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Melengesterol Acetate (MGA) Induced Puberty in Awassi Ewe Lambs

[1]Ebru Emsen, A. Carlos and Gimenez Diaz,
Ferda Köycegiz, Müzeyyen Kutluca, Mustafa Yaprak and Hakki Emsen
[1]Ataturk Universitesi, Ziraat Fakultesi, Zootekni Bolumu, 25240 Erzurum, Turkey
Department of Animal Science, Ataturk University, 25240 Erzurum, Turkey

Abstract: An experiment was designed to investigate the ovarian activity by which progestin administration induces puberty in Awassi ewe lambs. Prepubertal lambs were fed to provide approximately 0.125 mg/ewe lamb MGA twice daily for a 12 d period (MGA; n = 14) or to serve as untreated controls (CONT; n = 14). Laparoscopic examinations of ovaries were conducted on days 7 and 8 after last MGA feeding. The percentage of ewes having active ovary on days 7 and 8 d after last MGA feeding was significantly higher ($p<0.05$) for treated (56%) than for control ewes (11%). We suggest that MGA withdrawal accelerates follicle growth to the preovulatory stage and puberty was able to be induced in 9 months old Awassi ewe lambs with MGA treatment for 12 days.

Key words: Puberty induction, MGA, Awassi

Introduction

In food-producing animals it is, for economic reasons, desirable to use as soon as possible those indivuduals that are reatined for breeding purposes because the period from birth to the point where the female animal first conceives and the male animal is used for the first time is essentially non-productive and costly.

Administration of progesterone or progestins during the prepubertal period induces precocious puberty in heifers (Gonzalez-Padilla *et al*., 1975 and Short *et al*., 1976). Young female lambs can also be induced to ovulate and display oestrus by the use of this treatment, as a means of increasing their lifetime productivity, particularly in systems of intensified production. It has been suggested that under practical conditions, the sheep treated must be older than 7 months and weigh more than 60% of their adult weight (Gordon, 1967). The efficacy of progestin administration to induce puberty in young females is influenced by age, breed, body weight and degree of follicular development prior to progestin treatment (Burfenning, 1979).

The objective of the experiment described here were to determine the effect of administration of a progestin (MGA) on ovarian development and to determine the relationship of these changes to induction of puberty in Awassi ewe lambs.

Materials and Methods

A total of 28 Awassi ewe lambs aged 9 months and with a mean live weight of 24.5 kg were used. Ewe lambs were weaned at 75 d of age. Blood samples were collected from the jugular vein every 4 days prior to experiment in order to determine the incidence of ovulations by measurement of plasma progesterone concentrations. Progesterone concentrations >0.5 ng/ml in at least two consecutive blood samples were deemed to indicate the occurrence of ovulation (Forcada *et al*., 1992). When animals did not show signs of ovarian activity, indicated by plasma progesterone concentrations, the animals were randomly divided into two groups (MGA= 14; CON= 14). From the second week of January, animals in MGA group were supplied with 0.125 mg/hd melengestrol acetate (MGA) (MGA^R 200 premix, Pharmacia and Upjohn Company, Kalamazoo, Michigan 49001, USA) twice daily for 9 days. Animals were undergone laparoscopic examination of ovaries on days 7 and 8 after last MGA treatment. Ewe lambs were restrained in dorsal recumbency in a 30 degree inclined laparotomy cradle and routinely surgically prepared. One ml of 2% lidocaine hydrocholoride, was administered subcutaneously at two paramedian sites 10 cm cranial to the udder and 2 cm either side of the ventral midline. One centimeter incisions through the skin were made over the sites of local anesthesia with a no. 10 scalpel blade. A 7 mm laparoscopic trocar in a trocar sleeve, directed caudally, was introduced subcutaneously for 2 cm in the left paramedian incision and then was penetrated into the abdomen. The trocar was removed. The abdomen was sufficiently inflated with carbon dioxide via the trocar sleeve and the laparoscope was inserted intrabdominally through the trocar sleeve. Through the right paramedian incision, a 5 mm trocar in a trocar sleeve was inserted intrabdominally with the previous technique. After locating the uterus with the laparoscope, each ovary was examined with the manupulation probe for precense of corpus luteum or follicle. Number of follicles and corpus luteum on ovaries in both uterine horn recorded. Birth and weaning weights, weights before and after MGA feeding were recorded. Data were analyzed by analysis of variance using general linear model.

Results and Discussion

The percentage of ewes having active ovary on days 7 and 8 after last MGA feeding was significantly higher ($p<0.05$) for treated (56%) than for control ewes (11%). There was a significant ($p<0.01$) differences in number of follicle at

Table 1: Body weights of ewe lambs in different stages and ovarian status of lambs treated with MGA and untreated

Measurements	MGA	Control	Significancy
Birth weight	4.0±0.19[a]	4.8±0.19[b]	*
Weaning weight	15.9±1.13	17.0±1.30	NS
Weight before MGA feeding	23.1±1.50	26.0±1.50	NS
Weight after MGA feeding	25.3±1.60	28.3±1.60	NS
Percentage of animals with active ovary (%)	0.0±0.56[a]	0.0±0.11[b]	*
Total number of follicle at ovaries	3.0±0.70[a]	0.2±0.70[b]	**
No of follicles at right ovary	1.7±0.40[a]	0.2±0.40[b]	*
No of follicles at left ovary	1.3±0.30[a]	0.0±0.30[b]	**

[a,b]: Means within rows, by category, comparisons not followed by the same letter are significantly different
NS: Non significant, **: p<0.01, *: p<0.05

ovaries were observed between MGA and CON groups. MGA treated lambs had higher (p>0.01) total of number follicle than untreated lambs. Ovary at the right side of uterine horn was more active compared to left side in treated animals. Age at puberty is influenced by both breed and nutrition, as they influence growth rate of lamb. Birth weight differed between two groups and CON group animals had higher (p<0.05) birth weight than those treated with MGA. However there was no significant differences found at weaning weight and weights before and after MGA treatment (Table 1). In our study, 56% of the MGA treated ewe lambs became pubertal after 7 or 8 days after treatment. This response was lower than reported previously in prepubertal heifers treated with MGA (Imwalle *et al.*, 1998). Efficacy of progestins might be dependent on the physiological age of treated animals. Imwalle *et al.* (1998) reported that 100% of heifers, maintained on a high plane of nutrition and were in excellent body condition at the time of the experiment, responded MGA treatment. In our current study ewe lambs were maintained on grassland and did not supplemented with additive concentrate.

There was no corpus luteum observed on 7 or 8 days after treatment. There might be two reasons for this result. One of them is that progestin treatment may facilitate onset of puberty but may not initiate the critical events leading to first ovulation. In support of this Anderson *et al.* (1996) proposed that the ability of progestins to facilitate puberty is related to the maturity of neuroendocrine systems that regulate LH secretion. The other reason that required time for ovulation might be longer than 8 days after last MGA feeding.

It is colcluded that, the onset puberty in Awassi lambs can be induced using MGA for 12 days. Early onset of sexual maturity provides economic advantages through increase lifetime reproductive rate. On the other hand the manupulition during the prepubertal period and puberty will effect the overall reproductive performance. Decreasing age at puberty is also profitable to producers because animals can start returning investment earlier and total lifetime production will be increased.

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