



Effect of Flushing Ration on the Sexual and Breeding Behaviors in Ghezel Sheep

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ABSTRACT

This study aims at investigating the effectiveness of utilizing barley as a Flushing ration with an energizing source and soybean meal-based diets as a Flushing ration with a protein source the sexual and breeding behaviors in Ghezel sheep. To this end, 36 three and half-year old ewes (51 ± 1.5 kilograms) with the record of giving birth to two lambs and 6 three-year old (89 ± 2.5 kilograms) rams were used. The ewes were divided into two treatment groups of A (i.e., the receivers of barley seeds), B (i.e., the receivers of soybean meal-based diets), and a control group of C with 12 ewes in each group. Also, three rams were utilized randomly in each group. The ewes received the Flushing ration two weeks before and two weeks after sexual intercourse. Hence, group A ewes were fed 400 grams of barley seeds and group B ewes were fed 400 grams of soybean. The results demonstrate that the ewes in the treatment group showed sexual receptivity behavior earlier than the control group ewes; however, the difference was not significant. Also, The receptivity power (i.e., the number of successful jumping permission) and the amount of estrogen, calcium, as well as magnesium levels were not significantly different at pro-estrus and estrus stages. Nevertheless, the amount of phosphorous serum and the new-born lambs' weight were reported to be significant ($p < .05$) in the treatment groups. The current study demonstrated that Flushing ration along with both energizing and protein sources improve the livestock's health and sexual behavior. In addition, such supplements have a positive influence on breeding rate and on the weight of lambs.

Key words: Flushing, Sexual Behavior, Reproductive Behavior, Ghezel Sheep

INTRODUCTION

Nutrition directly influences fertility through mechanisms such as the development of oocytes, egg-laying, and fetal survival; also, it indirectly affects such behavior through blood metabolites and hormones (Robinson et al. 2006). Economically speaking, fertility and reproductive behavior are considered as the most prominent characteristics in livestock breeding. Moreover, they are regarded as the most important determining factors for the efficiency of livestock breeding, conservation of species, and genetic advances have (Ahmad fazel et al., 2014). In general, follicular populations with reference to sheep are to a high extent sensitive to nutrition; hence, the effect of nutrition on egg-laying rate can be divided into three types: a) static, b) dynamic, and c) emergent. The impact of static refers to the ewe's physical condition or the long-term effects on their egg-laying. Furthermore, the impact of dynamic is regarded as short-term so that it impacts positively on the ewe's physical condition score through nutritional supplement ration (i.e., Flushing) during two to three weeks before mating and increases egg-laying rate without gaining extra

weight(Scaramuzzi et al., 2006; Somchit-Assavacheep, 2011). Sexual behavior is mainly related to the females' power of attraction and receptivity (Çağdaş et al., 2010) by which both environmental and physiological factors can affect both males and females (Hurley, 1989). There are several studies about protein importance in reproduction. Using protein in ewes ration significantly increased ovulation and pregnancy rate (Ocak et al. 2006). Providing excess dietary crude protein (CP) during the 5-8 days before anticipated estrus (i.e. beginning of the mid-luteal phase) increased the ovulation rate (Smith & Stewart, 1990;). Also, the sexual attraction of female animals is pertained to the males' attraction and stimulation upon the female breeds; furthermore, the females' sexual receptivity is related to the females' sexual permission to the males for jumping and successful ejaculation into the females' vagina (Tilbrook et al., 1990). A plethora of studies demonstrate that nutritional materials play a significant role in livestock sexual behavior (Pfaff, 1990; Hidiroglou, 1979b, 1979a; Sabra & Hassan, 2008). Appropriate nutrition along with the hormone levels relate to the reproduction behavior and play a prominent role on the livestock sexual behavior. Considering all sheep, the males' receptivity ability and attraction behavior occur in a short period of time within the estrous stage (Tilbrook et al., 1990). To this end, the current study aims to investigate the improvement of livestock sexual and breeding behaviors through using Flushing ration.

