

RESEARCH REGARDING THE RAMS INFLUENCE IN TRIGGERING OFF-SEASON SEXUAL CYCLES

Alexandru Marian FLOREA¹, Ionică NECHIFOR¹, Andre CRÎȘMARU¹,
Constantin PASCAL^{2*}

¹Research and Development Station for Sheep and Goat Breeding Popăuți – Botoșani, Romania

²University of Life Sciences, Iași, Romania

*Corresponding author email: pascalc61@yahoo.com

Abstract

In order to achieve the fundamental objective, an experimental protocol was developed which was applied at the same level and respecting all the experimental variables for three consecutive seasons, the period of each season being the same, respectively May-June. The experimental batch consisted of 30 adult females of the Karakul de Botoșani breed, aged between three and seven years. In each experimental season the batch of selected adult sheep had a good body condition and was maintained in a separate compartment. In order to study the effect due to the presence of rams on females and on the possibility of initiating the sexual cycle during periods outside the natural breeding season, an adult breeding ram was introduced inside the batch. In order to avoid physical exhaustion, the ram was changed at certain intervals. Adult sheep exhibiting sexual cycles were mounted immediately after detection, with breeding repeated after 10 hours. The data obtained were statistically processed, and analysing the average values shows that the proportion of sheep that manifested heat and were mounted was higher than 56% in each of the three seasons.

Key words: birth rate, ewe, ram, reproduction season, sheep Karakul of Botoșani.

INTRODUCTION

The seasonal manifestation of sexual cycles in breeding sheep is a characteristic of the species inherited from wild forms, and is therefore of genetic origin. This aspect demonstrates the lack of completing taming process in a direction useful for the breeder (Barid et al., 1981; Thwaites, 1982). The biological and economic efficiency of sheep farming depends mainly on the way in which it is coordinated and the way in which the breeding activity is applied on the farm.

In order to perform in the management activity of the farm, it is necessary to intensify the breeding function in sheep, developed and applied according to the particularities of each existing population because the results in this field are directly influenced by the value of breeding characters (Pascal et al., 2000; Stoica et al., 2003).

Among the ways and practical solutions that do not involve allocation of large material and financial resources, which can intensify reproduction in sheep, we list: inducing puberty to use lambs for breeding in first autumn and using the influence of biological and natural

factors to trigger heat in adult sheep in periods considered to be in the off-season.

There is a lot of scientific information in the specialized literature that sustain that breeding rams, in certain situations and under certain conditions, can stimulate oestrus and ovulation in females, this phenomenon being called the “ram effect”. This effect, if properly managed and exploited in the management of small ruminants, can have a favourable effect in that it can stimulate the onset of both puberty and oestrus. Another positive effect due to rams’ influence also refers to the fact that when used at the beginning of breeding season it can have a positive influence in both oestrus and ovulation synchronization. Although the degree of response obtained varies by genotype and latitude, it is a valuable management tool in most circumstances (Delgadillo et al., 2009).

MATERIALS AND METHODS

Research regarding the breeding rams influence on the onset of sexual cycles in the off-season was an important objective and aimed to assess the possibility of increasing the total number of

lambs obtained from adult females belonging to the Karakul de Botoşani breed.

In order to investigate how the presence of breeding rams influences the onset of sexual cycles during periods outside the natural breeding season, a batch of 30 adult females aged between three and six years, was set up.

The research was carried out for three consecutive seasons, being organized in calendar periods placed outside the natural breeding season, respectively in May-June. In order to obtain relevant results, the same protocol was observed in each experimental period, the batch was maintained in a separate compartment, having maintenance and feeding conditions adequate for the established objectives.

In each experimental season, in order to obtain the goal of the experiment, the selected sheep were isolated from the breeding rams for 40 days. During this period, none of the 30 females didn't come into contact with the rams (i.e. visually, by sound or smell), being completely separated and kept at a considerable distance. Through this technique, we aimed to achieve a synchronization of oestrus activity throughout the batch.

Also, in order to study the breeding rams influence on sexual cycles onset in off-season, in each experimental period in the batch of adult sheep, a breeding ram was introduced that had an apron attached to the abdominal area that prevented the possibility of mounting. To avoid exhaustion, it was changed every 5 days. Every day, when one of the females showed heat, she was taken out of the lot and subjected to the natural mating process. For the statistical processing of the data but also for testing the statistical significance of the differences between the average value specific to the studied parameters, the algorithm Variable Analysis (ANOVA Single Factor) and the Pearson Correlation were used, both included in the MsExcel 2007 software package.

