A Study on Using *Ferula communis* (Chakshir) for Oestrus Synchronisation in Shami (Damascus) Goats under Eastern Mediterranean Condition of Turkey

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Abstract

This study was carried out at the Research and Training Farm of Mustafa Kemal University in Hatay province of Turkey. The experimental Shami goats (20 heads) were allocated into 2 groups as control (C) and treatment (T). Animals in both groups were inserted with Progesterone-Sponges (method of Chrono-gest) for a period of 17 days. While C group animals were fed with a diet containing 16% crude protein and 2500 kcal/ME in dry matter, the treatment group (T) was fed with the same diet with addition of 10% giant fennel, *Ferula communis* L. (Chakshir) which is known with oestrogenic effect, from 10th day of sponge application to the end of treatment. Oestrus determination was done by mean of teasing buck. The teaser was introduced to the experimental goat group three times in a day after withdrawing of sponges. During the teasing period it was detected that *F. communis* caused earlier oestrus surge in group-T compare to group-C (27.2± 2.89 h and 41.6 ± 2.39 h). But, the time interval between first and last animal in heat was rather large in T group where the interval was observed 24.9 h and 21.0 h for group-T and group-C, respectively. On the other hand, twinning rate was calculated as 60% vs 30% in the group-T and group-C, respectively. Results showed that *F. communis* has an important effect on the oestrus synchronization ($P<0.001$), without affecting on litter size ($P>0.05$).

Key words: Shami (Damascus) goat, Ferula communis, Oestrus, litter size

Introduction

There are a close relationship between reproductive characteristics and feeding methods in animal production. Nutrients and some metabolic hormones in feed (insulin, growth hormone etc) have stimulative effect on folliculogenesis and ovulation (Scaramuzzi et

al, 1993). Oestradiol-17β is an important mediator for this effect. Some plants produce some substances, like phytoestrogens that stimulate oestrogen synthesis in animal.

Phytoestrogens are novel estrogens found in variety of plants, which may be ingested directly or as constituents of tissues from animals that have ingested plants. Phytoestrogens have also noxious effects, leading to impaired fertility in domestic animals as well as disturbance of normal gestation process depending upon their source. There are a number of phytoestrogenic plants likely to be consumed by humans, such as giant fennel *Ferula hormonis* L. (Homady et al, 2002). The Sardinian (Italy) giant fennel *F. communis* L. (giant fennel), has been reported to contain ferutinin, acting as a possible source of phytoestrogens of the daucane type. This plant is morphologically indistinguishable from the poisonous chemotype of *F. communis* (Arnoldi et al, 2004). According to the reports of some researchers, *Ferula* genus has also poisonous and non-poisonous plant types (Egber, 1998; Homady, 2002; Arnoldi, 2004). Poisonous *Ferula plant* types contain especially anticoagulant constituents and cause toxic effect.

The toxic effect of *Ferula.* in cattle is associated with hemorrhagic disease, probably due to their ferulenol, ferprenin, 4-hydroxylated, and pronylated coumarins (Aragno et al, 1988). The Moroccan *F. communis* variety brevifolia from which ferulenol has been extracted was shown to cause coagulapathy substantially reducing the activity of Vitamin K-dependent clothing factors without affecting platelet numbers, liver function or its structure (Tliqui, 1994).

F. communis grows naturally on the pasture of the Eastern Mediterranean mountainous regions of Turkey, and goat flocks grazed it with other herbaceous vegetation. It has got green vegetation during May and June and then gets dry. Goats ingest fresh or dry branches and leaves. Also, some people eat ground *F.* root by mixing with honey. Goat keepers and other citizens of the region claim that this plant has an aphrodisiac role for both animals and humans.

Though the folkloric usage of this plant in human and animals, there has been limited data or scientific work to asses its usage in animal reproduction. Therefore this study was aimed to investigate the effects of *F. communis* on oestrus synchronisation and litter size in goats.

Material and Methods

This study was carried out at Research and Training Farm of Mustafa Kemal University in Hatay Province of Turkey. The experimental Damascus goats are known Shami

or Şam goat at the region. One yearling and 20 heads of goats were allocated into 2 groups as control (C) and treatment (T). Animals in both groups were inserted with progesterone-sponges (method of Chrone-Gest) for a period of 17 days. Group-C animals were fed with a diet containing 16% crude protein and 2500 kcal metabolisable energy in dry matter. The other group was fed with the same diet adding 10% *F. communis* (Chakshir) root, from 10th day of sponge insertion until introducing of the teaser buck**.** *F.* root were harvested by digging from Kel-Mountain in Yayladagı, dried under shed and ground before mixed to the diet. Goats were ingested the diet individually by morning and evening feeding and daily amount of ingested feed were recorded. Goats were checked for oestrus at least three times a day by teasing buck after withdrawing of sponges, and were considered to be in heat when they stood for mounting by a buck. Oestrus date and time were recorded for each doe and one buck was allowed to mate with maximum of 5 does during joining.

Differences between groups for daily feed ingestion and oestrus determination time were compared by t-test and for litter size by Chi-square in SPSS program (Kinneer and Gray, 1994).

