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EFFECT OF VAGINAL ADMINISTRATION OF PGE_1 ON REPRODUCTIVE TRAITS IN NON-SEASONAL AK KEÇI'S DOES

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Abstract

This investigation was performed on 19 does (multiparous and non-parous) of Akkeçi (Saanen×Kilis) goats which rose in experimental farm Animal Science Department of Faculty of Agriculture in Ankara University. Estrus induction and synchronization in non-breeding goats were done by intra-vaginal progesterone sponges' administration for 11 days. Each does receive 50 mg Cloprostenol and 500 I.U. PMSG. In the trial group (12 goats), 50-100 mg/doe Misoprostol, an analogue of PGE_1, was administrated Intra-vaginally at 48 h after PMSG injection. Fresh buck semen was diluted in physiological serum and trans-cervical artificial insemination was carried out in does 3-4 h after PGE_1 administration. In Misoprostol treated group, the findings were as follows: Conception rate 66.67%, fecundity 50%, litter size 200%, fertility 37.50%, early abortion 37.5%, late abortion 25%, twins 100%, triplets 0%, male kid ratio 83.33% and viability rate 50% was found. But, in control group, conception 71.43%, fecundity 71.43%, litter size 250%, early abortion 60%, late abortion 0%, twins 50%, triplets 50%, male kid ratio 60% and kids' viability rate 100% were occurred. In conclusion, the difference between the groups regarding conception, fecundity, litter size, early abortion, late abortion, twin birth , male kid birth and viability rates were found no significant.

Keywords: Goat, Out of Breeding Season, Trans-Cervical Insemination, PGE_1

1. INTRODUCTION

Semen contains large amounts of prostaglandins (1) which are secreted by seminal vesicles (2). Lipid extraction from human seminal fluid has the pharmacological actions which are related to prostaglandins (PGs). The dilatation or contraction response is depended on the site of PGs production and animal circumstance (obtained from formerly pregnant or from sterile animal; 3).

It is found that Prostaglandins have an effect on smooth muscle contractility; it is natural that attention was first directed towards their action on the smooth muscle of the reproductive tract. The contractions are thought to play a role in propulsion of spermatozoa through the UTJ (Utero Tubal Junction) into the isthmus (4). Electromyographic activity of the mare oviduct is stimulated by intramuscular administration of

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PGE_2 (5). Interestingly, both PGE_2 and $PGF_{2\alpha}$ stimulate contractions of this muscle (6). Prostaglandins can be absorbed from the vagina and enter the circulation in a sufficient amount to alter muscle tone in the uterus and fallopian tube (7). Prostaglandin E may play a role in gamete and embryo transport by controlling oviduct smooth muscle function. It was found a significant increase in the amount of PGE (E_1, E_2 and E_3) at the peak of the breeding period due to the increased sexual activity of rams (1). It has been suggested that there is a link between PG and fertility too. The lower concentrations of PG were found in the seminal fluid of infertile men (8). Vaginal administration of misoprostol has an effect on uterine contractility (9) which maybe has a role in sperm transportation. It is proven that the depth of semen deposition site in the genital tract has direct correlation with the rate of resulted pregnancy and it is greater when the catheter reached the uterus. Therefore this investigation was carried out for determining the effect of vaginally administration of prostaglandin E_1 analogue, Misoprostol in order to pass cervical canal by catheter use, to perform deeper semen deposition and to observe possibilities for improving fertility in Akkeçi does during out of breeding season.

2. MATERIAL AND METHODS

2.1 Location

This study was performed from July of 2011 to December of 2012 in Ankara-Turkey. Animals were kept at the experimental farm of Faculty of Agriculture located in 875 m from sea level 39º57'43"N latitude and 32 º51'57"E longitude.

2.2 Experimental Animals

Nineteen Akkeçi does at different ages (1-3 years old) and physiological status (multiparous and nulliparous) were randomly selected and used in this study. Does were fed with 1.0 kg wheat straw and 0.5 kg concentrate mixture daily per animal and salt blocks containing trace minerals and water was available ad libitum.