MATERIALS AND MTHODS

The trial was carried out at the breeding and research farm of Ghezel sheep in Miandoab, (1371m above sea level, longitude 36°: 9" East and latitude 36°:58" North). For this study, 36 three and half-year old ewes (50±3 kilograms) with the record of giving birth to two lambs and the body condition score of approximately 3 within the same environmental conditions were assigned to two groups of 14. Also, 4 three-year old (89±2.6 kilograms) rams were put to two groups of two. The release time of the rams was from 08:00 A.M. to 12:00 P.M. and 04:00 P.M. to 08:00 P.M.; also, the ewes were selected randomly and were released within the groups. The observations involved direct observation as well as camera recording and reviewing of livestock sexual behavior. The sheep in each group were fed 4 times daily, with the mixed ration of TMR in table 1 in clouding sheep in group A received Barley grain (400 g) group B : soybean meal (equivalent with the protein of 400 g of barley grain) and Group C: control (basal diet). The rations were formulated based on NRC table (1985). The sheep were synchronized in terms of sexual receptivity in 14 days by CIDR made by New Zealand Ltd (No. 39020401-0608) and 48 hours after sexual receptivity synchronization with CIDR, the rams were set free in the flock. The experiment was carried out one week before and one week after inoculation the sheep sexual intercourse.

Sexual receptivity observation in the sheep was recorded in both groups from the initial to the final contact which involved successful sexual jumping culminating in the ejaculation of the male's penis into the female animal. Also, the breeding percentage and birth weight were measured. The sheep samples of blood were tested in three stages, namely the initial experiment, 48 hours, and 24 hours after CIDR taken from the jugular vein of the ewes' neck. The blood serum samples were separated using a centrifuge with 3000 rpm for 15 minutes and were stored in the freezer with at -20° C until analysis of microtubes. The levels of hormones and metabolites were measured using ELISA and spectrophotometric methods. The estrogen-measuring kits were made by DRG German Company (ELA-1567); also, the calcium magnesium and phosphorus metabolites were produced by the Bio- Chemistry of Tehran, Iran.

For the analysis of data, the researcher has made use of SAS and the procedures of Freq. and GLM. Also, the means were compared by tukey test.

Table 1 Ingredient and nutrient composition of experimental diets

Item	A	B	C
Ingredient (%)			
Alfalfa hay	41	28	29
Barley grain	27	13	15
Wheat straw	29	50	51
Molasses	2	4	5
Soybean meal	-	5.9	-
Nutrient composition			
Metabolizable energy(Mcal/kg)	2.19	2.12	2/0
Crude protein (%)	9.3	9.3	7.6
Crude protein (g/day)	153	153	100
(ME/CP) ration	0.235	0.23	0.26
Calcium (g/day)	5.5	5.3	5.1
Phosphorus (g/ day)	2.69	2.66	2.20

RESULTS AND DISCUSSION

The results of the current study show that the use of supplementary Flushing ration with an energizing source and soybean meal-based diets as a Flushing ration with a protein source improve the sexual and breeding behaviors in Ghezel sheep before their sexual intercourse. As can be seen in Table 2, the ewes in the treatment group showed sexual receptivity behavior earlier than the control group ewes; however, the difference was not significant. Also, the receptivity power (i.e., the number of successful jumping permission) was not significantly different. As shown in table 3, the estrogen level of blood in these sheep in the treatment group was higher but not significant in comparison to the control group. It indicates the early sexual behavior. Robinson et al. (2006) reported that since the steroid hormones has an important role in controlling sexual behavior, the quick development and growth of follicles as well as the increase in the hormones level, especially estrogen, influences the livestock sexual behavior positively.

Table 2. Effects of flushing die on Sexual Behavior

	A	B	C	SEM	P-value
The Initial Period of Sexual Receptivity	32.11	31.05	33.79	0.29	Ns
The Total Hours of Sexual Receptivity ¹	37.52	38.46	36.82	0.36	Ns
Sexual Receptivity	26	27	23	-	Ns

¹ The Number of Hours after CIDR-Taking

Increasing concentrations of Estradiol leads to sexual behavior within 1 to 2 days (Çağdaş et al., 2010). As is evident in table 3, the amount of calcium and magnesium serum in the two

experimental groups was not reported to be significant; nonetheless, the level of phosphorus in the two groups with Flushing ration (particularly the group which were fed barley) increased significantly in comparison to the control group. The results of the current study are in line with Seifi et al.'s (2005) study in that calcium and phosphorous levels in pregnant cattle's blood were higher than their not pregnant ones ($p < 0.05$).