Results and Discussions

In the study, ground *F. communis* was added to the ration in the treatment group by 10% because of possible toxic effect to animals. As seen from Figure 1, amount of daily diet ingestion was lower in the treatment group than the control group. The lower consumptions in

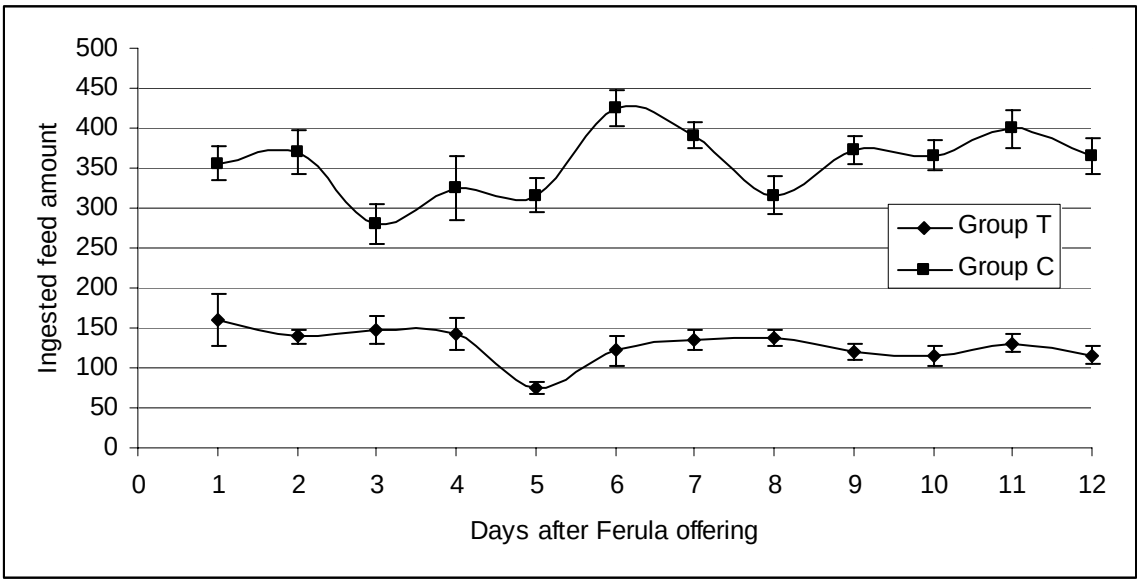

Figure 1. Daily diet consumption by the groups

group-T might be due to the bitter taste of *F. communis* because of containing volatile oils, sesquiterpenes, acetophenone derivatives, coumarins, acetylenes and polysulfans (Homady et al, 2002). Also, Egher et al (1998) reported that *F. communis* may possess toxic affect on animal health if *F. communis* is found prominent and lush on the pasture area. However, it wasn't observed such effect on present experimental goats. It was more likely either lower feed intake or *Ferula communis* used this experiment may not contained toxic substances.

The effect of *F. communis* on oestrus synchronisation and litter size of animals is given in Table 1. At the first day of study all experimental animals were weighted and the body weight difference between groups was not significantly important (P>0.05). Effects of treatment on the time interval between the sponge withdrawing and the onset of oestrus were, however, statistically important (P<0.001).The results show that this time interval was 27.2± 2.89 h and 41.6 ± 2.39 h in group-T and group-C, respectively. This could be caused by the stimulative effect of ferutinin content of *F. communis.* It is reported by Arnoldi et al, (2004) that ferutinin is a substance which acts as a possible source of phytoestrogens in *Ferula*. It is well known that oestrogenic substances have effects on morphological changes of female's genital organs at the pro-oestrus and oestrus phase of cycle. Also this kind of substances eases the mating and transportation of spermatozoon into oviduct. We also know that dose-dependent estrogens are responsible for stimulating uterine contractility and restricting the development of the implanted embryo. During the oestrus cycle, when oestrogen level in blood circulation reaches to threshold, LH secretion from anterior lob of the pituitary gland is stimulated and ovulation is occurred after 24 h from LH peak (Çoyan, 1994; Homady et al, 2002; Kaymakçı, 2002).

The time interval between first and last goat in heat was found to be larger in T-group. This interval was calculated as 24.9 h vs 21.0 h in group-T and group-C, respectively.

Table 1. Live weight, oestrus synchronisation time and litter size of experimental group

Traitment / Groups	Live weight (kg)	Oestrus time after withdrawing sponge (h)			Litter size
	X ± s.e.	X ± s.e.	Min	Max	X ± s.e.
T	34.8 ± 0.66	27.2 ± 2.89	16.2	41.1	1.6 ± 0.16
C	34.7 ± 0.85	41.6 ± 2.39	30.2	51.2	1.3 ± 0.15
Significance	ns	P<0.001			ns

T, treatment group; C, Control group; X ± s.e., mean ± standart error; ns, non significant

The effect of this treatment on litter size was shown in Table 1. Although it was not significantly important (P>0.05), litter size of group-T was higher than group-C. This insignificancy might be related to the flock size which is not enough for statistical calculation.

In conclusion, *F. communis* shortened the incidence of oestrus time in goats without affecting litter size. The obtained narrow time may give the opportunity to stock person or goat keepers to manifest effective husbandry practices.To obtain more general results this study should be repeated with large scale flocks.

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