de production d'ovins laitiers au Sud de l'Espagne est décrit à travers des résultats préliminaires d'une enquête faite chez les producteurs de la coopérative COVAP. L'intensification des systèmes de Mérinos et l'introduction de races étrangères à hautes performances sont les deux principales pratiques adoptées par les producteurs. Les services techniques de la coopérative essaient de contrôler les systèmes pour guider leur évolution. Quelques outils pour atteindre cet objectif et certains problèmes associés sont discutés.*

Mots-clés : *Ovin laitier, intensification, conduite d'élevage.*

Introduction

Sheep production is a traditional farming activity in Southern Spain. Systems to produce wool, meat and milk are found throughout the area's agricultural ecosystems. Although traditionally, extensive systems have been used for meat sheep farming, current socio-economic conditions have persuaded farmers that milk production is more profitable than lamb production. Consequently, many sheep farmers are intensifying their activities, modifying their management systems to milk local breeds, crossbreeding local breeds with high-yielding foreign breeds or even introducing high-yielding foreign ewes.

Although government organisations increasingly demand that strict records are kept in order to ensure the traceability of animals and their products, guarantee food safety, and to monitor the efficiency of support measures, efforts to monitor and assess the evolution of these systems, as is the case with other livestock production systems, are usually thwarted somewhat by the lack of technical and economic information. However, the existence of cooperatives provides an opportunity to increase the chances of success in this task, particularly if tools and staff are organised specifically with this aim in mind.

Monitoring is a two stage process: (i) exhaustive recording of information; and (ii) the incorporation of this information into a management program that allows farms to be analysed individually and in groups, in order to make comparisons within the group and between groups. Data can be gathered by specialist cooperative staff, but if the benefits of monitoring and evaluation are to be extended to cover a wide range of farmers, the farmer himself should record daily routine information about events on the farm.

COVAP is a cooperative society in Southern Spain, that is the largest livestock cooperative in Andalusia and the second largest in Spain and whose members are intensifying mainly dairy production systems (Gómez-Cabrera, 2003). It registered a turnover of 200 million euros in 2003,

collecting 172 million litres of cows' milk, 2.5 million litres of ewes' milk and 2.85 million litres of goats' milk that year. It has also beef cattle and lamb fattening facilities, and 6,500 heads of beef cattle and 130,000 lambs are marketed each year. Fifty per cent of this production is marketed directly as the various cuts of meat sold. 25,000 Iberian pigs are also marketed by the cooperative. In 2003, a new slaughter house was opened (COVAP, 2004). Recently, COVAP began a program to record information about the reproductive management of dairy cattle (Gómez-Cabrera *et al.*, 2002). This program has been implemented at approximately 20% of dairy cattle farms with the help of a technician from the cooperative. Bearing in mind the differing technical abilities of farmers to manage the program, two options were offered from the outset: (i) the farmer enters the information into the program that he has at the farm; or (ii) the technicians enter the data that has been gathered by the farmer and noted on a specially designed control sheet. In the first case, farmers' databases are downloaded regularly onto a general program in order to control the quality of information supplied. The second option is only intended to be a provisional measure, until the farmers are able to manage the program on their own.

The experience acquired has led COVAP directors to initiate a project aimed at monitoring emerging dairy sheep systems in the provinces of Cordoba, Badajoz and Ciudad Real (Southern Spain). The project objectives are: (i) to characterise the dairy sheep production systems that are currently emerging in the area covered by COVAP in the southern region of Spain; (ii) to assess the technical and economic indicators of the different breeds and management systems; and (iii) to initiate a monitoring program for milking and an artificial insemination program.

This paper presents the preliminary project results, focusing on the first two objectives. The paper is divided into three parts. Following this introduction, the methodology is then outlined. The first project objective will be achieved using a questionnaire-based survey of all the dairy sheep producers in the cooperative. This survey is a methodological device designed to characterise the production system. The second project objective will be achieved via a voluntary management program. This program includes the creation of a software package for the cooperative technical staff to assist farmers in the management of their farms. Certain tools are introduced in the methodology section, which have been designed as a part of this voluntary management program for the farmers to record all the events affecting the technical and economic performance of their farms. The following sections then discuss the preliminary results of the survey and the problems encountered with the data collection tools.

