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The Effects of Dose of Pregnant Mare Serum Gonadotropin (PMSG) on Reproductive Performance of Algerian Rembi Ewes during Seasonal Anoestrus

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Abstract

The current study was designed to evaluate the effect of different doses of pregnant mare serum gonadotropin (PMSG) on reproductive performance of Rembi ewe during seasonal anoestrus. A total of 120 sheep and 12 rams of Rembi ewe lamb were used in this experiment. Vaginal sponges containing 40 mg of fluorogestone acetate were inserted into the vagina of the ewes. The sponges were withdrawn on day 7 and 300 IU of PMSG (group 1, n=30, 500 IU of PMSG (group 2, n=30) and 700 IU of PMSG (group 3, n=30) were injected intramuscularly. The rates of fertility in groups 2, 3, 4 and the control group were found as 86,2%, 79,3%, 72,4%, and 44,8%, respectively. Fecundity rates were 1.14%, 1.20%, 1.03% and 0.48% in groups 2, 3, 4 and the control group, respectively. The rates of prolificacy in groups 2, 3, and 4 which received different doses of PMSG and the control group were found as 1.08%, 1.52 %, 1.43%, and 1.08%, respectively. Lambing rates were obtained as 67.5%, 77.5%, 77.5% and 58.8% in groups1, 2, 3 and in control group, respectively. The effect of the hormonal treatments on the birth weight of lambs averaging 1.90 ± 0.16, 2.60 ± 0.11 and 3.25 ± 0.19 kg respectively. The application of 500 IU PMSG was rather more effective than injections of 300 IU and 700 IU in Rembi ewes being outside the breeding season.

Keywords: Rembi ewe; PMSG; Reproductive performance

Introduction

The Algerian Arabis a breed of sheep that is common in north-western Africa. Algerian Arab sheep are particularly common in Algeria, but are also found in neighboring countries of North Africa and South of the Sahara in parts of West Africa. In Algeria, lamb production is governed by the seasonal pattern of pasture growth and the reproductive seasonality of sheep. Sheep production in Algeria is mainly known in steppe areas where the Algerian sheep has become adapted, showing a particular productive performance. Algerian sheep population is estimated at 16 million, head of which half are females. The Rembi race represents 12% of the national sheep flock and constitutes one of the most interesting Algerian races based on its physical, productive and reproductive skills by two lambing's per year with a rate of twinning quite acceptable [1].These breeds are characterized by their high rusticity and capacity for adaptation to different environments [2]. Rembi sheep produces good quality meat and respond well to genetic improvement through selection. Some researchers [3-6] reported varying extents of fertility, fecundity and prolificacy rates, using different doses of PMSG administered via injection to ewes in the breeding season. There was no study about different doses of PMSG in Rembi ewes during the seasonal anoestrus period. Therefore, the present work was aimed to investigate the effects of different doses of PMSG on reproductive performance in Rembi ewes synchronized with progesterone during the seasonal anoestrus.

Materials and Methods

Location, animals, and hormonal treatments

This study was performed in Tiaret (west of Algeria) latitude 35°15'N and longitude 1°26 'E. The trials were performed during the period from August 2007 to October 2008 corresponding to the breeding season for this breed.

A total of 120 ewes, ranging in age from 1.5 to 3 years and weighing 35 to 42 kg, were used in the trial.All animals were treated for parasites with invermectin (Baymec) and albendazole (Valbazen) 8 days before initiation of the experiment (March 2007).

Progestagen sponge and PMSG treatment

Animals were randomly divided into 4 groups, each of 30 ewes. Groups 1, 2, and 3 received intra-vaginal sponges containing 40 mg of FGA (CHRONO GEST®») for 14 d. At withdrawal of the sponges on day 14, the ewes were given intramuscularly 300 (group 1), 500 (group 2), and 700 (group 3) IU of PMSG (de «FOLLIGON 1000 UI®». Group 4 served as control.

Ovarian stimulation by PMSG injection

The effect of PMSG dose (0, 300, 500, and 700 IU) on reproductive efficiency of the ewes were evaluated using variables as defined below:

Lambing rate=Percentage of ewes lambed from pregnant ewes previously diagnosed

Fertility % =Percentage of ewes lambed from the total of ewes mated

Fecundity %=Percentage of lamb born per ewe mated

Prolificacy %=Lambs born per ewe lambed

Single or multiple lambing=Percentage of ewes lambed with one lamb (single) or with two or more lambs (multiple)

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Statistical analysis

The percent of lambing, fertility, fecundity, prolificacy and birth weight were planned and analyzed by an SPSS version 10.1 (SPSS Inc., Chicago, IL, USA). These parameters were computed by mean value, one way ANOVA variation, regression and correlation index. All results are given as mean ± standard error. For the interpretation of reproductive parameters, we considered the following formulation:

- Fertility: 1 = 2 = ewe infertile and fertile sheep.
- Fertility: 0 = zero lamb born, 1 = one lamb born, 2 = two lambs and 3 = three lambs.
- Prolificacy: 1 = single lamb, 2 = 3 = dual lamb and lamb triple.

