

INFLUENCE OF ATMOSPHERIC TEMPERATURE ON HEATING RELEASE AT KARAKUL DE BOTOȘANI SHEEP BREED

M.A. Florea^{1,2}, I. Nechifor², C. Pascal^{1,2}

¹University of Agricultural Sciences and Veterinary Medicine, Iasi, Romania

²Agricultural Station of Research and Development for Sheep and Goat Growing
Popauti-Botosani, Romania

Abstract

To enlighten a natural factor, respectively the temperature from natural reproduction season, in the realised research were studied a representative number of sheep which belongs to Karakul de Botoșani breed.

The effectuated research indicate the fact that at thermal levels placed around mean temperature of 10°C manifested ovulatory heat approximate 50.71% from the total flock assigned to mating in 2013 and in periods specific to seasons from years 2014 and 2015 the rate of sheep which manifest heat decreased below 25%.

Also, the realised research shows the fact that in each season when the atmospheric temperature was higher than 20°C was recorded the lowest rate of sheep which manifest heat. In this way, in 2013 season the total of adult sheep which manifested ovulatory heat at temperatures higher than 20°C was 26 which correspond to a rate of only 2.33%.

In the season from 2013 autumn the highest point of the curve in which is presented the situation of sheep entering in heat correspond with the date of 1st of October, day in which the mean daytime temperature was 5.2°C and the total number of sheep which manifested heat was of 170 females representing a rate of 15.18% from total sheep flock which were assigned for mating in that season.

In reproduction campaign from 2014 the highest number of females which enter in heat into a single day was placed in September month, being of 88 females and in that day the average temperature was 10.7°C. Analysis of curve in which is presented the situation of sheep entering in heat in year 2015 show the fact that maximum peak correspond to 28th of September. In that day the average temperature was 12.3°C and manifested heat a number of 88 females.

Analysing the obtained data in those three seasons could be observed that curve peak which show the entrance of sheep in heat is different placed, but only in the periods in which average temperature is situated around the value of 10°C.

Key words: Karakul de Botoșani, sheep, heat, reproduction, temperature

INTRODUCTION

Seasonal manifestation of sexual cycles at reproductive sheep represents a breed characteristic inherited from wild forms, having a genetic origin. This aspect demonstrates the lack of completion of domestication process into a useful direction for breeder, respectively that sheep to manifest ovulatory heat on whole period of year [3, 14]. Nowadays, when at world level

the focus is on increasing of productions and on realised incomes from sheep rearing it is mandatory that preoccupations which consider the utilisation of natural factors in intensification of reproductive activity to increase assuring so, by reduced expenses, a maximum of economical efficiency in obtaining of new generation for production or reproduction or by a significant decreasing of the interval between generations.

At the elite farm belonging to Research Development Station for Sheep and Goats Rearing "Popăuți" normal period for Karakul de Botoșani breed mating is placed in interval between September to November of

*Corresponding author:

floreamarianalex@yahoo.com

The manuscript was received: 20.10.2017

Accepted for publication: 08.11.2017

each year. A suitable utilisation of natural factors could generate extension of reproduction season for sheep and goats on a longer period through the year. In these conditions, the duration of germination cycle, sexual cycle and reduced gestation period will allow organisation of two calving per year, with the condition to eliminate lactational anestrus by practicing the lambs' artificial rearing.

MATERIAL AND WORKING METHODS

Biological material was represented by adult sheep which form the reproductive nucleolus of Karakul de Botoşani breed. To assure a high accuracy of data, in each of those three seasons in which observations were made, the realised activities were similar.

To show the correlation between the number of females which manifested heat in relation with the recorded thermal levels in natural mating season, studies were carried out on three consecutive mating seasons, respectively in reproduction season from years 2013, 2014 and 2015.

September and October represent the period with the most intense activity of reproduction function so those ones will provide concluding data on study. Data regarding atmospheric temperature are taken from website *Reală Prognoză* which manages the information from Meteorology National Agency for Botoşani City, because Research Development Station for Sheep and Goats Rearing is situated at a distance of around 7 km from Botoşani City.

RESULTS AND DISCUSSIONS

Regarding the influence and role of natural factors in initiation of ovulatory heat at sheep is well known the fact that in tropical and sub-tropical areas, where vegetation is abundant all year round, estrum (heat) could appear on all period of the year. Not the same thing happens in areas with temperate climate, as in the case of Romania, where reproduction activity is divided in two seasons mainly dependent by duration of day-light.

A first season prim, considered to be the main one, is in autumn, when light decreases till reaching a rate of 1:1 between light and dark, and the secondary season is placed in spring months when light increases as duration till reaching the same rate.