Methodology

A questionnaire comprising 123 items was designed. The items were grouped into the following sections: socio-economics, land basis, infrastructure, animal basis, facilities, machinery, milking facilities, herd composition, reproductive management, feeding management and sanitation. Questions about marketing were not included because all the farmers sell their products through the cooperative.

A total of 49 dairy producers supply milk through the cooperative. Five of them did not wish to take part in the survey. So, the number of answers obtained for most items is 44, although some answers were not considered adequate when the data were treated. In some cases the real number of answers treated was less than 44.

A computer program and a control sheet have been designed for the dairy sheep farm management program following a set of basic criteria similar to those adopted for the reproductive management program for dairy cattle. The first criterion is to ensure that basic data are recorded for as many farms as possible, rather than trying to record all the possible information, which is generally difficult for the farmer to manage. However, it is important to bear in mind that some farmers can and wish to keep an exhaustive record of all the animal events individually, and therefore the program must coincide with all the information on the recording scheme.

In the modern age of information technology, researchers must take advantage of the opportunity offered by official registers and especially now that governments are compiling digital versions. Several years ago, it became compulsory in Spain to keep a farm register book, as well as a record of animal movements and medical treatments. These registers were accompanied by the identification

of animals using an ear tag. Now the electronic tagging of sheep and goats has been added to these requirements and it will be compulsory in Spain for animals born after the 9th of July 2005 (Ministerio de Agricultura, Pesca y Alimentación, 2005). Although these requirements cause real problems for many farmers, they also provide an opportunity to meet the need for information about farming systems.

The computer program is now up and running and has been designed in a modular format. It allows the information contained in the digital versions of compulsory records to be used. Certain aspects of the control sheet designed to be used by the farmers are particularly important. The control sheets were designed with the following criteria: (i) The sheet must be small enough for the farmer to carry it with him; (ii) Preferably, the notes taken should be in the form of numbers rather than words, to aid external comprehension; (iii) The information required for the farm register, the animal movement book and the medical treatment book must be included in addition to basic reproductive information: births, purchases, deaths, sales, changes in an animal's productive category and the kind of feed given; (iv) Economic control is restricted to feed use, staff, medical treatments and service expenses; (v) Together with the global information on lambing, if farmers are interested in individual control, the identity of the animal can be also recorded; and (vi) Notes must be taken daily, establishing a routine and thereby avoiding omissions.

For this purpose, a double sheet had to be completed daily for technical control and there was also a single sheet for any economic information. A pocket book was printed containing copies of the double sheet. These were given to the farmers and the rationale behind the book was explained. In a previous visit, the objectives and the importance of the project had been explained to them by the technical staff from the cooperative. The use of the pocket book was monitored through successive visits. Figure 1 shows the characteristics and conditions of use of this record card.

Births and miscarriages			**Date: / /**
Single (1b)	Double (2b)	Triple (3b)	Miscarriages

Incoming (I) , Sales (S) and Deaths (D)				
	Ewes	Rams	Young sheep	Lambs
I				
S				
D				

Concentrated (C) and Mixed feed (M) (Kg)		
	Adult and young sheep	Lambs
C		
M		

Treatments		
Animal No.	Medical treatment	Cause

Breeding animals affected			
Births (B_1/B_2/B_3) / Miscarriages (M) / Incoming (IP/IR) / Sales (S/SR) / Deaths (D/OC)			
Event.	Animal number	Farm/Slaught Code / Lamb No.	Guide number/Sex

Births and miscarriages: Put the number of single (1) double (2) and triple (3) births and the number of miscarriages that occurred that day.
Incoming, Sales and Deaths:
Lambs: Write the number of lambs that were born alive in I and the number of animals sold or to be used in restocking in S and the number of animals that died or were slaughtered for own consumption in D.
Young sheep: The number of young sheep bought or lambs used for re-stocking in I, the number sold or used for reproduction (as ewes or rams) in S and the number of animals that died in D.
Rams: Animals bought or to be used as studs in I, number of animals sold in S and the number of animals that died in D.
Ewes: The number of sheep bought or that come from the young stock, to be used for lambing in I, the number of animals sold in S and the number of animals that died in D.
Consumption of concentrated or mixed feed: Put the number of kg of concentrated (C) or mixed feed (M) given to adult and young sheep and/or the lambs.
Treatments: Write the number of the treated animal, the treatment used and the cause of the treatment.
Animals affected:
Event: Write the type of event: Birth (B_1, B_2 or B_3, for single, double or triple births) Miscarriage (M), Incoming through purchase (IP) or through restocking (IR), Sale (S) or restocking (SR), Death (D) or slaughter for own consumption (OC).
Animal number.: the number of the animal affected.
Farm/Slaught Code / Lamb No.: the code of the farm or slaughterhouse, in the case of a sale, and the number of the lambs, in the case of a birth.
Guide Number / Sex: The health guide number in the case of a purchase (IP) or a sale (S) or the sex of the lambs in the case of a birth.