RESULTS AND DISCUSSIONS

Applying off-season breeding has high economic advantages because in a period of two years we could organize three or more breeding seasons.

Taking into account the geo-climatic conditions and the biological peculiarities of the local

breeds, the efficient use of the mounts in off-season would consist in carrying out activities that would trigger heat and implicitly breeding females during the spring months (April-May) or in early summer (June-July) and lambing should take place in early autumn (September-October) or late autumn and early winter (November-December).

The organization of two lambing per year is financially justified on large numbers. In holdings with a large number of females intended for breeding, separate herds may be set up, which may undergo certain techniques to stimulate the onset of heat in other seasons of the year. In this way, we create the possibility that basic production (milk or meat) has a permanent character and the revenues obtained from their constant capitalization generate the improvement of management in the respective farm (Tăpăloagă et al., 2018).

Also, in order for the activity carried out to induce heat in the off-season to be efficient, methods that do not generate the commitment of high financial and material resources must be applied, with an effect in increasing the costs per productive cycle. Therefore, the main conditions for frequent or multiple lambing are the most efficient methods of off-season head induction and refers to:

- photojournalism;
- reduction of postpartum anoestrus;
- use of natural factors;
- use of supplementary feeding;
- use of stimulating rams.

The effect due to the presence of rams is part of the technique based on bio stimulation because it has been found that when sheep that do not have a sexual cycle are stimulated to ovulate by the presence of ram. The explanation for this is that rams produce chemicals called pheromones, which are perceived by sheep and can stimulate the appearance of oestrus in peripubertal sheep or in sheep approaching the beginning of the breeding season.

Applying adequate techniques is necessary because local breeds, including the Karakul de Botoşani, are characterized by a high degree of lateness and the proportion of females that naturally show heat in the off-season is less than 5% (Pascal et al., 2009).

Studies regarding the possibilities of subjecting sheep to techniques and procedures to manifest

heat in atypical seasons has been intensively researched in several countries around the world. Based on the results and analysis of the biochemical changes that occur in sheep in the presence of the male, it is assumed that their maintenance, during periods considered to be in the off-season, with breeding rams would alter the level of cortisol concentration which also attracts increases in LH concentrations there four accelerating occurrences of ovulation (McCosh et al., 2010).

In a more unique experiment, conducted over a two-year period, in which the aim was to study whether the isolation of ram from sheep is necessary to obtain a more favourable response to ram's effect and whether they react in May as well as in natural breeding season in early October, it was found that 86% of eligible sheep responded positively to the ram's effect and had sexual cycles. The response was higher ($P < 0.05$) in June in the second year too ($P = 0.05$) (Cushwa et al., 1992).

Other research has been done to highlight the presence of ram effect. Thus, in a 3-year study of a total of 331 Nungua black-headed and 104 African dwarf sheep in West Africa, it was found that sheep of these breeds reacted strongly to the stimulation caused by sudden introduction of rams after a 10 months' total separation. The sudden presence of ram obviously changed the proportion of sheep that showed oestrus with typical manifestations of behaviour immediately after contact with a ram. More than 25% of sheep have reacted to the effect of ram from day one, but studies have also confirmed the existence of racial differences in the response of sheep to the sudden presence of males (Ngere et al., 1975).

To investigate how the presence of breeding rams influences the onset of sexual cycles in breeding females during periods atypical of the normal breeding season, but also for economic reasons, each year 30 adult females were

selected. Only adults in very good physical condition were chosen and they were all maintained separately from the basic herd. A breeding ram was introduced inside this batch, but to avoid exhaustion it was changed every 5 days. The research was carried out in calendar months outside the natural breeding season, respectively in May-June, and was repeated for three consecutive seasons. That flock of sheep was kept in a stable and separate compartment, and the feed was based on the same categories of feed used during the cold season (Figure 1).



Figure 1. Batch of ewes used for off-season mating

In each of the three seasons, the batches were set up in the first three days of May and at the beginning of July all the sheep were transferred to the basic herd. A ram chosen from the batch of testers was present throughout this period in the batch.

