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Effect of Repeated Super-ov Treatment on Superovulatory Response and Embryo Recovery Rate in West African Dwarf Goats

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Abstract: A total of 18 parous, healthy and cyclically sound 2-3 years old West African dwarf goats were used to study the effect of repeated super-ov treatment on superovulation and embryo recovery rate. The goats were divided into 3 treatment groups identified as T_1, T_2 and T_3 consisting of 6 goats in each group. T_1, the control was administered with physiological saline, T_2 administered with super-ov regarded as Initial treatment and T_3 regarded as repeated administration of super-ov. The results show that the superovulatory response (CL) during initial and repeated stimulation averaged 7.57±0.52 and 6.85±0.48, respectively. The higher embryo recovery 78.00±0.08% in repeated group differed significantly ($p<0.05$) from initial super-ov treatment 45.00±0.06% and the control group 30.00± 0.02%. The lower number of embryos and transferable embryos of 4.00±0.60 and 3.75±0.85, respectively in the initial super-ov treatment than to second stimulation 5.00±0.84 and 4.85±0.94 were due to ovarian hyper stimulation in these animals. The results indicated that super-ov treatments induce superovulatory response in West African dwarf goats.

Key words: Superovulation, super-ov, goats, embryo, treatment, response

INTRODUCTION

The primary goal of superovulation is to obtain consistent high number of viable good quality embryos from each donor (Nowshari *et al*., 1995; Senthilkumar *et al*., 1998). Superovulation involves the use of Follicle Stimulating Hormone (FSH), Follicle Stimulating Hormone + Luteinizing Hormone (FSH + LH), Pregnant Mare Serum Gonadotrophin (PMSG), synthetic prostaglandin e.g., cloprostenol (Pereira and Holtz, 1996; Zaimfirescu and Sonea, 2000). Repeated use of gonadotrophin produce inconsistent response (Armstrong, 1993; Goel and Agrawal, 1993) because of antibody production. The use of alternative superovulation agent has not been studied in West African dwarf goats. This study was, therefore, designed to evaluate the superovulatory response and embryo recovery rate in West African dwarf goats treated repeatedly with super-ov.

MATERIALS AND METHODS

Eighteen, healthy, parous and cycling 2-3 years old West African dwarf goats, body weight 30-40 kg were used as donors during the period of estrous activity. The goats were maintained under semi-intensive system of management.

Hormone administration: A total of 25 units (at 8.33 units for 24 h interval) of super-ov (P-FSH, Ausa Intern. Inc. USA) per goat was administered intramuscularly for 3 consecutive days during 10-14 days of oestrus cycle. 7.5 Lutylase (Dinoprost tromethiamine Upjohn, USA) per goat was administered on second day of superovulatory treatment to induce oestrus. Each goat on manifesting oestrus received 1 m^2 Receptal-vet (Gn RH analogue, 0.004 mg Buseretin (mL. Hoechst, India) intravenously as ovulating agent

Detection of oestrus: The does were watched closely for obvious signs of heat as described by Akusu and Egbunike (1990). As soon as the does came on heat, they were mated to a virile buck. This usually took place very early in the morning before mid-day. In order to ensure that mating took place, even at other times, the buck was left with the does throughout the heat period which lasted 2-4 days.

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Recovery and evaluation of embryos: The recovery method used in this trial is laparatomy as described by Nowshari and Holtz (1992). In this method, embryo collection was carried out under general anaesthesia using chlorpromazine with ovaries, oviducts and uterine exposed by mid-ventral incision. Oviducts are cannulated via the fimbrae and part or all the reproductive tract is flushed by gently expressing the recovery medium consisting of Dulbecco's Phosphate-Buffered Saline (D-PBS, GIBCO, USA) enriched with 2% heat in-activated oestrus goat serum was used for flushing along the uterine horns and fallopian tubes. Immediately after collection, the flushings were microscopically examined and the embryos evaluated at × 70 for identification of uncleaved degenerated or regular embryos. Quality was assessed by the stage of the development, integrity of the zona pellucida, nature of the shell surrounding the embryo. These were carried out at the Histology Unit of the University of Port-Harcourt Teaching Hospital, Port-Harcourt, Nigeria. The parameters determined are:

- Number of corpora lutea on the ovary.
- Number of embryos recovered.
- Embryo recovery rate (%).
- Transferable embryos.

Data analysis: All the data collected from this trial were subjected to analysis of variance (Steel and Torrie, 1980). Treatment means when significant were separated by the use of Duncan's New Multiple Range Test as described by Obi (1990).