Fig. 1. The technical control sheet.

Preliminary results of the survey

The average age of the farmers is 40.56 years old and they have been engaged in dairy sheep farming for an average of 4.17 years. Dairy sheep farming is attracting entrepreneurs from both the agricultural and the non-agricultural sectors. The farmers' prior activity was mainly breeding sheep for meat: 46% of farmers had experience managing meat herds, generally merino crossbred with specialised meat breeds, such as Ile-de-France or Fleischaff; 9% had experience managing dairy cows and 9% in other livestock activities. In fact, the meat sheep farmers have intensified their farms, modifying their practices to introduce the milking of ewes. In many cases, they use the same breed for milking and lamb production. But the most interesting socioeconomic datum is that 29% of dairy sheep farmers came from the non-agricultural sector.

Only 22% of the farmers rely exclusively on sheep production. 34% of the farmers combine sheep production with agricultural activities, and 31% of the farmers manage other livestock species, particularly Iberian pigs and beef cattle. 13% of the farmers are also engaged in other non-agricultural activities.

The most common type of labour is family labour. 59% of the farms are run without salaried workers. Only 13.63% of the farms are corporate farms, in which only salaried workers manage the enterprise. 27.27% of the farms combine the two types of workers.

Some farmers manage more than one breed or crossbreed, although it is unclear whether they are managed as different herds. For the purpose of explaining the distribution of animals between different breeds or crossbreeds (Table 1), genetically different animals are considered different herds. Eleven farmers manage two herds and six farmers manage three herds, giving an average of 1.52 herds. Pure high-yielding foreign herds (Lacaune, Assaf and Awassi) are more numerous than local breed herds (Merino, Manchega and Talaverana), forty versus sixteen herds. The remaining eleven herds are different crosses between local breeds and high-yielding foreign breeds.

Table 1. Distribution of the animals according to the different breeds[†]

Breed	No. herds	No. animals	No. ewes	No. rams	No. ewe or ram lambs
Assaf	12	3,301 (275)	2,491 (208)	87 (7)	727 (61)
Awassi	3	651 (217)	400 (133)	24 (8)	135 (45)
Lacaune	25	8,546 (342)	5,831 (233)	311 (12)	2,414 (97)
Total foreign breeds	40	12,498 (312)	8,722 (218)	422 (11)	3,276 (82)
Manchega	3	791 (264)	710 (237)	16 (5)	65 (22)
Merino	12	7,322 (610)	6,047 (504)	181 (15)	1,019 (85)
Talaverana	1	130	130		
Total local breeds	16	8,243 (515)	6,887 (430)	197 (12)	1,084 (68)
Assaf x Merino	1	488	488		
Assaf x Merino 75-25	1	248	240	8	
Awassi x Manchega	1	116	116		
Awassi x Merino	3	1,575 (525)	1,274 (425)	48 (16)	266 (89)
Lacaune x Merino	5	1,490 (298)	1,264 (253)	36 (7)	190 (38)
Total crossbreed	11	3,917 (356)	3,382 (307)	92 (8)	456 (41)
Total numbers	67	24,658	18,991	703	4,816
Average by herd	1	368	283	10	72
Average by farm	1.52	560	432	16	109

[†]In brackets, the average number per herd.

The total number of animals in the dairy herds is 24,658, with 18,991 milked ewes. These numbers

generate averages per herd and per farm of 368.02 and 560.40 animals and 283.44 and 431.61 ewes. The number of milked local breed ewes is lower than the number of foreign breed ewes: foreign breeds account for 8,722 ewes and local breeds for 6,887 ewes.

