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Flushing Ration Effect on the Breeding and Sexual Behaviors in Markhoz Goat (Iranian Angora)

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Author's contribution

The sole author designed, analyzed, interpreted and prepared the manuscript.

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ABSTRACT

The objective of the present study was to investigate the productivity 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 breeding and sexual behaviors in Markhoz Goat. In this study, 42 three and half-year old goat (48±1.5 Kg) with the record of giving birth to two kids and 5 three-year old (87±2.4 Kg) rams were used. The goats were divided into three 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 14 goats in each group. In addition, three kids were utilized randomly in each group. The goat received the Flushing ration three weeks before and three weeks after sexual intercourse. Therefore, group A goats were fed 600 grams of Barley seeds and group B goats were fed 600 grams of soybean. The results showed that the goats in the treatment group showed sexual receptivity behavior earlier than the control group goats; anyway, the difference between these groups was not significant. In addition, 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. However, the amount of serum phosphorous and the new-born kid's weight were reported to be significant ($p < .05$) in the treatment groups. The present study showed that Flushing

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ration along with both energizing and protein sources improve the livestock's health and sexual behavior, and also such supplements have a positive influence on breeding rate and on the weight of kids.

Keywords: Flushing; reproductive breeding; sexual behaviors; Markhoz goat.

1. INTRODUCTION

Markhoz goat breed, known as Angora goat in other places, was previously scattered in the Iranian provinces of Western Azerbaijan, Kurdistan, and Kermanshah but is currently distributed only in a small part of Kurdistan of Iran, Iraq and a few villages of Kafri city, As Sulaymaniyah, KRG of Iraq [1]. Historically, these animals had an important cultural role in Kurdistan since the mohair obtained from these animals is used as a raw material for making national clothes. In fact, the name is derived from these local clothes (Maraz). However, due to the increased market demand for goat meat in recent years, most of income from goat husbandry is now from meat [2]. Nutrition directly influences fertility through mechanisms such as the development of ocytes, egg-laying, and fetal survival; also, it indirectly affects such behavior through blood metabolites and hormones [3]. Economically speaking, fertility and reproductive behavior are considered as the most prominent characteristics in livestock breeding. Furthermore, they are regarded as the most important determining factors for the productivity of livestock breeding, preservation of species, and genetic advances have [4,5]. Usually, follicular populations with reference to goat are to a high extent sensitive to nutrition; therefore, the effect of nutrition on egg-laying rate can be divided into three types: a) static, b) dynamic, and c) emergent. The effect of static refers to the goat's physical condition or the long-term effects on their egg-laying. Moreover, the effect of dynamic is regarded as short-term so that it impacts positively on the goat's physical condition score through nutritional supplement ration during two to three weeks before mating and increases egg-laying rate without gaining extra weight [6-8]. Sexual behavior is mainly related to the females' power of attraction and receptivity [9, 10] by which both environmental and physiological factors can affect both males and females [11]. Also, There are several studies about protein importance in reproduction. Using protein in dams ration significantly increased ovulation and pregnancy rate [12]. 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 [13]. In addition, the sexual attraction of female animals is pertained to the males' attraction and stimulation upon the female breeds; moreover, the females' sexual receptivity is related to the females' sexual permission to the males for jumping and successful ejaculation into the females' vagina [14]. A plethora of studies showed that nutritional materials play a significant role in livestock sexual behavior [15]. Appropriate nutrition along with the hormone levels relate to the reproduction behavior and play a prominent role on the livestock sexual behavior. Considering all Markhoz goat, the males' receptivity ability and attraction behavior occur in a short period of time within the estrous stage [4,5]. The aims of the present study was to investigate the improvement of Markhoz goat sexual and breeding behaviors through via Flushing ration.

2. MATERIALS AND METHODS

2.1 Sampling and Experiments

The study was carried out at research farm of Markhoz goat in Kafri city, Sulaymaniyah, KRG of Iraq. In this study, 42 three and half-year old goats (48±1.5 kilograms) with the record of giving birth to two kids and the body condition score of approximately 3 within the same environmental conditions were assigned to two groups of 14. Also, 5 three-year old (87±2.4 kilograms) rams were put to two groups of two. The release time of the rams was from 09:00 A.M. to 12:00 P.M. and 05:00 P.M. to 08:00 P.M.; in addition, the kids 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 goat in each group were fed 4 times daily, with the mixed ration of TMR in Table 1 in clouding goat in group A received Barley grain (600 g) group B: soybean meal (equivalent with the protein of 300 g of Barley grain) and Group C: control (basal diet). The rations were formulated based on NRC table (1985). The goat were synchronized in terms of sexual receptivity in 15 days by CIDR made by New Zealand Ltd and 72 hours after sexual receptivity synchronization

Table 1. Component and nutrient composition of experimental diets

Elements	A	B	C
Nutrient composition			
Phosphorus (g/day)	2.71	2.68	2.22
(ME/CP) ration	0.25	0.25	0.28
Calcium (g/day)	5.52	5.55	5.3
Metabolizable energy(Mcal/kg)	2.21	2.14	2.2
Crude protein (%)	9.5	9.5	7.8
Crude protein (g/day)	155	155	100
Component			
Alfalfa hay	43	30	31
Soybean meal	-	6.1	-
Wheat straw	31	52	53
Barley grain	29	15	17
Molasses	4	6	7

with CIDR, the rams were set free in the flock. The trial was carried out one week before and one week after inoculation the goat sexual intercourse. Sexual receptivity observation in the goat 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 goat. In addition, the breeding percentage and birth weight were measured. The goat samples of blood were tested in three stages, namely the initial experiment, 72 hours, and 48 hours after CIDR taken from the jugular vein of the goats neck. The blood serum samples were separated using a centrifuge with 4000 g 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; in addition, the calcium, magnesium and phosphorus metabolites were produced by the Bio- Chemistry of Agriculture of college, Garmian university, Kalar, Sulaymaniyah, KRG of Iraq.

