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COMPARISON ON THE RESPONSE OF EWES TO THE "RAM EFFECT" IN SEVEN BULGARIAN BREEDS

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Abstract

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In Bulgaria no experiments have been conducted to study the response rate of local breeds to the "ram effect". The aim of the present study was to compare the degree of synchronization of oestrus by using the "ram effect" in some of the widely distributed sheep breeds in Bulgaria. For this purpose there were conducted 8 experiments with seven typical Bulgarian breeds: Bulgarian Dairy Synthetic Population Sheep (BDSP), West Stara Planina Sheep (WSPS), Central Stara Planina Sheep (CSPS), Tsigai, Karakachan Sheep (KS), Pleven Blackhead Sheep (PBS), Karnobat Fine-wool Sheep (KFWS) and a total number of 4506 ewes. Rams, equipped with aprons to prevent breeding of oestrus ewes, were used as teasers and also as stimulators of sexual functions of ewes. The synchronising "ram effect" was established by the characteristic peaks in the dynamics of ewes in oestrus and inseminated ewes which were observed between the 16th and 26th after placing teaser rams in the flocks. It was found that all seven Bulgarian breeds responded to the "ram effect" with typical two peaks within there were inseminated between 34.7 and 76% of ewes. From the comparison between different breeds it appeared that the differences were mainly connected with the technique of conducting synchronization, body condition score (BCS) of ewes, level of nutrition and other factors (climatic, grazing conditions, management and etc.) rather than with the breed characteristics. Significantly higher rate of response was established in the experiment conducted with Pleven Blackhead Sheep. The reasons were the lack of fertilization of ewes in oestrus during the first 15 days of the contact with rams, providing an optimal BCS and activation of ram libido before introduction into the flock.

Key words: Bulgarian sheep breeds, ram effect, comparison, response rate, oestrus synchronization

Introduction

The most popular method for non-hormonal synchronization of oestrus of ewes is the so called "ram effect" (Signoret, 1980; Martin and Scaramuzzi, 1983; Knight, 1983; Martin, 1984; Pearce and Oldham, 1984; Korjonen, 1997; Ungerfeld, 2003). This method represents an introduction of rams just before the end of the anestrus, after a period of separation from ewes. In 60-85% of ewes occurred an ovulation a 40-60 hours after exposure to rams. This ovulation is qualified as "silent" because ewes don't show oestrus behavior and it is followed by a luteal phase of normal duration associated with oestrus, 18 – 19 days after introduction of rams in the flock (Ungerfeld et al., 2004). In almost 50% of ewes after the first "silent" ovulation there is a short luteal phase of 6-7 days, followed by a normal cycle and oestrus behavior, 23 – 25 days after ram introduction (Martin et al., 1986; Thimonier et al., 2000; Ungerfeld et al., 2004). These two peaks of oestrus activity corresponded to the ewes with one or two "silent" ovulations. A similar response was observed in different sheep breeds in experiments conducted in many countries around the world. Depending

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on the breed, season of application and many other factors the response rate to the "ram effect" may vary over a wide range.

It is not known how will respond the local sheep breeds to the "ram effect" because so far such an experiments or observations have not been conducted. This gave us a reason to compare the degree of synchronization by using the "ram effect" in some of the widely distributed sheep breeds in Bulgaria.

Materials and Methods

For six years (from 2005 to 2011), eight experiments were conducted with a total number of 4506 ewes from seven typical for Bulgaria breeds: Bulgarian Dairy Synthetic Population Sheep (BDSP), West Stara Planina Sheep (WSPS), Central Stara Planina Sheep (CSPS), Tsigai, Karakachan Sheep (KS), Pleven Blackhead Sheep (PBS), Karnobat Fine-wool Sheep (KFWS). All experimental sheep were reared on pasture in a traditional for Bulgaria grazing system. It was applied a less or more feed supplementation of all experimental ewes except the animals from Central Stara Planina Sheep breed (Table 1). In the beginning of breeding period, ewes were milked. Exceptions were the experiments with Tsigai and Karakchan Sheep breeds where the milking period continued till the end of September, i.e. the whole breeding period.

In all experiments the rams were separated from ewes and reared separately at least 45 days before the beginning of breeding period. Rams equipped with aprons to prevent breeding of oestrus ewes were used as teasers and also as stimulators of sexual functions of ewes in all experiments. The synchronising "ram effect" was established by the characteristic peaks in the dynamics of ewes in oestrus and inseminated ewes which were observed between the 16th and 26th day after placing teaser rams in the flocks.

