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Applicability of different Synchronization Protocols during Breeding Season in Kilis Goats

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ABSTRACT

The objective of this study was to determine the effects of four different oestrus synchronization protocols on some reproductive characteristics in Kilis goats. For this purpose, 75 heads of goats were used and divided into 5 groups as Progesterone (P_4: intravaginal sponges with 20 mg progesterone), Progesterone + Pregnant Mare Gonadotropin Hormone (P_4+PMSG: intravaginal sponges + 300 IU intramuscular injection of pregnant mare serum), single dose Prostaglandin F_2 Alpha ($PgF_2\alpha$-I: single $PgF_2\alpha$ intramuscular injection), double dose Prostaglandin F_2 Alpha ($PgF_2\alpha$-II: double $PgF_2\alpha$ intramuscular injection) with 11-days interval and Male Effect (Control). All goats were naturally - mated. At the end of the study, kidding rates of single and multiple birth types were calculated as 33.34 %, 66.66 % in P_4; 40.00 %, 60.00 % in P_4+PMSG; 46.67 %, 53.33 % in $PgF_2\alpha$-I; 46.67 %,53.33 % in $PgF_2\alpha$-II and 53.33 %, 46.67 % in control groups, respectively. Inconclusion, it was detected that P_4+PMSG application increased kids number.

1. INTRODUCTION

Oestrus control for a successful breeding increases the number of pregnant goats in a short time period and thus brings out to obtain more uniform kids.

Hormonal application to the control of oestrus and ovulation can increase pregnancy rate and be the tool toobtain uniform kids under good management condition. Several hormone application studies for this aim have been made in different countries inbreeding or non-breeding seasons (Blaszczyk et al., 2004; Paulenz et al., 2005; Gül and Keskin, 2010; Oliviera et. al., 2013).

As well as uniform kid production, oestrus synchronisation conduces to suitable marketing chance andkidding schedule to take advantage of feed supplies.

Exogenous hormones are used tocharacterize the chain of physiological events involved in the sexual cycle, while non-hormonal oestrus synchronisation methodsinvolve the use of photoperiod control andbuck effect(Błaszczyk et al., 2004. Baldassarre and Karatzas 2004; Pellicer-Rubio et al., 2008; Lopez-Sebastian et al., 2007).

One of the most preferred oestrus synchronisation methods is based on using of fluorogestone acetate (FGA) in goats. The buck effect is used in order for it to be a natural synchronisation method instead of exogenous hormone applicationsin mating programmes (Rosa and Bryant, 2002; Martin et al., 2004). There are also synchronisation methods based on prostaglandin f2alpha in goat production.

However, there is need for time tousein oestrus synchronization and ensure pregnancy in goats under extensive systems. For this purpose, exogenous hormone application is one of the most efficient methodsto increase litter size.

Turkey has almost 10.4 million heads ofgoats that include native hair goats as 97 % and Angora goat as 3% (TSI, 2016). Hair goatsare known with low milk yield and fertility rate. In Turkey, goats are generally managed traditionally under an extensive system. In this system, bucks are held in the flocks throughout the year. Therefore, kidding has spread over long period that causes same problems such as vaccine application, kid survival rate, kid rearing, labour especially milking management etc.

Even though there is no available data in Turkey Statistical Institute (TSI), it has been estimated that Kilis goat population is approximately 500,000 heads in Turkey(Gül et al., 2016).Kilis goats are considered the most dominant goat breed in East Mediterranean and South Eastern Anatolia region in our country. These goats are influenced by the geographic latitude and known as seasonal polyestrous breeds. Extended kidding period because of mating duration in herds is also a problem for Kilis goat farming.

The aim of this study was to determinethe suitable oestrussynchronization protocols for Kilis goatsin this area.

2. MATERIALS AND METHODS

2.1. Animals

Animal material of this studyconsistsof 75 goats. The animals were maintained in closed fold under extensive management. The animals were allowed to graze all day and fedwith 750 g/head/day of commercial concentrated feeds in the evenings after returningfrom the pasture and having free access to water.

2.2. Experimental design

The experiment has beencarried out in Kilis Province in Turkey. Kilis is placed in the southernof Turkey and on the northern edge of Syria. The district has good agricultural lands and planes. A Mediterranean climate dominates over the region, winters are cool and rainy, spring and fall warm, and summers are hot. The mean temperatures are between 4 °C and 7 °C in winter and the temperatures do not fall under 25 °C in summer (Anonymous, 2016). In this study, we applied five oestrus synchronizationmethodsin goats. All goats were randomly divided in equal numbers into 5-treatmentgroup with regard to age and weight during the breeding season. Bucks were isolated from does two months prior to introduction of male. Accordingly, Group-P4 (Progesterone): 20 mg intravaginal fluorogestone acetate (FGA, 20 mg progesterone analogue) sponges were inserted onthe 19thof August 2014, and withdrawnonthe 30thof August, 2014.Group-P_4+PMSG (Progesterone + Pregnant Mare Gonadotropin Hormone): 20 mg intravaginal FGA sponges wereinserted as Group P4 within 11 days and the goats were injected intramuscularly (IM) 300 IU of PMSG on 28th August 2014 in this group. Group-$PgF_{2\alpha}$-I (Prostaglandin F_2 Alpha):1 cc/head $PGF_{2\alpha}$ (Estrumate®) were injected to the goats in this group on 30th August 2014, one day before buck joining.Group- $PgF_{2\alpha}$-II: The same doses of $PGF_{2\alpha}$were injected to the those of this group on 19th and 30th August with 11 days interval.