Results and Discussion

Effects of dose of PMSG on reproductive efficiency of Rembi ewes

The effects of PMSG dose on reproductive efficiency are summarized in Table 1.

The rates of fertility in groups 1, 2, and 3 which received different doses of PMSG (500 UI and 700 UI) and the control group were found as 86,2%, 79,3%, 72,4%, and 44,8%, respectively (Table 1). The rates of fecundity in groups 1, 2, and 3 which received different doses of PMSG and the control group were found as 1,14%, 1,21%, 1,03%, and 0,48%, respectively (Table1). Lambing rates were 83.33%, 76.66%, 82.60%, 70% and 43, 33% in groups 1, 2, 3 and the control group, respectively (Table1).

Multiple lambing in group 3 with injection dose of 500 I.U. (40%) was the highest value between all groups ($P<0.05$). This value in groups 2 (26.66%) were higher and 4 (23.33%) than group 1 (3.33%) ($P<0.05$) (Table1). Birth weight, live-weight is given in Table 2.

Rembi sheep produces good quality meat and respond well to genetic improvement through selection. Several studies have shown that PMSG application increases the percentage of multiple lambing and prolificacy in sheep as a consequence of an increasing in ovulation rate [7,8]. According to Dogan and Nur [9] findings, PMSG stimulates the number of follicles and this caused more follicular development.

	Group 1 (control) N=30	Group 2 300 UI PMSG N=30	Group 3 500 UI PMSG N=30	Group 4 700 UI PMSG N=30
Estrus response (%)	69.66	69.66	69.66	69.66
Lambing rate (%)	43.33	83.33	76.66	70
Single lambing (%)	40	56.66	36.66	43.33
Multiple lambing (%)	3.33	26.66	40	23.33
Triple lambing (%)	0	0	0	3.33
Rate of lambs living	46.66	110	116.66	100
Mortalité %	0	0	0	3.33
Fertility (%)	44.8 ± 9.2^{a}	86.2 ± 6.4^{b}	79.3 ± 7.5^{b}	72.4 ± 8.3^{b}
Fecundity (%)	0.48 ± 0.11^{a}	1.14 ± 0.12^{b}	1.21 ± 0.14^{b}	1.03 ± 0.15^{b}
	1.08 ± 0.08^{a}	1.08 ± 0.08^{a}	1.52 ± 0.11^{b}	$1.43 \pm 0.13^{a,b}$

Table 1: Effects of dose of PMSG on reproductive efficiency of Rembi breed ewes a.b: Means in the same row with different superscripts differ significantly ($p<0.05$)

Single lambing (SL) (n=53)	Multiple lambing (ML) (n=28)	Triple lambing (TL) (n=01)
3.25 ± 0.19 kg	2.60 ± 0.11 kg	1.90 ± 0.16 kg

Table 2: Average weight at birth the lambs.

In the present study, Rembi ewes were administered different doses of PMSG following a 12-day progesterone treatment. The results on oestrus rate for treated groups were consistent with that reported by some other researchers. Aközet al. [10] reported to have obtained an estrus rate of 100% with PMSG injections of 300 and 700 IU, and estrus rates of 93.3% and 100% with injections of 40 mg FGA after a 7-day treatment with 30 mg of progesterone. They reported that the administration of 700 IU of PMSG was more effective in ewes outside the breeding season. Similarly, Ustuner et al. [11] reported that PMSG administration improved the efficiency of synchronization of estrus and ovulation both during and outside the breeding season. Also, Koyuncu et al. [12] synchronized the Kıvırcık ewes using pessaries containing progesterone and superovulated them with different doses of PMSG (500 and 700 IU) during breeding season. Prolificacy rates were 158% and 196% in the 500 and 700 IU groups, respectively. In our study, doses of 500 IU were found more effective. Similarly, estrus and fertility responses of 97% and 66%, respectively, were observed in a study with Pelibuey and Blackbelly ewes when 500 IU PMSG were applied at sponge removal Rosado et al. [13]. In our study, doses of 300 IU found more effective with a fertility rate of 86.2%. It was thought that fertility parameters could be affected by different treatment seasons such as anestrus, breeding or transition season. Algerian Ouled Djellal sheep have a relatively strong performance of reproduction and a percentage of fertility, fecundity and prolificacy reported about 91%, 105% and 115% [14].

Relevant to this, Al-Merestani et al. [15] conducted a study in which Syrian Awassi sheep were treated with intravaginal sponges combined with 400 IU of PMSG. They have reported a lambing rate as 78%. In our study, lambing rate as 70.7%. The results of the present study and those obtained by Belkasmi et al. [16] are in agreement.

Conclusion

In conclusion, synchronization programs with sponges containing FGA (40 mg) can improve the reproductive efficiency of Rembi ewes when PMSG is administered. A dose of 300 and 500 IU of PMSG is suggested to increase the percentage of ewes in estrus, fertility, and fecundity rate. But, a dose of 500 and 700 IU of PMSG is suggested to increase the percentage of prolificacy rate.

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