To highlight a natural factor, respectively temperature from reproduction season, in effectuated research were introduced a representative number of adult sheep belonging to Karakul de Botoşani breed.

Centralization of obtained data show important aspects which could be successful utilised in future. So, in table 1 is presented a situation of sheep entering in heat in relation with the temperature level observed in the same period of time from three consecutive years. The resulted situation presents a different way of entering in heat of sheep which form the live stock of analysed breed. At thermal levels situated at less than 10°C in the season specific to year 2013 manifested heat 50.71% from the total flock assigned to mating in that year and in periods specific to seasons from years 2014 and 2015 the rate of sheep which manifest heat decreased below 25%.

Table 1 Situation of females which manifested sexual heat and atmospheric temperatures during September-October

Thermal interval	Sheep which manifested heat 2013		Sheep which manifested heat 2014		Sheep which manifested heat 2015	
	n	%	n	%	n	%
<10°C	568	50.71	134	9.18	279	24.92
10-15°C	339	30.27	546	37.42	623	55.62
15-20°C	187	16.69	493	33.79	73	6.52
>20°C	26	2.33	286	19.61	145	12.94
Total	1120	100.0	1459	100.0	1120	100.0

Could be also remarked the fact that in all those three seasons subjected to research it is observed that in time interval in which atmospheric temperature was higher than 20°C was recorded the lowest rate of sheep which manifested heat. So, in season of year 2013 the total of adult sheep which manifested ovulatory heat at temperatures higher than 20°C was 26 which correspond to a rate of only 2.33%.

Mating in year 2013 started on 9th of September and from this reason for previous days we don't have the number of females which manifested sexual heat. As could be observed from figure 1, in September-October 2013 atmospheric temperature varied between a minimum limit of 5.1°C, recorded on 3rd of October 2013, and a maximum limit of 23.7°C on 28th of October 2013, time interval in which the number of females which manifested sexual heat varied between 2 heads and 170 heads.

In reproduction campaign from 2013 could be observed that at the beginning of September and in first decades of October exterior temperatures were over 15°C.

Analysis of data presented in figure 1 show that in September and in first 25 days of October the total number of sheep which manifested heat was of only 123 heads, representing a rate of 11.78% from the total females utilised for reproduction in that season.

To inferior temperature limit, ranging between 9.6°C and 5.1°C, recorded during 28.09-4.10.2013, matches them the maximum number of females which manifested sexual heat. The highest point of curve in which is presented the situation of sheep entering in heat in that season matches the date of 1st of October, day in which average daytime temperature was 5.2°C and the total number of sheep which manifested heat was of 170 females representing a rate of 15.18% from the total sheep flock which was assigned for mating in that season.

From the same figure 1 it could also be observed that period in which were recorded lower temperatures and number of females which manifested sexual heat was increasing, practically in those days sheep which manifested heat were over 100 heads.

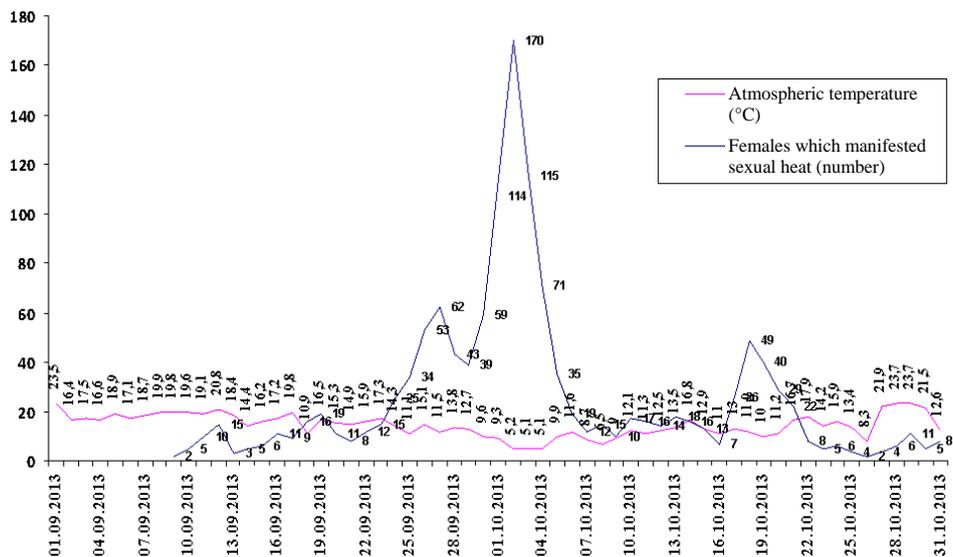


Fig. 1. Number of females which manifested sexual heat in September-October 2013

In season from autumn of year 2014 very hot beginning of September, with situation was quite different because after a average daytime temperatures situated

around the level of 20°C, this climatologically factor decreased in the second and third decade of the month. In interval between 19th and 27th of September average temperature was around a mean value of 15°C and on this accentuated chilling background was noticed a significant decrease of sheep which manifested heat. In this interval, with average temperature situated below 15°C, manifested ovulatory heat a total number of 386 females, representing a rate of 26.45% from the number of females assigned to mating.