RESULTS AND DISCUSSION

The results of repeated super-ov administration on the superovulatory response and embryo recovery rate of West African dwarf goats are shown in Table 1. The result of the number of Corpora Lutea (CL) on the ovary showed no significant difference ($p>0.05$) between goats on T_2 initial 7.57±0.52 and T_3 repeated 6.85±0.48 super-ov treatment, but, they differed significantly ($p<0.05$) from the control group T_1 3.45± 0.25 in the number of corpora lutea on the ovary. A higher number of CL on the ovary 7.57±0.52 was observed in T_2 initial super-ov treatment. The responses were comparably higher than the reports of 4.62±0.02 by Iheukwumere (2004) in goats. Decrease in superovulatory response (CL) on repeated stimulation may have been due to the production of antibodies in the blood of the do nor animals, Goel and Agrawal (1998). Senthilkumar *et al.* (1998) reported similar findings in small ruminants. For consistent response, it is necessary to replace porcine or ovine source of follicle stimulating hormone (Senthilkumar *et al.*, 1998).

Goats on T_2 initial super-ov and T_3 repeated super-ov treatments showed values of 4.00±0.60 and 5.00 ±0.84, respectively in the number of embryos recovered.

These values were similar ($p>0.05$), however, they differed significantly ($p<0.05$) from the control group. In this study, the higher number of embryos recovered of 5.00±0.84 was higher than the range 4.00± 0.84 reported by Goel and Agrawal (1998) but lower than 6.0 embryo numbers obtained in FSH treated goats reported by Rathore *et al.* (1998). The lower number of embryos recovered in the control group of goats may be due to excessive oestradiol level in the circulation during early lutea phase (Goel and Agrawal, 1998) and for premature release of $PGF_2\alpha$ (Pereira *et al.*, 1998). The similarity observed between goats treated on T_2 initial and T_3 repeated super-ov administration in this study confirms the efficacy of super-ov in inducing superovulation and enhancing ovarian activity in goats. These observations agree with the reports of Goel and Agrawal (1998) and Rathore *et al.* (1998) in goats.

There were significant differences ($p<0.05$) in embryo recovery rate between the treatment groups. Goats on T_3 repeated super-v administration 78.00±0.08% differed significantly ($p<0.05$) from T_2 initial super-ov treatment 45.00±0.06% and the control group 30.00±0.02%, however, T_2 initial super-ov differed significantly ($p<0.05$) from the control group in embryo recovery rate. The higher embryo recovery rate of 78.00±0.08% observed in T_3 super-ov treatment was higher than 75% reported by Rathore *et al.* (1998) but comparably lower than 85% embryo recovery rate reported by Pereira *et al.* (1998) in goats treated with prostaglandin $F_2\alpha$ before flushing in goats. The differences observed in this study may be due to an improvement in the collection practice and less variability on ovulatory response observed in repeated treatment group (Goel and Agrawal, 1998).

Table 1: Effect of repeated ovarian stimulation by Super-ov porcine-FSH in West African dwarf goats

	Treatments (Super-ov)		
Parameters	T_1 Control	T_2	T_3
Number of corpus luteum	3.45±0.25^b	7.57±0.52^a	6.85±0.48^a
Number of embryos recovered	2.00±0.50^b	4.00±0.60^a	5.00±0.84^a
Embryo recovery rate (%)	30.00±0.02^c	45.00±0.06^b	78.00±0.08^a
Tans. Embryo recovery	2.10±0.52^b	3.75±0.85^a	4.85±0.94^a

abc: Means within row having different superscripts are significantly different ($p<0.05$)

The transferable embryo recovery ratio was similar ($p>0.05$) between T_2 initial super-ov treatment 3.75 ±0.85 and T_3 repeated super-ov treatment 4.85±0.94, however, they differed significantly ($p<0.05$) from T_1 control group of goats 2.10±0.52. The observed difference in transferable embryo recovery, though not significant may be as a result of hyper stimulation observed in few goats of the T_2 group. Goel and Agrawal (1998) reported similar observations in Stroh goats. Rapid transport of ova or embryos down the reproductive tract and expulsion through the cervix in animals exhibiting hyper stimulation resulted in significantly reduced embryo/transferable embryo recovery (Goel and Agrawal, 1998). This observation is in agreement with the reports of Nowshari *et al*. (1995) in goats.

CONCLUSION

The results of this study, suggest that super-ov could induce superovulation and ovarian activities in West African dwarf goats. A decrease in responses was however, noticed due to repeated stimulation. Hyper stimulation in some goats at initial stimulation adversely affected embryo/transferable embryo recovery rates.

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