2.3 Estrous Induction and Synchronization

Does were randomly divided in two treatment groups (n=7 does were in control group(C) and n=12 does were in treated group (T)). The estrous cycles of the does were induced and synchronized using intravaginal sponges for 11 days. Each of does has received 500 IU PMSG (Chrono-Gest, Intervet) and 50 mg Cloprostenol (Sincromic, Vilsan) 48h before sponge removal. The treated group (T) has received 50-100 mg/doe intravaginal Misoprostol (Cytotec, Aris) at sponge removal time. To detection of estrous Teaser bucks were used 24h after PMSG injection for detecting estrous.

2.4 Artificial Insemination

Two sexually mature and healthy bucks were used for semen collection. Semen was collected by using an artificial vagina immediately before artificial insemination (AI) time. The ejaculates were pooled and placed in a thermos at (37ºC) after collect. The pooled semen had macroscopically good visual mass activity, sperm concentration ~$3x10^9$/ml, progressive sperm motility ≥85%, and normal sperm morphology ≥90%. Thus, the pooled ejaculate diluted with normal saline for final concentration of approximately $400x10^6$ spermatozoa per ml in order to use for AI. Then, semen was included into 0.5ml straws then, transcervical AI was done as previously described by Sohnrey (10).

2.5 Fertility and Fecundity

Pregnancy was determined by ultrasonic scanning 70 days after insemination. The number and sex ratio of kids were both recorded after parturition.

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2.6 Statistical Analysis of Results

The comparison of groups was performed by χ^2 analysis and by using PASW 18 package program.

3. RESULTS

The results of this study are shown in table 1. Pregnancy rates at 70 days after artificial insemination were 71.43% and 66.67% in control and PGE_1 treated group, respectively. The fertility rates were 37.50% and. 40.00% in PGE_1 treated and control groups, respectively.

The pregnancy rate was higher in animals that received Misoprostol, although the difference was not significant. Fecundity and litter size were 50.00% vs. 71.43% and 200% vs. 250% in PGE_1 treated and control groups, respectively. There was no significant difference between these parameters. Although abortion rates were 60.00% in control and 62.50% in Misoprostol treated groups, there was no significant difference.

4. DISCUSSION

Data of this experiment did not reveal significant difference between control and misoprostol administrated groups.

The high rate of abortion was found no significant between two groups. But it was very high in both groups which may be caused by heat stress. It has been demonstrated that early embryonic dead in goats caused by heat stress, resulted in low fertility, because goats have more non-infectional embryonic dead rather than other livestock (11).

The concentration of prostaglandin E in the semen is important factor when PGE is administrated to increase fertility. Dimov (1) investigated the effect of 50 µg prostaglandin E_2 supplement into one dose of diluted semen for the use in artificial insemination and found increased fertility from 37.8 to 91% in rams which had lower concentration of PGE_2 in semen (9.9 μgml^{-1}). However, PGE_2 supplement did not improve fertility in rams having shown higher concentration of PGE_2 (48.9 μgml^{-1}). The effect of PGE_2 may be attributable to cervix dilatation which plays important role in sperm transportation due to special anatomical structure of ewes.

It was hypothesized that vaginal administration of PGE_1 would increase the number of spermatozoa that entered into the oviduct, thereby increasing fertility of the inseminated does. Since pregnancy rates were not improved by PGE-treatment in does, it is possible that PGE_1 did not alter the number of spermatozoa that colonized the oviduct. Another suggestion is that rams used for artificial insemination should have high PGE concentration in their semen. Small number of animals in this experiment is also a question.

It seems that cervix dilatation may not improve fertility rate in goats when fresh semen used for AI. It would be more effective for frozen thawed semen, as observed in ewes (12). Embryonic loss is an inconvenient factor for summer breeding. Especially, during hot periods in temperate regions. However, increased kid production may be essential in many goat farmers. Therefore, further studies concerning estrous induction and AI combined with eventual heat stress effect would be useful during out of breeding season in dairy goats.

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Table 1. Effects of Misoprostol administration on reproductive characteristics of Akkeçi does

	Pregnancy%	Abortion%	Fecundity%	Litter size%	Fertility%
Control	71.43	60.00	71.43	250	40.00
Misoprostol	66.67	62.50	50.00	200	37.50

The difference was not significant between treatments (P>0.05).