Phosphorus deficiency results in decreased pregnancy rates, increased ovarian cystic follicles, activity, and reduced fertility in general. In a study on twenty-seven heifers, Marrow (1980) demonstrated that Phosphorus deficiency ration causes increased level of insemination rate per pregnancy from 103 to 208. In addition, Pugh et al. (1985) reported that reduced level of phosphorus causes reproductive problems. Phosphorus is regarded as one of the components of nucleic acids, nucleotides, and most of the proteins. Also, phosphorus is considered for the transmission of energy and normal metabolism of phospholipids; furthermore, it is regarded as the main part of coenzymes (Seifi et al., 2005). Moreover, the presence of phosphorus in the synthesis of phospholipids and CAMP enjoys the main role on reproductive behavior. Hurley and Doane (1989) showed that protein-dependent calcium and phosphorus and protein-dependent CAMP are very important in the mediation of hormones activity Calcium-dependent mechanisms play a prominent role in the biosynthesis of steroids within the adrenal glands and ovaries. Besides, calcium is involved in use of cholesterol through mitochondria or the stimulation of changing pregnenolone to progesterone stimulation (Seifi et al., 2005). The stimulation of GnRH and the release of LH from the anterior pituitary is associated with calcium-dependent mechanisms and in the absence or blocking of calcium, LH is not released (Hurley & Doane, 1989).

Table 3. Effects of flushing diet on Serum Hormones and Metabolites

	Blood-Sampling Time	A	B	C	SEM	Pvalu
Estrogen	1	31.9	29.8	30.2	2.66	Ns
	2	41	43.5	40.4	3.88	Ns
	3	69.3	71.2	67.4	5.64	Ns
Calcium	1	14.37	14.54	13.42	1.74	Ns
	2	21.21	19.30	18.3	1.76	Ns
	3	14.57	15.6	15.32	1.65	Ns
Magnesium	1	2.7	3.1	3.41	0.47	Ns
	2	3.8	4.2	3.55	0.56	Ns
	3	4.31	4.11	3.98	0.62	Ns
Phosphorous	1	5.18	5.62	4.98	0.78	Ns
	2	6.86	5.77	3.98	1.2	*
	3	7.44	6.75	4.45	1.45	*

As shown in Table 4, the breeding rate in both of the experimental groups receiving Flushing ration is higher than the control group which is due to the increased number of growth follicles and egg-laying. Molle et al.'s (1997) study is consistent with the current study in that the use of soybean meal increases

the fertility and pregnancy rates ¹ in the first sexual intercourse. Also Daghighkia et al. (2011) have demonstrated that the use of barley and vegetable oil can be regarded as an energy source in the Flushing ration which improves the livestock's reproductive performance and pregnancy. In contrast, Amanlou et al., (2010) reported that the use of protein source with low degradation in the rumen during the late periods of pregnancy does not have a significant role on the breeding rate.

Table 4 indicates that the ewes receiving the Flushing ration (especially soybean) enjoyed heavier lambs than the control group ($p < .05$). The consumption of a protein source with an average degradation in the rumen and an energy source in Flushing ration increased the birth-weight of lambs (both males and females) which corresponds with the results of Sabra and Hassan's (2008) study. Nevertheless, Webb et al. (2010) reported that dietary protein sources do not influence the birth-weight of lambs significantly.

Table 4. Effects of flushing diet on Sheep Reproductive Traits

Group	No. of offspring's	Lambing rate	Fertility	Twin-Breeding	Birth Weight (Kg)
A	12	109.9	91.66	8.3	4.86±0.068 ^a
B	13	118	91.66	16.6	4.94±0.089 ^a
C	9	100	75	0	4.02±0.073 ^b

Numbers or values within column with different superscripts are different ($p < 0.05$).

CONCLUSION

The utilization of flushing diet including protein or energy source before the sexual intercourse improves both the sexual receptivity and the reproductive performance of sheep. Also, we conclude that flushing diet along with nutrients have a positive influence on breeding rate which is due to an increase in follicle growth rate and egg-laying

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¹ The number of lambs an ewe is able to bear

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