G34.16_514, [1] Djemali.mnaouer@inat.agrinet.tn

Conservation and genetic improvement of Tunisian native dairy sheep productivity by Sarda genes using intra-uterine artificial insemination

M. Djemali[1], S. Romdhani[2], L. Iniguez[3], A. Bedhiaf[1] , L. Sâadoun[4] and I. Inounou[3],*
[1]Laboratoire des Ressources Animales et Alimentaires, 1082 Cité Mahrajène, Tunisia ,[2] Laboratoire des Productions Animales et Fourragères, Rue Hédi Karray, 2049 Ariana, Tunisia, [3] ICARDA. P.O. Box 5466, Aleppo, Syria,[4] OEP,30 rue Alain Savary, 1002 Tunis, Tunisie.

Abstract

It has been identified that the Sicilo-Sarde breed, the only indigenous milking sheep in the country had recognized a considerably population reduction due to low production ability, indiscriminate crossing and a shift to dairy cattle because of government incentives. The objective of this study was to use frozen semen from Sarda rams via intra uterine artificial insemination to improve its productivity under southern Mediterranean conditions. A total of 600 ewes from 10 flocks were synchronized in April 2005 by inserting hormonal sponges. Sponges were removed after 14 days and 500 IU of PMSG were injected. Intra uterine insemination using laparoscopy was used 48 hours later. Results showed that fertility, prolificacy and mortality rates were on average 53%, 166% and 5%, respectively. All F1 females were kept as replacements and F1 males are actually managed in a selected ram program. Important facts have interacted in the current production conditions and triggered a reverse process to the decline of this breed: a recently formed association of producers of this breed in the need of technological improvement, a well defined market with an unsatisfied demand for increased production, and the involvement of the private sector that has installed capability to absorb the production and processes the milk.

Keywords: *sheep, Sicilo-Sarde, milking, laparascopy, insemination, semen, sarda*

Introduction

Tunisia indigenous breeds of sheep and goats contribute substantively to the livelihood of farmers in different agro ecologies (Iniguez, 2005). These breeds are well adapted to local conditions. It has been identified that the Sicilo-Sarde breed, the only native milking sheep in the country and in North Africa has undergone a considerably population reduction due to indiscriminate crossing and a shift to dairy cattle because of government incentives. The Sicilo-Sarde breed was a cross between the Sarda and the Comisana realized by Italians in Norhern Tunisia at the end of the1800s. In the fifties, the breed supplied a processing cheese unit in the region with 7000 l/d, a quantity that represented only 40% of the total milk produced by the breed. Today the same cheese processing unit,which is still the main cheese unit in the region, is supplied with only 1600l/d.

After the independence, most of the Sicilo-Sarde flocks remained in cooperative farms owned by the state and some were private. With the privatization process of cooperatives, the Sicilo-Sarde breed saw its population size decreased from 200 000 ewes in1995 to only 25 000 ewes by the year 2000 (Saâdoun et al., 2005). Low sheep milk price and more incentives for dairy cattle were among the main reasons for this decline. When state farms (cooperatives) were

privatized, the new investors chose to shift to dairy cattle instead. From 1995 till the year 2000 a variety of alternatives were tried by national and international institutions (EU and others) to stop the decline of the breed and save it from extinction, but no success was realized

Interestingly important facts interacted in the production conditions of this breed when a farmers association was created in 2003 to save the breed. It was able to double the breed milk price one year after its formation. In order to improve milk production of the breed by genetics and given the closed country borders for health reasons, importation of Sarda rams was impossible. However the possibility of importation of frozen semen was given. The objective of this study was to report on the intra uterine artificial insemination protocol using laparascopy to improve the Sicilo-Sarde productivity under southern Mediterranean conditions.

Materials and methods

Ten flocks from the breed association were selected in Baja region. From each flock 60 ewes were selected and were split in 5 groups of 12 ewes. Each group was identified by a different color. A thousand frozen doses from seven proven rams were imported from Italy. All identified ewes were checked for non pregnancy and checked to have good body conditions and good previous reproduction records. The ten flocks were scheduled to receive the hormonal sponges starting on April 04, 2005. The 10th flock was treated on April 13, 2005.

