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ARTICLE

Oestrous Response to Synchronization using Different Progesterone Treatments in Yankasa Ewes

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SUMMARY
The study investigated the efficiency of synchronization using different progesterone treatment. Twenty post pubertal Yankasa ewes randomly assigned to four treatment groups (n=5/group) and four rams were used for the study. Animals in group 1 serve as control (0.5mls normal saline), while in groups 2 and 3, oestrous was synchronized by daily intramuscular injection of 10mg and 15mg progesterone respectively for 14 days. Intravaginal sponges containing 30mg progesterone acetate was used to synchronize animals in group 4 (14days). The rams were used to heat check ewes starting (from) 24 hours after progesterone withdrawal. Significantly higher oestrous response and shorter response interval was observed in ewes treated with vaginal sponges compared to the injectable progesterone ($P<0.05$). The heat duration was however similar in all treatment groups ($P>0.05$). Fertility of ewes determined by evaluation of ovulation rate, average litter size, resorption rate, conception rate and embryo mortality was not affected by treatment ($P>0.05$). Results of the study indicate higher oestrous response for the vaginal sponges treated group and similar fertility of ewes administered different progesterone treatments.

KEY WORDS: Yankasa sheep; progesterone; oestrus synchronization; oestrus response.

INTRODUCTION

Sheep are important animals in subsistence agriculture on account of their unique ability to adapt and maintain themselves in harsh environment. These small ruminants are therefore owned by a large proportion of the rural population providing meat as well as serving as a ready source of revenue out of season (Nuru, 1985). Studies of physiology of sheep have contributed to improve agricultural production and highlighted that the sheep is a useful model in studies of mammalian reproduction and neurophysiology (Crawford *et al.*, 1995).

The Yankasa is a meat breed of sheep found in northern and north central Nigeria. The breed is white with black patches around the eyes, nose, ears and muzzle (Mason, 1996). The females are hornless, mature ewes weigh between 32 and 43 kg, while the rams weigh between 40 and 51kg (Osinowo *et al.*, 1982). Oestrous synchronization is a valuable management tool that has been employed successfully in enhancing reproductive efficiency, particularly in cows, ewes and does. Oestrous synchronization is applied effectively in assisted reproductive techniques such as artificial insemination and embryo transfer in small ruminants (Godfrey *et al.*, 1997).

Oestrous synchronization has been accomplished using several protocols with varying degree of success (Robinson *et al.*, 1968; Smith *et al.*, 1981). The objectives of this research therefore, are to evaluate the effectiveness of three (3) methods of oestrous synchronization on the reproductive performance of Yankasa ewes.

MATERIAL AND METHODS

Animals

Twenty post pubertal Yankasa ewes weighing between 22.2-25.1kg and four rams weighing between 35-40kg were used for the study. Animals were kept in a dwarf-walled fenced and well-ventilated house. The animals were kept indoors at night and allowed access to grazing outdoors most of the day. Maize offal was provided as supplementary feed and clean drinking water provided *ad libitum*.

Experimental Design

The ewes were randomly assigned into four

experimental groups (n=5/group). The rams were kept out of sight of the ewes until required. The experimental design was the completely randomized. Data collected were subjected to analysis of variance (ANOVA) using the procedure recommended by Steel and Torrie (1980). Where significant difference occurred means were separated using Duncans Multiple Range Test (DMRT).

Experimental Procedure

The animals were kept for a stabilization period of 14 days during which treatment was administered against ecto and endo parasites using Ivomectin (200μg/kg). Physical evaluation of the reproductive system of the rams was undertaken. The ewes were weighed and assigned into treatment groups as follows; group 1 was administered 0.5 mL normal saline (i.m) for 14 days. Groups 2 and 3 were administered 10mg and 15mg progesterone (i.m) respectively (14 days) for oestrus synchronization. In group 4, vaginal sponges impregnated with 30mg acetate progesterone was used for synchronization. The brand used was chronogest® (France).

Oestrus Detection

The rams were used to heat-check ewes starting 24 hours after progesterone withdrawal. Oestrous detection was done four times daily. Ewes showing signs of oestrus were allowed to run with the rams until they were out of oestrus.

Fertility Studies

Three ewes were selected per group at 100days post *coitum*, animals were sacrificed by cervical dislocation for evaluation of the reproductive tract. Fertility was evaluated using the following parameters.

