



EFFICACY OF CLOMIPHENE CITRATE IN AUGMENTING FERTILITY OF ANOESTROUS GOATS

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ABSTRACT

A study was designed to assess the efficiency of clomiphene citrate in augmenting fertility in anoestrous goats. Fifty-two pluriparous goats (2-6 yr old) with the history of anoestrus since last kidding were taken for the study. Animals were divided into two groups. Animals of Gr-I (n=26) were treated with TANUVAS mineral mixture type 2 (10 g/day) for 20 days orally. Animals of Gr-II (n=26) were treated with TANUVAS mineral mixture type 2 (10 g/day) for 20 days followed by clomiphene citrate 150 mg (Ovulanta-Kit, Vet Mankind, India) orally for five days. Follicular activity was observed by ultrasonography after supplementation of mineral mixture in both the groups until pre-ovulatory follicle size of ≥ 5 mm, followed by administration of buserelin acetate (40 μ g, intramuscular). In Gr-I, 16 (61.5%) animals showed pre-ovulatory follicles in 52 days interval whereas in Gr-II, 24 (92.3%) animals showed in five days post treatment with clomiphene citrate. In both the groups, 50.0% of the animals were allowed for natural mating and the remaining were artificially inseminated (AI) with frozen semen. In Gr-I, 37.5% (3/8) and 62.5% (5/8) animals conceived by natural mating and AI, respectively; whereas, the corresponding values in Gr-II were 75.0% (9/12) and 100.00% (12/12). The results showed the potent efficiency of clomiphene citrate in the treatment of anoestrus in goats.

Key words: Anoestrus, Artificial Insemination, Clomiphene citrate, Fertility, Goat

The normal breeding season for goats in Tamil Nadu is September to October, February to March and May to June (<http://agritech.tnau.ac.in>). Reproductive performance in goats can be improved by induction of oestrus during the anoestrous period and lactational anoestrus after kidding (Carnevali et al., 1997). Previously oestrus was induced and synchronized in goat by extending and shortening the length of the luteal phase with exogenous progestogens and prostaglandin F₂ α (PGF₂ α) analogues respectively (Khanum et al., 2005, Fonseca et al., 2012). Kulaksiz and Daskin (2012) reported equine chorionic gonadotropin (eCG), which possesses follicle stimulating hormone (FSH)-like activity, promotes ovarian follicular development and induces superovulation in goats. However, gonadotropin induced

protocols reported to have high incidence of retained follicles and subsequent refractoriness due to the formation of antibodies against the exogenous gonadotropin (Holtz, 2005; Holtz et al., 2012). Clomiphene citrate is an oral non-steroidal selective oestrogen receptor modulator and it has capacity to induce FSH from the anterior pituitary (Memon et al., 2011). Thus, a study was designed to assess the influence of clomiphene citrate in the treatment of anoestrus and induction of fertile oestrus in goats.

MATERIALS AND METHODS

Fifty two pluriparous goats (2-6 yr old, 28-35 kg body weight) were presented at the Veterinary Clinical Complex, Veterinary College and Research Institute,

Tirunelveli (Tamil Nadu) during January 2017 to December 2019 with the history of anoestrus after last kidding. Physical, clinical and gynaecological examinations were performed. Blood samples were collected and subjected to haematological (Automated Haematology Analyzer, Triviron Health Care Pvt. Ltd.) and biochemical (Advanced Semi-Automated Clinical Chemistry and Coagulation Analyzer, Triviron Health Care Pvt. Ltd.) examinations. Trans-rectal ultrasonography examination with (5.0–7.5 MHz) linear transducer (SONORAY, DS 30 Plus VET) was performed to confirm non-pregnant anoestrus (no cyclic structure with smooth hypoechoic ovarian parenchyma with non-significant structures) does and weaning of kids was advised.