The preferred foreign breed among farmers is Lacaune, with twenty five herds and 8,546 animals, followed by Assaf, with twelve herds and 3,301 animals. Lacaune producers are making the necessary institutional arrangements to establish an official breeding program, a national association and a herd book.

Merino is the dominant local breed, accounting for up to twelve of the sixteen herds and 7,322 out of 8,243 animals. The genetics of these Merino herds is varied and the ewes are partially milked, after a period of suckling by the lambs. In some areas this dual purpose Merino system has been in place for many years and the cheese from La Serena (Badajoz), produced with Merino milk, has been granted Denomination of Origin status. An increasing number of farmers are milking Merino ewes in order to improve the profitability of the farm.

An outline of the reproductive management of herds is presented in Table 2. The table shows the number of lambing seasons per year and the methods used to control the reproductive performance of the herds. The herds are divided into batches and the farmer usually plans the lambing dates of the different batches so as to have a regular production of milk all year round. The number of lambing seasons per year is higher than in normal meat systems. Seventeen farms (38.63%) have more than four lambing seasons per year and only three of them have 1 lambing season.

Table 2. Reproductive management. Number of farms in each category

Reproductive treatment	No. lambing seasons/year					Total
	1	2	3	4	>4	
No treatment	1	2	4	1	2	10
Pharmacological treatment	1	5	5	4	8	23
Sponges		2			5	7
Melatonin	1			1	2	4
Total	3	9	9	6	17	44

The main reproductive control method used is pharmacological treatment, in twenty three cases (52.27%). Sponges are applied in seven cases and melatonin in four cases. Ten farms do not use any reproductive control methods, apart from the usual husbandry practices of flushing and the male effect, implemented by nearly all the farmers. Nevertheless, farmers are still trying out different methods, especially those that do not have experience with sheep herds, and although these figures represent the results at the time of the interview, there is not yet a clear pattern in farming practices.

One of the most important characteristics of the dairy sheep systems is the pattern of the suckling and milking periods. A traditional Merino dual purpose system in this area is characterised by one month of suckling before the ewes are milked. The patterns observed in the forty four farms vary considerably, and require deeper analysis than is possible here. One practice adopted when systems are intensified is the artificial rearing of lambs. Table 3 compares rearing methods with the number of days before weaning. Artificial rearing allows early milking: when artificial rearing is used, ewes are milked from the first day after the lambs have suckled the colostrum. Ewes are only milked right from the beginning of lactation in the sixteen cases of artificial rearing. But when there is a period of suckling, in many cases the ewes are milked at the same time, prior to weaning. The length of the period when suckling and milking coincide varies considerably, not only between the twenty eight farms that adopt natural suckling but also within the same farm for different lambing dates. Since this particular decision is influenced by many factors, it is difficult to summarise the information. But it is nevertheless an interesting issue to be analysed in the future: how different practices related to weaning and the combined suckling and milking period affect farm performance.

Table 3. Summary of the lamb production systems. Numbers of farms per system

Method of rearing	Days to weaning				Total number
	21	30	30-45	45-60	
Artificial	3	1	11	1	16
Natural	4	9	10	5	28
Total number	7	10	21	6	

Table 4 provides a summary of the feeding systems. The main characteristic is the large number of farmers who use total mixed feed as the main ingredient. The reason is that it is a service provided by the cooperative. Thirty six farmers (81%) give mixed feed to milking ewes, twenty (45.45%) give it to dry ewes, twelve (27.27%) feed it to rams and three of them give this type of feed to lambs. In this case, the most common type of feed given to lambs is forage or pasture and grain. In general, farmers have adopted one system for feeding each different type of animal, but this not the case with the rams, which are fed according to the activity they must perform at the time, hence they are given a more complete feed during mating seasons.

Table 4. Type of feed used by types of animals. Number of farms per system

Type of feed	Milking ewes	Dry ewes	Rams	Lambs
Dry mixed feed	28	16	9	3
Wet mixed feed	3	3	2	
Mixed feed + grain	2			
Mixed feed + forage	3	1	1	
Forage + grain	8	13	13	15
Pasture + grain		11	4	26
Non regular[†]			15	

[†]Only for rams.