In all experiments teaser rams were approximately 3-4% of the ewe population in different flocks. The duration of contact was approximately for 1 hour in the morning and 1 hour in the evening. Exception is the experiment conducted with Pleven Blackhead Sheep where the rams were introduced in each flock for about 5 hours per day. The ram libido has been stimulated in three of the experiments carried out with Tsigai, Karakchan and Pleven Blackhead Sheep breeds where for this purpose the oestrus of a few culled sheep was synchronized by the hormonal treatment. Teaser rams were placed with ewes in heat (hormonal treated) to activate their sexual activity, so that they would seek more actively for ewes in heat at the start of breeding period.

The ID numbers of ewes in heat and inseminated sheep were recorded on a daily basis for the period of 30 – 42 days, as much as continued the breeding period through the different years and in different farms. In the experiments with Pleven Blackhead Sheep and CSPS all ewes in oestrus were registered only after 15th day after ram introduction into the flock. At the experiments in which the insemination started from the first day of contact with teaser rams it was also registered the number of ewes from the first to the 15th day inclusive after placing rams in the flocks.

Statistical significance of the differences between sheep breeds was determined by χ^2 (chi square test) by Plohinskiy (1980).

Table 1
Data for the synchronising response of different breeds to the "ram effect"

Breed of sheep	Number of ewes	Feed supplementation per one ewe per day	Average BCS of flock	Inseminated from the 1st to 15th day, % of all ewes	Responded to the "ram effect"	
					% of all AI ewes from the 16th to 26th day	% from the all lambed ewes
Bulgarian Dairy Synthetic Population Sheep	2397	300 g compound feed, 18 %crude protein	2.72	9.7a	46.4a	54.7a
West Stara Planina Sheep	902	250 g barley	2.75	18.5b	49.2a	58.2a
Central Stara Planina Sheep	213	Not applied	2.67	-	34.3b	39.4b
Tsigai	267	200 g wheat bran	3.27	24.7c	49.8a	58.5a
Karakachan Sheep	109	200 g wheat bran	3.19	31.2c	44.9a	50.5a
Pleven Blackhead Sheep	344	300 g barley	3.35	-	74.1c	82.0c
Karnobat Fine-wool Sheep	274	300 g barley	2.55	22.3bc	35.8b	43.2b
Total/weighted average	4506	-	-	14.2	48.0	56.2

abc - The percentages in a single column are statistically significant at $P<0.05$ if they have no the same letter

Results and Discussion

An average between 34.3 to 49.8% of the available in mating period ewes, of six included in the experiments sheep breeds, were inseminated within 11 days, between 16th and 26th day from the contact with rams (Table 1).

In the carried out experiments, with the exception of experiment conducted with Pleven Blackhead Sheep breed, the percentage of ewes which responded to the "ram effect" appears to be lower than the results described for some other breeds. After 14-day contact with vasectomised rams, 90% of Ile-de France sheep in one experiment were in oestrus during the follow-up 10-day period (Thimonier et al., 2000). Although in a slightly longer period, Cushwa et al. (1992) also found a higher percentage (86%) of mated ewes from the 10th to the 31st day after introduction of rams. A high share of Corriedale ewes in oestrus (72.9%) between the 17th and the 30th day of insemination was also reported by Silva and Ungerfeld (2006), although in postpartum ewes the response was slightly weaker and 65.3% of ewes displayed heat within the two peaks.

It is known that the "ram effect" in more seasonal breeds, which were all of the compared breeds, increases with approaching the natural breeding period when a small part of the ewes begin to ovulate spontaneously (Nugent et al., 1988; Cushwa et al., 1992; Rosa et al., 2006). On the other hand the insemination of all sheep breeds have been started shortly before or in the beginning of the normal breeding season and therefore, this factor couldn't have any impact on the response rate to the "ram effect".

A significantly higher difference of the response rate in our studies was found only in Pleven Blackhead Sheep (dairy sheep breed). An average 74.1% of ewes of this breed reacted to the "ram effect" (Table 1).