2.2 Data Analysis

The analysis of data were done by using of SAS V.14 [16] and the procedures of Freq and GLM. In addition, the means were performed and compared using by Tukey test.

3. RESULTS AND DISCUSSION

The results of the current study showed that the use of additional 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 Markhoz goat before their sexual intercourse. The results of Table 2 showed that the Markhoz goat in the treatment group showed sexual receptivity behavior earlier than the control group Markhoz goats; anyway, the difference was not significant. In addition, the receptivity power (i.e., the number of successful jumping permission) was not significantly different. Also, the results of Table 3 showed that the Estrogen level of blood in these goats in the treatment group was higher but not significant in comparison to the control group. It showed the early sexual behavior. The results of study of Kheirabadi and Rashidi showed 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 [17].

Table 2. Flushing die effects on sexual behavior

	A	B	C	SEM	P- value
The total hours of sexual receptivity	39.54	40.48	38.84	0.38	ns
The initial period of sexual receptivity	34.13	33	35.81	0.31	ns
Sexual receptivity	28	29	25	-	-

Barazandeh and coauthor reported that increasing concentrations of Estradiol leads to sexual behavior within 1 to 2 days [14]. The results of Table 3 showed that 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 Ghafouri and coauthor [4] study in that calcium and phosphorous levels in pregnant goat blood were higher than their not pregnant ones ($p < 0.05$). The results of phosphorus deficiency in decreased pregnancy rates, increased ovarian cystic follicles, activity, and reduced fertility in general. Kheirabadi and Rashidi demonstrated that Phosphorus deficiency ration causes increased level of insemination rate per pregnancy from 103 to 208 [17]. Maria and coauthor [18] reported that reduced level of Phosphorus causes reproductive problems. Phosphorus is considered as one of the components of nucleic acids, nucleotides, and most of the proteins. In addition, Phosphorus is considered for the transmission of energy and normal metabolism of phospholipids; moreover, it is considered as the main part of coenzymes [2]. Furthermore, the presence of phosphorus in the synthesis of phospholipids and CAMP enjoys the main role on reproductive behavior. Lewis and Brotherstone [15] demonstrated 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. In addition to, calcium is involved in use of cholesterol through mitochondria or the stimulation of changing pregnenolone to progesterone stimulation [13]. The stimulation of GnRH and the release of LH from the anterior pituitary is connected with calcium-dependent mechanisms and in the absence or blocking of calcium, LH is not released [4,5,19]. The results of Table 4 showed that 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. Fischer and coauthor [7] study is agreement with the present study in that the use of soybean meal increases the fertility and pregnancy rates 1 in the first sexual intercourse. Abegaz and coauthor [5] have showed that the use of Barley and vegetable oil can be regarded as an energy source in the Flushing ration which improves the livestocks' reproductive performance and pregnancy. In contrast, Ghafouri and coauthor [4] 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. Also, the results of Table 4 showed that the goats receiving the Flushing ration (especially soybean) enjoyed heavier kids 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 kids (both males and females) which match with the results of Ghavi Hossein-Zadeh and Ardalan [20] study. Anyway, Rashidi and coauthor [12] reported that dietary protein sources do not influence the birth-weight of kids significantly.

Table 3. Flushing die effects on metabolites and serum hormones

	Sampling time/ blood	A	B	C	SEM	P- value
Phosphorus	1	5.20	5.64	5	0.8	ns
	2	6.88	5.79	4	1.3	*
	3	7.46	6.77	4.47	1.5	*
Calcium	1	14.39	14.56	13.44	1.76	ns
	2	21.23	19.32	18.5	1.79	ns
	3	14.59	15.8	15.34	1.7	ns
Magnesium	1	2.9	3.3	3.43	0.49	ns
	2	4	4.4	3.57	0.58	ns
	3	4.33	4.13	4	0.66	ns
Estrogen	1	32.1	30	30.4	2.7	ns
	2	42.2	43.7	41	4	ns
	3	69.5	71.4	68.1	5.69	ns

Table 4. Flushing die effects on characterizes of Markhoz goat reproductive

Group	Number of offspring's	Fertility	Lamping	Twing breeding	Birth weight (kg)
A	14	92.68	111.8	8.5	4.9 ± 0.07^{a}
B	15	92.68	120	17	4.95 ± 0.09^{a}
C	11	77	101	0	4.1 ± 0.08^{b}

4. CONCLUSION

Supplementation of flushing diet including protein or energy source before the sexual intercourse improves both the sexual receptivity and the reproductive performance of goat. In addition, we infer 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.

CONSENT

It is not applicable.

ETHICAL APPROVAL

As per international standard or university standard ethical approval has been collected and preserved by the authors. The study was conducted with permission from the Department of Animal Science of Garmian university and ethics committee (Act No.27 of 2018) in collaboration with the Department of Biology, Garmian univertity, Kalar, As Sulaymaniyah, KRG of Iraq.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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