Further, the animals were classified into two groups i.e. Gr-I (n=26) were treated with TANUVAS mineral mixture type 2 (10 g/day) for 20 days. After repeated trans-rectal ultrasonography to confirm anoestrous condition and owners of the goats in Gr-I were advised to bring the animal exhibiting the signs of oestrus. Gr- II (n=26) goats were treated with TANUVAS mineral mixture type 2 (10 g/day) for 20 days followed by repeated transrectal ultrasonography to confirm anoestrous condition. The owners of Gr-II goats were advised to bring the animals daily from the 2nd day of treatment with clomiphene citrate (150 mg/day) and copper sulphate (750 mg/day) orally for five days (Ovulnata® Kit, Vet Mankind) for periodical trans-rectal ultrasonography to monitor ovarian follicular dynamics with linear transducer (5MHz) (Martinez et al., 1998). As the size of the follicles reached ≥ 5 mm in Gr-II (after five days from the cessation of clomiphene citrate) and Gr-I (immediately after onset of oestrus) were injected

with buserelin acetate 40 μ g intramuscularly.

Responded animals of both the groups were divided equally for fixed time natural mating with mature fertile bucks and AI with frozen semen two times 24 h apart at peak ovarian follicular development. Ovulation was confirmed by identifying the presence of corpus lutea after day seven or absence of mature follicles 72 h post treatment with buserelin acetate. Pregnancy was diagnosed by trans-rectal ultrasonography after 35 days of natural mating and AI (Suguna et al., 2008). The data were analyzed using Chi-square test.

RESULTS AND DISCUSSION

As presented in Table 1, the incidence of oestrus was significantly ($P < 0.01$) higher in animals of Gr- II treated with clomiphene citrate (92.3%) than Gr-I (61.5%). The onset of oestrus in Gr-I and Gr-II was 52.00 ± 0.25 and 5.12 ± 0.36 days, respectively and differed significantly ($P < 0.01$). Similarly, Rateb et al. (2019) also reported that clomiphene citrate can efficiently induce ovarian hyper-stimulation in goats. Clomiphene is a non-steroidal ovulatory stimulant which is a selective oestrogen receptor modulator (Duarte et al., 2016). Clomiphene blocks the negative feedback inhibitory effects of oestradiol, in turn stimulates the hypothalamic-pituitary-gonadal axis which causes secretion of GnRH followed by release of FSH and LH from the anterior pituitary (Sir et al., 1989). Yilmaz et al. (2018) reported that ovulation usually occurs 5 to 6 days later coinciding with elimination of clomiphene half-life.

Table 1. Induction of oestrus, follicle size (Mean \pm S.E.) and ovulation rate in goats

Character	Oestrus induction	Onset of oestrus after treatment (days)	Size of largest follicle (mm)	Ovulation after buserelin acetate administration
Gr-I (n=26)	16 (61.5%)	52.00 ± 0.25	5.6 ± 0.40	12 (75%)
Gr-II (n=26)	24 (92.3%)	5.12 ± 0.36	8.3 ± 0.29	24 (100%)

The size of pre-ovulatory follicle was higher in the present study. Ovulation of follicles occurred after 72 h of buserelin acetate administration in 75 and 100% of animals in Gr-I and Gr-II, respectively and significantly ($P < 0.01$) higher in animals treated with

clomiphene (Table 1). We administered GnRH at peak ovarian activity to promote ovulation. The administration of buserelin acetate at peak ovarian activity had promoted ovulation and more number of accessory corpora lutea which is in agreement with Rateb et al.

(2019) and Memon et al. (2011). Administration of GnRH at oestrus improved the success rate of fixed-time AI, as well as to collect oocytes or embryos for application of assisted reproductive techniques (Rateb et al. 2019). In the study significantly ($P < 0.05$) higher

conception rate in Gr-II (100.0%) and Gr-I (62.5%) was recorded with AI (Table 2) and in agreement with findings of Rateb et al. (2019). The conception rates in Gr-1 and Gr-II with fixed time natural mating were 37.5 and 75.0%, respectively.

Table 2. Reproductive performance in goats

	Natural mating		Artificial insemination		No. of kids born	Litter size
	No. of does	Conception rate (%)	No. of does	Conception rate (%)		
Gr-I	8	37.5% (3/8)	8	62.5% (5/8)	9	1.12
Gr-II	12	75% (9/12)	12	100% (12/12)	38	1.81

Litter size was higher in the does treated with clomiphene citrate (1.81) than that of animals treated with only mineral mixture (1.12) and is in agreement with observations of Rateb et al. (2019). It was inferred that clomiphene citrate is a potent agent to treat the anoestrus condition and improves fertility in terms of conception rate and litter size in goats.

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