A significantly higher percentage of reaction could be hardly connected with the breed characteristics and was mainly related with the method of preparation for the breeding period and all basic activities associated with the "ram effect". At the experiment conducted with Pleven Blackhead breed, 5 previously stimulated teaser rams together with several ewes in oestrus were introduced in the flocks of ewes in a good body condition score (BCS) for about 5 hours per day over 15 days during which ewes in heat were not inseminated. The basis for this allegation gives us unpublished results from the experiment with the same breed and at the same farm (Todorov and Ivanov, personal communications) under the same conditions to those in the experiments with other breeds included in this study. In these experiments 47.4% of ewes from two flocks (n = 368) have responded to the "ram effect".

Comparison of the average results from six breeds where some of the main factors have not been provided, for example the lack of fertilization of ewes in oestrus during the first 15 days of the contact with rams and activation of ram libido, with the results from the experiment performed with Pleven Blackhead Sheep showed considerable differences (Figure 1). Providing the main factors resulted in about 50% higher synchronization with the "ram effect".

With the exception of experiment performed with Pleven Blackhead Sheep breed, reported lower percentage of reaction to the "ram effect" (varied from 34.3 to 49.8) in comparison with the results reported of many authors (Cushwa et al., 1992; Thimonier et al., 2000; Rosa and Bryant, 2006) is mainly due to the fact that the ewes in most experiments were

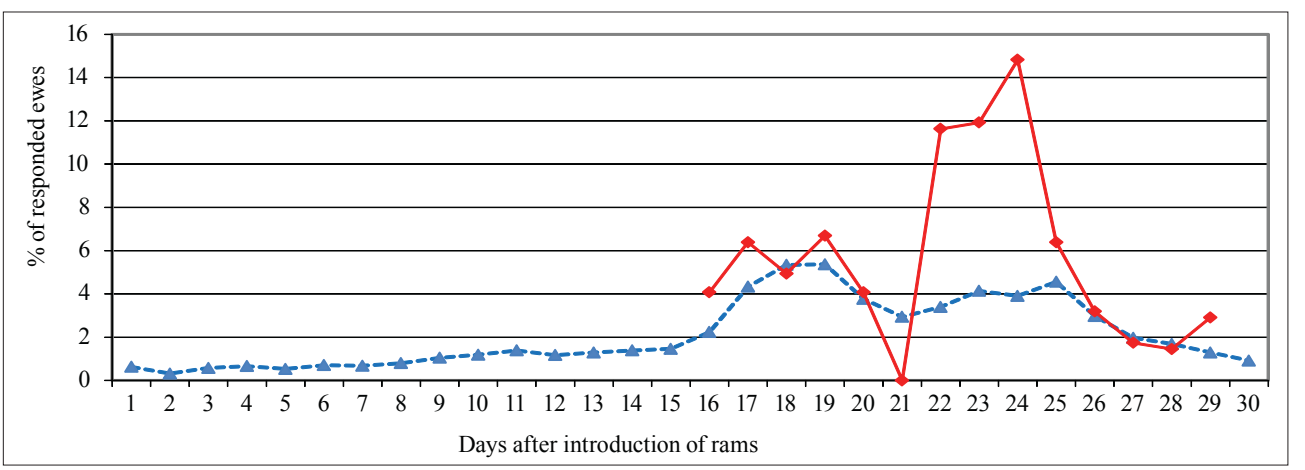

Fig. 1. Dynamics of insemination of the ewes from Pleven Blackhead Sheep (solid line) and an average for the six Bulgarian breeds (dotted line) as a percentage of available in the mating period ewes

inseminated before expected "ram effect" between 16th and 26th after introduction of rams. Since it was provided a lack of fertilization of ewes in oestrus during the first 15 days of the contact with teaser rams, the proportion of responded sheep would have reached 60 - 65%.

It is known that the "ram effect" was dependent on ram libido, which was associated with the secretion of pheromones and the activity of searching and courting (Lindsay and Signoret, 1980; Perkins and Fitzerald).

The response of all breeds used in our experiments was typical for the "ram effect" leading to induction of oestrus in two peaks - 17th – 19th and 23rd – 25th days from the beginning of contact with rams.

Conclusions

All used in our experiments seven Bulgarian breeds (BDSP, WSPS, CSPS, Tsigai, KS, PBS, KFWS) responded to the "ram effect" with typical two peaks of oestrus activity within there were inseminated between 34.3 and 74.1% of all available ewes. The observed differences between individual breeds were apparently connected with the technique of conducting synchronization, BCS of ewes, level of nutrition and other factors (climatic, grazing conditions, management, and etc.) rather than with the breed characteristics.

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