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INFLUENCE OF SALT SUPPLEMENTATION – SALT EXCLUSION DIET ON ESTRUS INDUCTION IN NORTH-EAST BULGARIAN MERINO SHEEP

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ABSTRACT

The aim of our study was to investigate the effect of salt supplementation - salt exclusion (SSE) diet on estrus induction in North-East Bulgarian merino sheep (NBMS). It was used three groups consisting of 180 animals each, where one serves as control and two were experimental. The control group was allowed to consume salt *ad libitum*, while the experimental groups had no access to salt for 10 days, after which their diet was supplemented with 17g/per capita for 6 days. During the experiment, teaser rams were used to reveal the animals which are in estrus. It was found that SSE diet doesn't stimulate the estrus onset in the sheep from NBMS.

Key words: sheep breeds, estrus, salt supplementation - salt exclusion diet.

Introduction

There are a lot of research which demonstrates that addition of food supplements or changes in the diet can affect positively many of the physiological functions including the reproductive performance in animals (Kistanova et al., 2012a; Kistanova et al., 2012b; Abadjieva et al., 2013; Marchev et al.,2015; Abadjieva et al., 2016. Kistanova et al., 2016).

However, there are some controversies about the application of certain dietary ingredients for improvement of reproductive traits in female animals.

One of the most debatable questions concerning the management of sheep reproduction is to use salt supplementation - salt exclusion diet as stimulant for induction or synchronization of estrus. In shortly the salt (NaCl) is excluded of the sheep's diet for one or two weeks and after that each animal is supplemented with 15 – 20 g salt daily, for approximately the same time period. In the past many authors proposed the application of this diet as alternative for hormonal treatment for inducing and synchronizing of estrus in sheep (Bratanov et al., 1975; Doichev et al., 1976; Solomonov and Jeliazkov, 1976. Bankov et al., 1989).

The results of the different studies vary a lot, depending on the period of salt supplementation – salt exclusion or the sheep breed which it was applied on. The recent researches of Metodiev et al., (2010a; 2010b) showed week positive effect in stimulating of estrus by salt supplementation – salt exclusion diet in Ile de France breed and positive effect of combined application of this diet with the ram effect in Synthetic Population Bulgarian Milk breed (SPBM). On the other hand Nedelkov et al., (2012) found that there is no significant effect of salt supplementation – salt exclusion diet on induction of oestrus in the ewes from Tsigai, Karakachan and SPBM breeds. The controversial data on that topic imply additional experiments to define whether the salt supplementation - salt exclusion diet can be used for inducing of estrus in sheep or not.

The aim of this study was to investigate the effect of salt supplementation – salt exclusion diet for estrus induction in North-East Bulgarian merino sheep (NBMS)

Material and methods

The experiment was held at the Experimental Station of Agriculture – Targovishte. Only clinicaly healty ewes and gimmers from North-East Bulgarian merino sheep breed were used. The animals (n=540) were divided equally into three flocks. One of the flocks serves as control and the animals from it obtained salt regularly. The animals from the other two flocks serve as experimental group.

The salt was excluded for 10 days from their diet and after that salt lick was returned and additionally each animal received 17 g salt supplemented to their concentrated feed for 6 days. The sheep from control and experimental groups were reared on pastures and supplemented with 300 g combined feed per capita, per day.

The breeding campaign started at the 4th day after salt supplementation was restored in the experimental group. Before the beginning of breeding campaign, the rams were isolated from ewes and gimmers. Each morning 3 teaser rams were released among the flocks in order to locate the ewes and gimmers which are in estrus. Stud rams were used for semen collection according to the individual breeding plan. The semen was collected by the method of artificial vagina by trained technician, evaluated under microscope and diluted with semen extender in ratio 1:3. The so prepared semen was used for artificial insemination which was performed twice in 8 hours interval.

Additionaly the body condition scoring (BCS) was performed according to Russel (1991) for each animal from control and experimental gropus.

Results and Discussion

Since the number of sheep in the control group is 180 and those in the experimental are 360, all the data is presented as percent. The results of the induced estrus in control and experimental groups during each five days of the breeding season are presented in table 1.

Table 1: Induced estrus in control and experimental groups during the breeding season

Days of breeding season	1–5		6–10		11–15		16–20		21–25		26–30		31–35		36–40		41–45	
Group	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Control	12	7.95	13	8.61	12	7.95	27	17.88	34	22.52	30	19.87	8	5.30	9	5.96	6	3.97
Experimental	23	7.14	29	9.00	28	8.69	48	14.91	80	24.84	45	13.97	24	7.45	25	7.76	20	6.21

During the first 15 days of the breeding campaign, the ewes and gimmers with induced estrus was 24.91% in the control and 24.83% of the treatment group. The highest number of sheep with manifested estrus in both groups was between the 16 and 30 day from the beginning of the campaign, which is typical for induction of heat as result of the effect of the ram appearance. In this period there was a manifested estrus in 60.27% of the ewes and gimmers form the control group and 53,72% in the experimental. The obtained data showed that salt supplementation - salt exclusion diet failed to induce estrus in the ewes and gimmers form North-East Bulgarian merino sheep, which is in agreement with the results of Nedelkov et al., (2012) which perform the similar treatment on ewes from Tsigai, Karakachan and SPBM breeds.

Table 2: Dependence of the estrus induction in sheep from their body condition scoring

BCS	N	Experimental				Control			
		1–15 day First Period		16–30 day Second period		1–15 day First Period		16–30 day Second period	
		N	%	N	%	N	%	N	%
2.38	48	18	37.5	30	62.50	11	44.00	14	56.00
3.00	75	26	34.6	49	65.40	10	37.04	17	62.96
3.53	68	19	27.94	49	72.06	6	30.00	14	70.00

The body condition scoring which was performed to part of the sheep from both groups allowed us to define the influence of this index on the effect of salt supplementation - salt exclusion diet and ram effect. The data presented in table 2 showed that during the first 15 days of breeding campaign there was a tendency of higher estrus manifestation in ewes and gimmers with lower than those with greater BCS, both in experimental and in the control groups. During the first period, in the experimental group, estrus was manifested in 37.5%,of the animals with BCS of 2.38, while in those with BCS 3.53 the percent were lower – 27.94% .

Similar tendency was observed in the control group where the percent of animals with manifested estrus was even higher – BCS 2.38 – 44.0%, BCS 3.53 – 30.0%. It can be concluded that the higher number of animals with manifested estrus during the first period of the breeding campaign is not due to salt supplementation – salt exclusion diet.

During the second period of the breeding campaign, in the experimental group the ewes and gimmers with BCS 2.38 manifested estrus with 9.59% lower than those with BCS 3.53. At the same time, in the control group the difference between the animals with BCS 2,38 and those with BCS 3.53 was 14% in favor of the animals with higher BCS.

There was a better response to the "ram effect" of ewes and gimmers with BCS of 3.53 compare to ewes with BCS of 2.38, especially at the second period of the breeding campaign. In experiments with Tsigai, Karakachan and SPBM breeds was also found that ewes with higher BCS had better response to the "ram effect" compaired to those with lower. Nedkov et al (2012).

Conclusion

It can be concluded that the application of salt supplementation – salt exclusion diet alone didn't lead to estrus induction in North-East Bulgarian merino sheep. BCS index doesn't influence the effect of salt supplementation - salt exclusion diet. The ewes and gimmers with higher BCS had better response to ram effect compared to those with lower BCS.

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