Group control: Only treated with male effect,15 heads of bucks were joined to the all groups on 31st August 2014.

In this study,fertility rate, kidding rate, litter size, birthand weaning weight were calculated after births in 2016.

Statistical analysis

The percentage of oestrus, pregnancy and lambing data were analysed with Chi-square test. Average birth and weaning weight were analysed by ANOVA (Kinnear and Grey, 1994).

RESULTS AND DISCUSSION

In this study, oestrus was observed in all groups. All goatswere matedand became pregnant and no abortion was recorded during pregnancy. The rate of

goats in oestrus and mated, pregnancy rate andfertility rate in Control, P4 group, P_4+PMSG, PgF2α-I and PgF2α-II groups were calculated as 100 % for all parameters, respectively (P>0.05). Because all parameters were found as 100 %, we did not need to give these results in a table.These findingsshowed that Kilis goats have high fertility level with the use of these exogenous hormones. These results are in line with different literatures. Thus, Gül et al (2016) reportedoestrus and birth rate as 100 % for Kilis goats. Also, some scientists declared that male effects in the presence/absence of exogenous hormones produced good results in goats (Carnevali et al., 1997; Kusina et. al., 1999; Wildeus, 2000; Veliz et al., 2002; Titi et al., 2009).

Some reproductive parameters of Kilis goats were given in Table 1. The single kidding rate in control, P4, P4+PMSG, PgF2α-I and PgF2α-II groups were calculated as 53.33 %, 33.34 %, 40.00 %, 46.67 % and 53.33 %, respectively (P>0.05).

Single kidding rates were found to be the same in control and $PgF_{2\alpha}$-II groups. Although there were proportional differences between groups, it was not statistically significant(P>0.05). Kilis goats are known with high reproductive characteristics in Turkey and this feature is demanding in goats (Özder, 2010; Gül et al., 2016).Our findings about reproductive traits supported this point.

Table 1: Reproductive performance of Kilis goats (%)

Groups	Single	Twin	Triplet	Quadruplet	Single	Multiple
Control	53,33	46,67	--	--	53,33	46,67
P4	33,34	66,66	--	--	33,34	66,66
P4+PMSG	40,00	33,33	20,00	6,67	40,00	60,00
$PgF_{2\alpha}$-I	46,67	53,33	--	--	46,67	53,33
$PgF_{2\alpha}$-II	53,33	46,67	--	--	53,33	46,67
P	0.155	0.016	--	--	0.155	0.241

As seen in Table 1, P4 and P_4+PMSG groups' goats gave more kids than the other groups. P_4 group are highest among than others (P<0.05) due to twin birth type in all groups. Triplet and quadruplet births occurred in only P_4+PMSG group. They were probably caused by pregnant mare serum gonadotropic hormone (PMSG).

When we compare single birth rate with multiple rate, there were no significant difference between groups (P>0.05). In groups, multiple birth rate was calculated as 46.67 % in control, 66.66 % in P4, 60.00 % in P_4+PMSG, 53.33 % in $PgF_{2\alpha}$–I and 46.67 % in $PgF_{2\alpha}$-II (P>0.05). According to multiple birth type results, although P4 group has the highest kidding rate, P_4+PMSG have the highest kids number (Figure 1). The P_4+PMSG combination has influence on kid number in birth (P<0.05). It has been reported same by different researchers that PMSG increases the fertility in goats (Bongso et al., 1982; Pendleton et al., 1992; Pintado et al., 1998).