Resorption rate=

$$\frac{\text{No of animals with foetal resorption X 100}}{\text{No of animals in the treatment}}$$

Conception rate =

$$\frac{\text{No of pregnant animals X 100}}{\text{No of animal in the treatment}}$$

(non-resorption)

Embryo mortality =

$$\frac{\text{No of corpora lutea - No of embryos X 100}}{\text{No of corpora lutea}}$$

Ovulation rate = No of corpora lutea

Average litter size = $\frac{\text{No of lambs}}{\text{No of ewes lambing}}$

RESULTS

Table I: Effects of *synchronization* protocol *on* oestrus response of yankasa sheep (mean ± sem)

Parameters	Treatment			
	Control	I/M Injection (progesterone) (10mg/day)	(15mg/day)	Vaginal sponges
% Heat response	40.00 ± 24.49^{b}	80.00 ± 20.00^{ab}	80.00 ± 20.00^{ab}	100.00 ± 0.00^{a}*
Response interval (Hour)	102.00±66.00^{a}	47.50 ± 6.96^{ab}	54.50 ±3.28^{ab}	32.40 ± 1.03^{b}*
Heat duration (hours)	26.50± 0.50^{a}	25.00 ±041^{a}	25.75±0.48^{a}	25.40 ±0.51^{a}ns
Pregnancy rate (%)	100.00 ±0.00^{a}	50.00 ± 28.87^{a}	50.00 ± 28.87^{a}	100.00 ±0.00^{a}ns

SEM: Standard error of mean

Means within the same row bearing the same superscripts are not significantly different (p>0.05). ns- not significant (p>0.05); *- significant (p<0.05)

Table II: Effects of synchronization protocol on fertility (means ± sem)

Parameters	Treatment			
	Control	I/M Injection (progesterone) (10mg/day)	(15mg/day)	Vaginal sponges
Ovulation	1.00 ±5.00	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00
Litter size	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00	0.8 ± 0.00
Resorption rate (%)	1.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.20 ± 0.20
Conception rate (%)	100 ± 0.00	50.00 ± 28.87	50.00 ± 28.87	100 ± 0.00
Embryo mortality	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.20 ±0.20

(SEM): Standard error of mean

Data on oestrus response are presented in Table I. Percentage of ewes which exhibited oestrus differed significantly ($p<0.05$) between treatments. Group 4 ewes had significantly higher percentage in oestrus than the control while other treatments were similar. Mean response interval differed significantly between treatment ($p<0.05$) with group 4 being significantly superior to the control while other treatment were similar. Mean heat duration was similar across all treatments. Pregnancy rate did not differ significantly between treatment ($p>0.05$).

The summary of the results of the effect of synchronization protocols on fertility is presented in Table II. Ovulation rate, litter size, resorption rate, conception rate and embryo mortality were similar between treatments ($p>0.05$).

DISCUSSION

Higher oestrus responses were induced when Yankasa ewes treated with sponges impregnated with 30mg medroxy acetate progesterone (MAP) (100%) compared to progesterone injection (80%). The interval of time from cessation of treatment to the onset of oestrus was longer in injectable progesterone group compared to MAP sponges group (54.5 ± 3.2, 47.5 ± 6.9 and 32.4 ± 1.0 hours respectively). The heat duration was however similar in all treatment groups ($p>0.05$). A 100% oestrus response to MAP sponges in combination with equine chorionic (gonadotrophin) was earlier reported in Karakul ewes, Safdarian *et al.* (2006). Similarly, Wheaton *et al.* (1993), Zeleke *et al.* (2005) and Greyling *et al.* (1994) compared MAP sponges with other progesterone treatments and reported a 100% response to medroxy acetate progesterone (MAP) in Marino ewes. Earlier reports indicated that vaginal pessaries or sponges have been found to be effective in synchronizing oestrus in Yankasa sheep (Osinowo, 1982).

Other attempts made at improving the tightness of synchrony have included the use of gonadotrophin releasing Hormone (GnRH) 30 hours after progesterone withdrawal and the injection of pregnant mare serum gonadotrophin (PMSG) at time of progesterone withdrawal. Prostaglandin $F_{2\alpha}$ is sometimes injected towards the end of progesterone treatment (Voh *et al.,* 1987).

Conception rates varied between 50-100% for the different treatment groups with the MAP sponges and control showing higher rates (100%) compared to the groups injected with progesterone. This is in agreement with earlier reports which showed that the types and dosages of progestins used to control the oestrous cycle have relatively less suppressive effects on luteinizing hormone secretion than the corpus luteum secreted progesterone and are associated with high luteinizing hormone (LH) pulse frequency and development of "persistent follicles" containing aged oocytes. Ovulation of an aged oocyte results in poor fertility. These effects are transitory and fertility at the following oestrus is normal (Mapletoft et *al.,* 2002). It has also been reported that intramuscular injection of progesterone, particularly if used in conjunction with pregnant mare serum gonadotrophin (PMSG) is of value in synchronizing oestrus for precisely planned artificial insemination. Gonadotrophins could be used in conjunction with injectable progesterone to improve conception rates. The use of human chorionic gonadotrophin (hCG) and gonadotrophin releasing hormone (GnRH) as methods of improving conception rates are based on their ability to induce ovulation and enhance corpus luteum development (Oyedipe *et al.,* 1988).

CONCLUSION

The result of this study indicated that oestrus response and shorter response interval were induced when Yankasa ewes were treated with medroxy progesterone acetate sponges compare with injectable progesterone. The heat duration was however similar in all groups. The results also showed that ovulation rate, litter size, resorption rate and embryo mortality were unaffected by treatment. This study, thus provide useful information on the use of progesterone for oestrus synchronization in Yankasa sheep.

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