As could be observed from figure 2 in September-October 2014 atmospheric temperature varied between a minimum limit of 0.1°C and a maximum limit of 24.9°C and

the number of females which manifested sexual heat varied between 4 heads and 88 heads.

The smallest number of females which manifested sexual heat in season 2014 was recorded in the days in which temperatures were higher but also to the end of October when mating was almost finished. Also the data from figure 2 show the fact that in period in which curve, through which is presented the situation of sheep entering in heat, recorded maximum values in 24th of September. In that day the average temperature was 10.7°C and the total sheep number which entered in heat was of 88 heads.

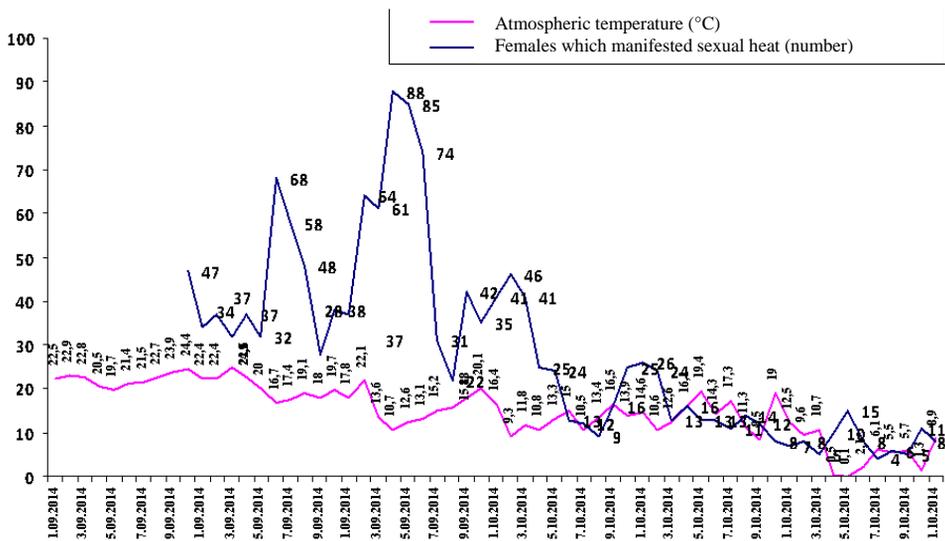


Fig. 2. Number of females which manifested sexual heat in September-October 2014

In year 2015 reproduction season started on 21st of September and from this reason for the previous days we don't have a number of females which manifested sexual heat. As it could be observed from figure 3 in September-October 2015, atmospheric temperature varied between a minimum limit of 3.0°C from 12th of October 2015 and a maximum limit of 34.4°C, but starting with 21st of September 2015 the number of females which manifested sexual heat varied between 9 and 85 heads.

Analysing the data presented in figure 3 could be observed that time interval in which, in season 2015, the highest number of females which manifested sexual cycles was between 27th of September 2015 and 15th of October 2015, period in which average daytime temperature was below 15°C. In this time interval manifested heat a total number of 902 females, representing a rate of over 80% from the total flock assigned to mating in that year.

Analysis of curve through which is presented the situation of sheep entering in heat in year 2015 show the fact that maximum

peak correspond to 28th of September. In that day the average temperature was 12.3°C and manifested heat a number of 88 females.