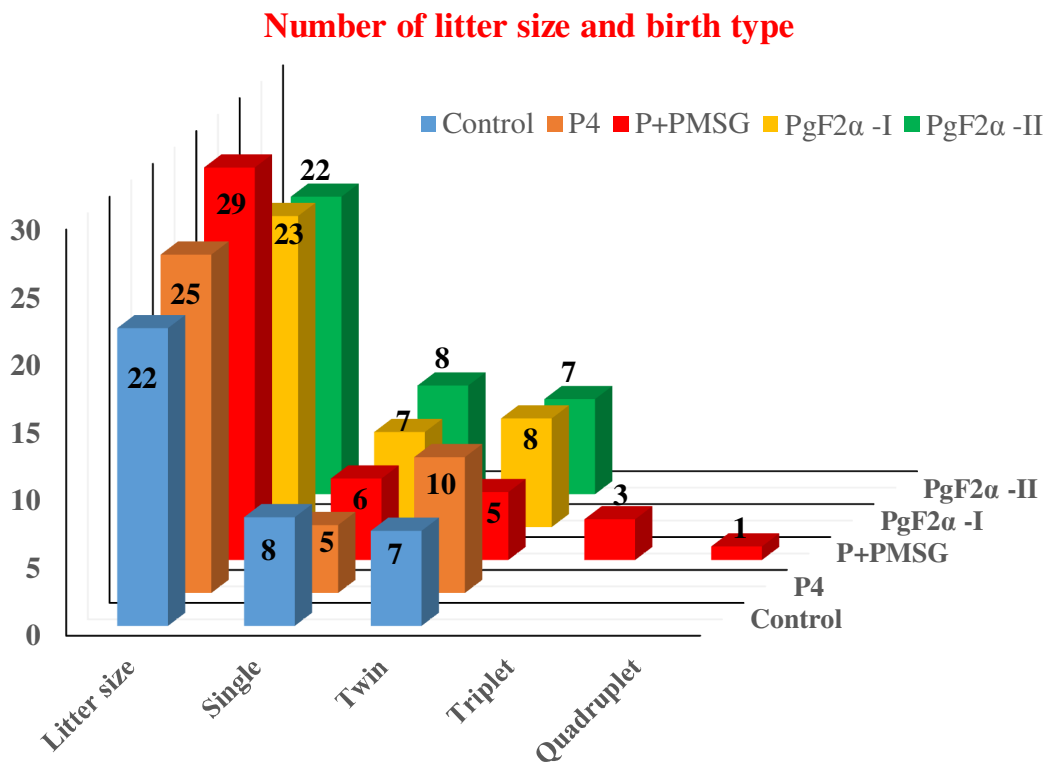

Figure 1:Some reproductive traits in Kilis goat with treated different oestrus synchronization protocols

This study has shown that the use of progesterone sponges with pregnant mare gonadotropin hormone was an efficient application to increase litter size.

The choice of multiple pregnancy is changing with the aim of farmer and/or milk yield of goats. Sometimes this situation exhibits different conditions especially, due to insufficient milk yield of mother, or goat milk could be marketed at higher prices than offspring rate. For this purpose, birth weight and weaning weight were determined and examined. With reference to the idea, if mother has high milk yield, it is better for the offspring's development and survival (Gül et al., 2016)

Birth weight obtained from this study was shown in Table 2. In the groups, there were no detected significant differences statistically in terms of birth weight and sex (P>0.05). These results have indicated that all goats have maintained the same breeding conditions and have similar genetic characteristics. We could have proved this argument when checking the results of birth type again.

Table 2: The birth weights of kids (kg)

Birth type		Control n X±SE	P_4 n X±SE	P_4+PMSG n X±SE	PgF2α -I n X±SE	PgF2α -II n X±SE	P
Single	Male	4 3.76±0.35	2 3.65±0.39	4 3.45±0.24	4 3.78±0.42	4 3.87±0.31	0.917
	Female	4 3.61±0.60	3 3.327±0.40	2 3.27±0.38	3 3.83±0.13	4 3.43±0.26	0.872
Twin	Male	10 3.43±0.311	11 3.17±0.21	8 3.14±0.36	10 2.77±0.27	4 3.11±0.12	0.151
	Female	4 3.35±0.06	9 3.14±0.31	2 2.76±0.76	6 3.04±0.52	10 2.58±0.33	0.169
Triplet	Male	--	--	2 2.49±0.35	--	--	--
	Female	--	--	7 2.54±0.29	--	--	--
Quadruplet	Male	--	--	2 2.67±0.33	--	--	--
	Female	--	--	2 2.21±0.07	--	--	--

Table 3 shows the weaning weight of the kids. According to Table 3, all kids lived at weaning. At the same time, survival rate of kids showed that Kilis goats had high milk yield. Our findings are coinciding with researcher's reports (Kaya, 1999; Zhang et al. 2008; Gül et al. 2016).

Table 3: The weaning weights of kids (kg)

Birth type		Control n X±SE	P_4 n X±SE	P_4+PMSG n X±SE	PgF2α-I n X±SE	PgF2α-II n X±SE	P
Single	Male	4 14.17±0.14	3 13.75±0.19	3 13.52±1.96	4 13.62±0.17	4 13.81±0.26	0.750
	Female	4 13.03±0.16	2 12.30±0.48	3 13.77±0.06	3 13.71±0.14	4 13.18±0.14	0.074
Twin	Male	10 12.69±0.42	11 13.60±0.20	6 13.34±0.28	10 13.53±0.18	4 13.28±0.24	0.208
	Female	4 13.03±0.16	9 12.81±0.32	4 12.76±0.37	6 11.41±0.42	10 13.23±0.23	0.081
Triplet	Male	--	--	3 12.1±0.46	--	--	--
	Female	--	--	6 11.59±0.30	--	--	--
Quadruplet	Male	--	--	2 12.80±0.11	--	--	--
	Female	--	--	2 10.95±0.14	--	--	--

In conclusion, it can be said that different exogenous hormones usage for improving fertility and litter size showed almost similar effects during the breeding season. The administration of PMSG hormone can increase the litter size. Different methods for oestrus synchronization in Kilis goats can be researched in breeding and non-breeding seasons under extensive conditions in the future studies.

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