EFFECT OF THE METHOD OF OESTROUS SYNCHRONIZATION AND eCG DOSAGE ON FERTILITY AND TWINNING IN ALGERIAN RUMBI SHEEP

BY

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ABSTRACT

Two hundred and twenty fife mature cyclic Algerian Rumbi ewes were used in this study. They were all used as control ewes in Autumn, and after lambing at the following Spring they were divided into 5 groups, after eliminating the infertile ewes. Each of the 5 groups, of thirty ewes each, has been treated differently. Four groups were synchronized with sponges progestogens and then received 0, 350, 450 and 700 i.u of eCG. The fifth group received double injections of PGF2α given 8 days apart, and then stimulated by 450 i.u of eCG. Control ewes presented an acceptable rate of fertility while ewes which received eCG treatments and particularity the dose of 450 i.u presented increased twinning and fertility rate and consequently total number of lambs born. The differences between stimulated groups by eCG and the others were significant, particularly between groups received the dose of 450 i.u and other groups.

Key words: Algerian Rumbi sheep, oestrus synchronization, eCG (PMSG), fertility and induced twining.

INTRODUCTION

Both genetic and non-genetic factors can markedly affect the reproductive performance of sheep flocks. Non-genetic factors that influence reproductive efficiency include nutrition, disease, management techniques, male infertility and environmental

factors. Obviously, several of these factors can interact within a flock to cause losses at specific stages of the reproductive cycle (**M. Vet. M., 1998**).

Although African sheep breed all year round, the overall productivity is poor due to the low reproductive rates (**FAO, 1985**). Twinning rates are also low, and this may be attributed to low ovulation rates (**ADU, *et al.*, 1979**), as is the case also in temperature climate breeds (**Bradford, 1972**). The efficiency of most sheep production systems, therefore, could be improved markedly by increasing litter sizes in the breeding flocks, which is possible if ovulation rates could be increased.

In U.S.A., there are two accelerated systems of production that are most common regiment ewes to a schedule permitting them to produce three lamb crops in 2 years (three - in - two) or five lamb crops in 3 years (the star system). Lambing -to- breeding intervals in these two systems are 8 months and 7.3 months, respectively. Other systems also exist, such as the CAMAL (Cornell Alternate Month Accelerated Lambing) system, which permits a lambing -to- breeding interval of 6, 8, 10 or 12 months and is accomplished by exposing ewes to rams every other month (**Keisler and Buckrell, 1997**).

In sheep, as in other species, high ovulation rates are achieved by improved nutrient intake before mating (flushing) (**Scaramuzzi, *et al.*, 1983**), by crossbreeding prolific with non prolific breeds (**Hanrahan and Quirke, 1985**), by immunization of ewes against sex steroids (**Smith, 1985**) or by the use of exogenous gonadotrophins (**Fraser, *et al.*, 1976**). Since management of large litter sizes is difficult and mortality rates high (**Bradford, *et al.*, 1974**), only moderate increases, probably limited to twins are desirable.

Algeria is endowed with genetic diversity among its sheep populations. However, information on hormonal manipulations of the oestrous cycle to increase productivity of these breeds is scanty. This study was conducted to examine the effect of three dosage of eCG on the onset of oestrus and twinning in an Algerian breed of sheep " Rumbi ", whose oestrus was synchronized using either intravaginal progestogen sponges or Prostaglandin F2 α.

MATERIAL AND METHODS

This study was conducted at the " Cherif El Dine " experimental station which is located in the Algerian highlands, 16 kms south of Tiaret (West of Algeria), at an attitude of 850 m.

Two hundred and twenty five Algerian Rumbi breed ewes that had never lambed previously, and aged from 1.5 to 2 years have been used as control at the beginning of this study (the first part of the study, i.e. Experiment I). They were bred with rams of the same breed, at September 1996. After their parturition, 75 infertile ewes were excluded from the second part of this study.

Fourty five days after lambing, the second part of this study (i.e. Experiment II) was continued with 150 lambing ewes.

Ewes were pasture grazed during daytime and housed at night with adequate provision for water, vitamins and concentrated aliment (300 g / ewe / day). They were divided into 5 equal groups of 30 ewes each.

Four groups of ewes (n = 120) were synchronized with 40 mg progestogen intravaginal sponges (SYNCHRO-PART: SANOFI, sante nutrition animal, LIBOURNE, CEDEX France). Intravaginal sponges were inserted and left in place for 14 days.

On the day of removal of sponges, the ewes of the four groups received an intramuscular injection of 350, 450 and 700 i.u of eCG (SYNCHRO-PART PMSG 700 i.u : SANOFI, sante nutrition animal, LIBOURNE, CEDEX France).

The remaining ewes (n = 30) of the fifth group received 2 equal doses of Prostaglandin F2 α (ESTRUMATE: Laboratoire Schering-Plough Veterinaire, 92300 LEVALLIOS-PERRET), given 8 days apart. On the day of the second injection, these ewes received 450 i.u of eCG. All ewes were then run with fertile rams equipped with marking Harnesses, at a ratio of 1:7, and the time to the onset of oestrus was recorded.