In the spring concerning the first season of 2018, it was found that first females that had sexual cycles were in third decade of May, about 22 days after the start of research. During the whole research period of the same year, it was found that a total number of 11 females showed sexual cycles, representing 36.66% of the total population (Table 1). In the following season, under the same conditions and under the influence of the same experimental treatment, the proportion of sheep that showed heat was only 30% and, in the season, placed in 2020 it increases to 43.33%.

Table 1. Statistic of ewes that manifested heat cycle in off-season due to ram's influence

Specification	n	Sheep with no heat triggered		Sheep that triggered heat		Pregnant sheep		Twin lambing sheep	
		n	% of the total batch	n	% of the total batch	n	% of mounted sheep	n	% of pregnant sheep
Season I (2018)	30	19	63.34	11	36.66 ^{bc}	10	90.90	1	10.00 ^{ns}
Season II (2019)	30	20	70	10	30.00 ^{ab}	10	100.0	2	20.00*
Season III (2020)	30	17	56.67	13	43.33 ^{cd}	13	100.0	1	7.69 ^{ns}

Note: ^{a, b, c, d} – environments with different symbols show significantly different values ($P < 0.05$);

* statistically significant differences ($P < 0.05$); ^{ns} – non-statistically significant differences ($P > 0.05$);

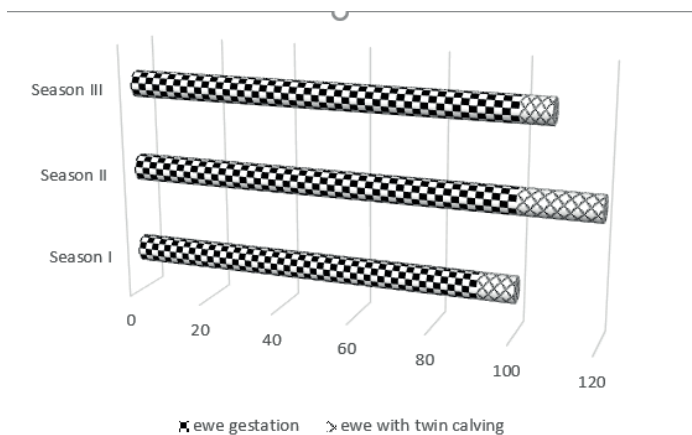


Figure 2. Sheep that showed sexual cycle under the influence of the experimental factor

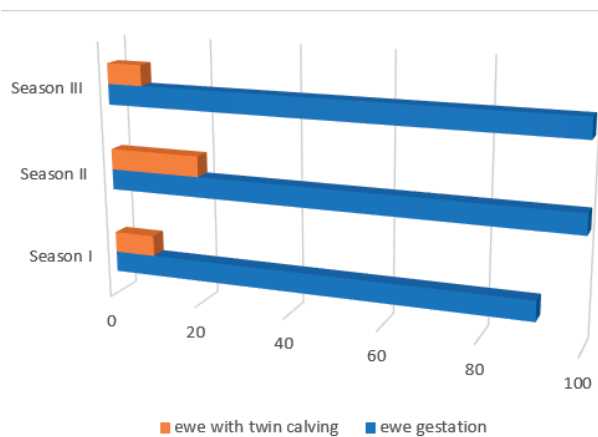


Figure 3. Ewes that became pregnant and lambbed twins out of the total number of those that showed sexual cycle

All adult sheep that were found having sexual cycles were mounted with the nursery rams included in the mating list. The mating was performed immediately after detection and repeated after an interval of 10 hours. The statistical processing of obtained data confirms that the proportion of sheep responded positively to the experimental factor, and showed sexual cycles, has different degrees of statistical significance for $P < 0.05$.

Tracking the number of adult sheep that showed heat and were mounted in each of the three seasons indicates that most remained fertile and completed the gestation, with the exception of one female, which during the first season showed a repeat of the sexual cycle and she did not become pregnant. It is interesting that in

each breeding season in which the research was carried out, within the batch of pregnant adult sheep a proportion between 7 and 20% had twin lambs (Table 1 and Figure 3).

However, their comparative proportion has no significance for the statistical threshold taken into account, except for the proportion of ewes with twin lambs from season II which was statistically significant for $P < 0.05$.