The animals are mainly fed indoors. Perhaps the main indicator of system intensification is the minimal role placed by grazing in terms of feeding. Most of the land is in a semi-dry area with low productivity and the contribution of grazing is not taken into account when calculating mixed feed for milking ewes. Grazing for long periods is not a good practice for high-yielding foreign breeds. Some experts believe that this is why imported breeds have failed to adapt in many areas of Spain (Ugarte *et al.,* 2001). The cooperative's technical services are trying to advise farmers in this area.

The survey also covers health care and sanitation as well as milking facilities and equipment. These aspects are not related here but it is interesting to point out that all the operations have milking machines, a milking parlour and a bulk tank for cooling. Twenty two farms, exactly 50%, have a pit parlour and the other 50% have platforms.

Another issue related to the project objectives was the interest of the farmer in joining a milking recording scheme. The possibility of applying a selection and breeding program in the future, and the possibility of comparing the performance of herds of the same breed or to make comparisons between breeds depend largely on how the farmers respond. Twenty one (47.72%) of the farmers said they would be willing to take part. But there were significant differences between breeds (Table 5). Sixteen of the twenty five Lacaune farmers (64%) and six of the twelve Assaf farmers (50%) were interested in the recording scheme, but the three Awassi farmers were not interested. Farmers that milk local breeds were on the whole unwilling. Only two of the twelve Merino farmers and the Talaverana farmer were interested. In order to simplify the table, crossbreeds have not been included. Only three farmers are not included in the table, since they only have crossbred animals, and in all three cases their answer was no. All the farmers that were willing to join the recording scheme had at least one foreign breed herd.

Table 5. Willingness to join a milking recording scheme. Number of producers

Breed	Yes	No
Assaf	6	6
Awassi	0	3
Lacaune	16	9
Total foreign breeds	22	18
Manchega	0	3
Merino	2	10
Talaverana	1	1
Total local breeds	3	14

Problems arising in data collection

In the survey, farmers were asked about their habits in relation to noting down technical and economic events, in order to find out about their experience and willingness. The results showed that only twenty four (54.54%) farmers usually take down information but about particular events. Due to the interest in monitoring the foreign breed systems, the answers of Assaf and Lacaune farmers were analysed to see if there were different from the general trend. 58.33% of the Assaf farmers and 48% of the Lacaune farmers wrote notes, percentages that are similar to the general trend.

After several months of monitoring, the following list was compiled, detailing the problems incurred when using the record sheet, which were having a major impact on the performance of the system:

(i) The items labelled as single(1b), double(2b) and triple(3b) record the number of single births, double births and triple births respectively. In the first version of the sheet, the labels used were single, double and triple. However, some farmers had difficulties in writing down the number of multiple births adequately. The current labels represent the response to this situation but there are still difficulties distinguishing between miscarriages and stillborns.

(ii) Events that lead to an increase in the stock of a specific category of animal were called "incoming". Events that led to a decline in the stock were called "sale" or "death". The rationale here is to create a daily balance sheet for the different categories of animals. For "lambs", the only incoming event (I) is birth, and declines in numbers are caused by sale (S) that include restocking to "young sheep" or death (D) that include slaughter to own consumption. The restocking could be an income into the "young sheep" category (income from the "lamb" category). The other possible incoming event for the "young sheep" category is through purchase. The casualties for this category are the same as for all the categories: sale and death. Finally, for the "ewes" and "rams", incoming events are purchases and changes from "young sheep" and the casualties are the two common ones.

The initial problem with this balance sheet of animals was that the farmer identifies casualty exclusively with death, and the concept of animals changing categories was barely understood. This concept must be modified, and the term casualty should not be applied when an animal changes category.

(iii) The daily register of feed supplied is very difficult. The farmers do not use kilograms as their unit of measurement, but rather recipients such as small carts, tins and buckets. One option would be to adopt these elements as units of measurement and to assess them in each case and the other to eliminate this register and to left only the purchase of feed.

(iv) The way medical treatments are applied, generally to a group of animals at the same time, makes difficult to write correct notes on the sheet. Farmers also dislike this issue, because of the possibility of contrasting this information with milk analysis, which could lead to suspicions of unacceptable practices. This controversial issue requires education, persistence and time before it can be resolved. Perhaps in this initial stage of the program, a good tactic would be only to ask about the most routine treatments.

(v) The size of the pocket book implies a clear restriction in terms of the amount of space available to write notes, and although the expected responses for all the items are numbers, the compromise between portability and space for writing is not clear and needs to be examined thoroughly.

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