RESULTS

Out of 120 ewes synchronized with progestogen, four ewes lost their sponges and were eliminated from the groups, leaving 29 ewes per group treated with sponges.

It is clear, among all results (Tables 1, 2 & 3), that Rumbi breed ewes could breed in Autumn as could in Spring. Their fertility rate is acceptable (66 %) if compared with ewes treated with sponges without stimulation by eCG (44.8 %). This high fertility rate was obtained with ewes treated with sponges and stimulated by 350 i.u of eCG with a significant difference (p- 0.008) between this group (350 i.u) and the group treated only with sponges, but not within the other groups.

For the twining rate, and consequently the total number of lambs born increased with oestrous synchronization at a significant level compared with control ewes (p= 0.000). Within groups stimulated with eCG, it is clear that was a significant difference between groups treated with sponges or with PGF2 α and stimulated with 450 i.u eCG and the other groups.

DISSCUSION

Since Algerian Rumbi ewes breed all year around, it was necessary to synchronize oestrus in this study to ensure timed lambing. The ideal method of oestrus synchronization should achieve both precision and good fertility and twinning. The present study succeeded in both these objectives within treatment groups. The synchrony obtained in this study is compared to that reported in other breeds (**Greyling and Vanderwesthysen, 1980**). It has been reported that oestrus synchronization, whether on its own or in combination with superovulation reduces sperm transport within the ewes reproductive tract consequently this involves a lower fertility (**Hawk *et al.*, 1987**). This was not the case in this study, since the rate of fertility and twining was high in groups stimulated with eCG, and so high for the two groups treated with 450 i.u eCG. (see Table 2).

The eCG treatment hastens follicular development and therefore the onset of oestrus in synchronized ewes (**Robinson, 1980 and Cahili, 1982**). In the temperate breeds of sheep, eCG increases twining, but litter sizes are variable (**Hackett, 1984**).

In this study, eCG increased the number of lambs, but the best result was obtained with 450 i.u. Lower or higher dose than 450 i.u reduced the twinning rate; these results agreed with those of **Gorden, (1971)** and **Botha, *et al.*, (1975)**.

From a production and economic point of view, it is concluded that eCG used judiciously (at 450 i.u), will increase twining substantially in Algerian Rumbi breed of sheep, without over stimulation to undesirable triplets.

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Experiment I: Control ewes

Table (1): Percentage of fertility and twinning rates in control ewes.

Number of ewes		Number of lambs born			Fertility rate (%)	Twinning rate (%)
Total	Lambing	Single	Twins	Triplets		
225	150	142	16 (8 x 2)	0	66.7 %	5.3 %

Experiment II: Synchronized ewes

Table (2): Relative effectiveness of four progestogen - eCG and one PGF2α - eCG treatments on reproductive performance on Rumbi ewes.

Criteria	Ewes treated with sponges				Ewes treated with PGF2α + 450 i.u eCG
	Without eCG	350 i.u eCG	450 i.u eCG	700 i.u eCG	
Total number of ewes (n)	30	30	30	30	30
Pessary loss (n)	1	1	1	1	—
Lambing ewes (n)	13	25	23	22	23
Fertility rate (%)	44.8	86.2	79.3	75.9	76.7
Lambing born (n)	17	33	35	33	36
Twinning rate (%)	30.8	32.0	52.2	45.5	56.5
Single lambs (n)	9	17	11	12	10
Twins lambs (n)	(4 x 2)	(8 x 2)	(12 x 2)	(9 x 2)	(13 x 2)
Triplets lambs (n)	0	0	0	(1 x 3)	0

الملخص العربي

تأثير تزامن الشبق مع جرعات من eCG علي خصوبة نعاج الرامبي الجزائرية

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تم استخدام ٢٢٥ نعجة ناضجة ولها دورات شبق وهي من النوع الرامبي الجزائرية خلال هذه الدراسة. اعتبرت النعاج كافة مجموعة سيطرة خلال فصل الخريف ، ثم بعد ولادتها في فصل الربيع قسمت الي خمس مجاميع بعد ابعاد غير الصالحة منها. عولجت كل مجموعة (٣٠ نعجة) من المجاميع الخمسة بطريقة مختلفة. تم تزامن الشبق لأربع مجاميع باستخدام الأسفنجات المهبلية متبوعة بحقن eCG بجرعات هي صفر، ٣٥٠ ، ٤٥٠ ، ٧٠٠ وحدة دولية. أما المجموعة الخامسة فحقنت بجرعتين من البروستاكلاندين أف ٢ ألفا بفارق زمني قدره ثمانية أيام بين الجرعتين الأولي والثانية متبوعة بجرعة تنشيطية من eCG قدرها ٤٥٠ وحدة دولية.

أظهرت نعاج السيطرة معدلات خصوبة مقبولة ، بينما أظهرت تلك المعالجة بالـ eCG وبالأخص بجرعة ٤٥٠ وحدة دولية زيادات واضحة بعدد الولادات التوائم ومعدلات الخصوبة وبالتالي مجموع المواليد. وكانت الفوارق الأحصائية معنوية بين مجاميع المعالجة بالـ eCG وغيرها وبالأخص تلك المحقونة بجرعة ٤٥٠ وحدة دولية وبقية المجاميع الأخري.