From the average values but also from the degree of statistical significance, it can be concluded that the presence of rams has a favourable bio stimulating effect and this procedure can be successfully applied in other sheep farms, the major disadvantage being the labour involved in implementing such a technological flow.

CONCLUSIONS

In order to correctly highlight the bio stimulating ram's effect, the research was carried out in calendar months outside the natural breeding season, respectively in May-June and was repeated for three consecutive seasons.

In the batch consisting of adult females that were to be put in contact with male breeders during off-season, maintained in the stable in common compartment, the feed was based on the same categories of feed used during the cold season.

In the spring of the first season, it was found that the first females had sexual cycles in the third decade of May, about 22 days after the start of the research, and during the entire duration of the research it was found that a total 11 females had sexual cycle, representing 36.66% of the total batch.

In the following seasons, under the same conditions and under the influence of the same experimental treatment, the proportion of sheep that showed heat after ram introduction in compartment, was 30% and in the third season it increases again to 43.33%.

Statistical processing of the data obtained confirms that the proportion of sheep that responded positively to the experimental factor and showed sexual cycles has different degrees of statistical significance for $P < 0.05$.

The results obtained in the research carried out have the role of improving the management activity and the statistical data obtained are correlated and converge as meaning and with the effect generated by the use of a vasectomized ram. In both circumstances the effect of the ram is similar because its presence allows the sheep to perform several cycles of oestrus before the desired date of reproduction, which will increase fertility (American Sheep Industry Association, 2015; Schoenian, 2018).

From the average values but also from the degree of statistical significance of the differences, it can be concluded that the presence of

rams has a favourable bio stimulating effect and this procedure can be successfully applied in other sheep breeding units.

REFERENCES

- American Sheep Industry Association. (2015). (ciencedirect.com/topics/agricultural-and-biological-sciences/ram-effect.)
- Barid, D.T., & Mac Nelly, A.S. (1981). Gonadotropic control of follicular development and function during the oestrus cycle of the ewe. *J. Reprod. Fert.*, Suppl. 30.
- Cushwa, W.T., Bradford, G.E., Stabenfeldt, G.H., Berger, Y.M., & Dally, M.R. (1992). Ram influence on ovarian and sexual activity in anestrus ewes: effects of isolation of ewes from rams before joining and date of ram introduction. *J Anim Sci.*, 70(4), 1195-200.
- Delgadillo, J.A., Gelez, H., Ungerfeld, R., Hawken, P.A.R., & Martin, G.B. (2009). The "male effect" in sheep and goats-revisiting the dogmas. *Behav. Brain Res.*, 200(2), 304-14. Doi: 10.1016/j.bbr.2009.02.004.
- McCosh, R.B., Eli M. Berry., Michael, E., Wehrman, J., & Berardinelli, G. (2010). Acute Effect of Exposing Virgin Ewes to Rams on Temporal Characteristics of Cortisol and LH Concentration Patterns During the Transition into the Breeding Season. *Biology of Reproduction*, 83(Suppl.1), 299.
- Ngere, L.O., & Dzakuma, J.M. (1975). The effect of sudden introduction of rams on oestrus pattern of tropical ewes, *The Journal of Agricultural Science*, 84(02), 263 – 264.
- Pascal, C., Ivancia, M., Gilcă, I., & Nacu, Gh. (2009). Research regarding the influence of natural factors on activity reproduction behaviour at rams, *13th Annual Conference of the European Society for Domestic Animal Reproduction*, 119, Gent - Belgium.
- Pascal C., Radu, R., & Pivodă, C.A. (2000). The permanent keeping over the growing and development of the young sheep from different races. *Scientific Works, Zootechny Series*, 43/44.
- Stoica, A., Şonea, Al., Tăpăloagă, P.R., & Drăguţ, P. (2003). *Methods of intensifying reproduction in mammals and birds*. Bucharest, RO: Granada Publishing House.
- Schoenian, S. (2018). *Maryland Small Ruminant Page* (<https://www.sheepandgoat.com/articles>).
- Tăpăloagă, D., & Tăpăloagă, P.R. (2018). Sexed semen and the reproductive management of a dairy farm. *Journal of Biotechnology*, 280, S4-S5.
- Thwaites, C.J. (1982). Development of mating behaviour in the prepubertal ram. *Anim. Behav.*, 30, 1053–1059.