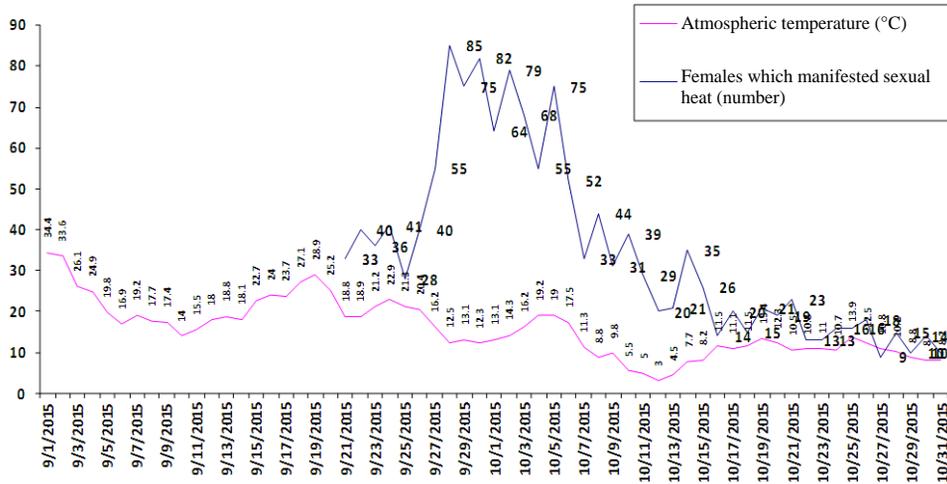


Fig. 3. Number of females which manifested sexual heat in September-October 2015

The lowest number of females which manifested sexual heat was recorded in the days in which temperature was higher and to the end of October when mating was already finished when the highest rate was represented by females which manifested a repetition of sexual cycle. It could also be observed that the peak represented by the greatest number of sheep which manifested heat during the same day was in the period in which were recorded the lowest temperatures, reaching a maximum of 85 heads on 10th of October when daytime temperature was 12.3°C.

Regarding the influence of different factors in stimulation and starting up of ovulatory heat at ovine reared in Romania were also effectuated research on other breeds [1, 2, 3, 4, 5, 6, 7], and all of them indicate the fact that microclimate factors play an important role in reproduction activity at ovine.

CONCLUSIONS

1. As well as at other breeds the debut of heat at Karakul de Botoșani ovine breed is placed in early autumn season, namely in year period in which could be observed a decreasing of average daytime temperatures.

2. The thermal level in which could be observed an increasing of sheep number which manifest heat are placed around average temperatures of 10°C.

3. From the effectuated research resulted the fact that in each season when atmospheric temperature is higher than 20°C was recorded the lowest rate of sheep which manifested heat.

4. In season 2013 the total of adult sheep which manifested ovulatory heat at temperatures over 20°C was 26 which correspond to a rate of only 2.33%.

5. In season from 2013 autumn the highest point of curve in which is presented the situation of sheep entering in heat in that season correspond to the date of 1st of October, day in which the average daytime temperature was 5.2°C and the total sheep number which manifested heat was 170 females representing a rate of 15.18% from the total sheep flock assigned for mating in that season.

6. In 2014 season the highest number of females which entered in heat in a single day was placed in September, being of 88 females and in that day the average temperature was 10.7°C.

7. Analysis of curve through which present the situation of sheep entering in heat in 2015 show the fact that maximum peak correspond to 28th of September. In that day the average temperature was 12.3°C and 88 females manifested heat.

REFERENCES

- [1] Florea M.A., Nechifor I., Pascal C., 2017 – Estimation of breeding activity for the Karakul of Botosani breed, *Lucrări Științifice - Seria Zootehnie* ISSN 1454-7368, Electronic (online) ISSN 2067-2330, vol. 67, p. 68-72
- [2] Nacu Gh., Tănase D., Pascal C., Botezatu Oancia Maria, 2010 – Researches regarding the directing of reproductive function in small ruminants, ISBN 978-5864-226-4, University Press, International Conference on Production Diseases in Farm Animals, Gent, Belgium, p. 91
- [3] Pascal C., Nechifor I., Costică C., 2015 – Cercetări cu privire la influența factorilor naturali asupra activității de reproducție și a comportamentului sexual la berbeci, *Lucrări Științifice-Zootehnie și Biotehnologii*, Chișinău. ISBN 978-9975-64-246-0, p. 221-227
- [4] Pascal C., Gîlcă I., Nacu Gh., 2010 – Researches related to age influence on certain reproduction traits in Tigaie sheep bred in Romania, 14th Annual Conference of the European Society for Domestic Animal Reproduction. *Reproduction in Domestic Animals*, ISSN 0936-6768, vol. 45, p. 102
- [5] Pascal C., Ivancia Mihaela, Gîlcă I., Nacu Gh., 2009 – Research regarding the influence of natural factors on activity reproduction behavior at rams, *Reproduction in Domestic Animals*. ISSN 0936-6768, p. 119
- [6] Pascal C., Ivancia Mihaela, Nacu Gh., 2008 – The influence of some factors on the reproductive function of Romanian local sheep, *Reproduction in Domestic Animals*. ISSN 0936-678, p. 99
- [7] Pădeanu I., Voia S., Gavojdian S., Frățilă I., Sauer Maria, Pascal C., Călin I., Petcu Mihaela, 2013 – Effects of using melatonin implants and syncro-part pessaries - pmsg on reproduction performance in Transylvanian merino breed ewes, *Lucrări Științifice Zootehnie și Biotehnologii (Scientific Papers Animal Science and Biotechnologies) USAMVB Timișoara*, vol. 45 (2), ISSN 1221-5287, p. 367-370.