For each flock, hormonal sponges were inserted in day (1). In day (14), sponges were removed and 500 i.u. of PMSG were injected. Group1 of each flock had sponges removed at 22:30 pm; group 2 at 23:30 pm; group 3 at 00:30 pm; group 4 at 02:30; group 5 at 03:30. In day (17), ewes were inseminated by frozen semen via intra uterine starting at 10:00 am with one hour for each group (figure 1).

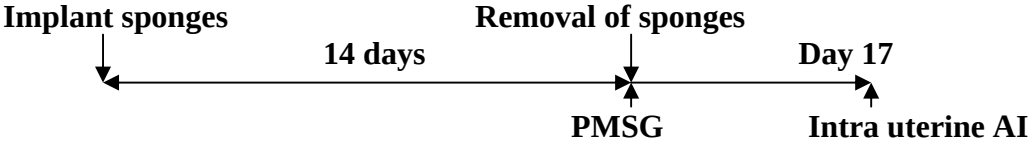

Figure 1. Intra uterine AI using frozen semen

For the intra uterine insemination, each ewe was put in a cradle with its feet tight and a sedative and an antibiotic were injected to sooth the animal which was cleaned from wool and dirt at the abdomen area. Two incisions were made about 75 mm each 5 cm from udder side by side of the linealba. The semen was checked for motility and put into the insemination gun and the AI was done via intra uterine. A laparscope and an air pump were used. An antiseptic was put to keep out flies and the animal was then put back to the yard. All information on each inseminated ewe were recorded.

Results

Fertility, prolificacy and mortality

Results showed that fertility, prolificacy and mortality rates were on average 53%, 166% and 5%, respectively (Table 1). Fertility rates varied from 157% to 184% and prolificacy rates varied from 47% to 63%. The fertility rate of a total number of 55 ewes, from the same protocol and inseminated at the cervical level, was 15%. These results showed the importance of the intra uterine AI in sheep when semen is frozen.

Table 1. Fertility, prolificacy and mortality rates (%) of the intra uterine AI using frozen semen

Farm number	Number of flocks	Fertility	Prolificacy	Mortality
1	2	62	162	5
2	1	63	168	8
3	1	60	175	6
4	1	53	172	5
5	1	53	184	7
6	1	47	157	0
7	1	51	157	0
8	2	51	169	5
Average	**10**	**53**	**166**	**5**

The number of lambs born by ram, sex and type of birth is shown in table (2). A total of 509 lambs were born with 266 males and 243 females. Lambs born single were 127, lambs born double were 174 and triplets were 207. Multiple births represented 75% in the studied flocks. A total of 24 lambs died.

Table 2. Number of offspring by sex and type of birth

Category	Ram 1	Ram 2	Ram 3	Ram 4	Ram 5	Ram 6	Ram 7	Total
Sex of lamb								
Male	39	20	36	34	51	35	51	**266**
Female	49	9	36	47	20	29	53	**243**
Type of birth								
Single	21	6	24	23	21	15	17	**127**
Multiple	67	23	48	58	50	49	87	**382**
Total	**88**	**29**	**72**	**81**	**71**	**64**	**104**	**509**

Production traits of the breed

A total of 7937 lactations recorded during the period 1997-2002 in the target flocks showed that average milk yield was 89 l ± 47 l, days in milk were 139d ± 47 d., and suckling period was 104 d ± 22 d.(Table 3). Average daily gains of lambs were reported by Selmi in 2004 to be 146 g/d ± 55 and 164g/d ± 48 g/d.

Table 3. Production traits of the Sicilo-Sarde breed

Trait	Observations	Average	Standard Deviation
Milk yield (liters)	7937	89	47
Days in milk	7937	139	47
Suckling period (days)	7937	104	22

Genetics

All F1 females are kept as replacements and F1 males are actually managed in a selected ram program. Seven families were formed from the 10 flocks and the scheme started as an exchange of young rams in a way that these rams will not be used in their flocks of origin. Extra males were gathered by the association and sold to small farmers in the region.The same protocol was repeated in 2006 and covered 1000 ewes in 20 flocks.

Conclusion

Intra uterine AI with frozen semen constitutes a reliable tool to inject improved genes when fresh semen is not available and live rams can not be imported. Important facts interacted under the current production system of this breed: a) An association of producers of this breed b) a well defined market with an unsatisfied demand for increased production to be processed into derivatives, and c), the back up of national and international research and national livestock development institutions to help farmers improve the productivity of their breed. This case represents how a decline of a breed was reversed by farmers initiatives backed up by research and development.

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