

## PROJECTION OF CONSTRUCTIVE, FUNCTIONAL AND MECHANIZATIONS SOLUTIONS FOR SMALL AND MEDIUM SIZE FARMS OF SHEEP AND GOAT

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### Abstract

*The expanding of sheep and goat breeding in our country in small and medium exploitations requires the necessity to assure optimum conditions of sheltering, which are adequate to this system. In this respect it is necessary to assure shelters, adequate to the size of the existent exploitations which to assure an appropriate thermal comfort, because in the climatic conditions from our country, due to the geographic position at the South-East of the European continent there are periods during a year when the air can have negative temperatures which can reach -10 C to -20 C. The social-economic changes which take place in our country and also the changes in the technologies of sheep and goats' breeding require the elaboration of certain new constructive and functional solutions, which are adequate to small and medium exploitations. When the internal environment with specific parameters from shelters (microclimate or bioclimatic) correspond to the physiological needs of sheep and goats, they can express their entire productive capacity, in the same time maintaining their health estate.*

**Key words :** sheep, goat, exploitations, microclimate parameters

### INTRODUCTION

To develop and streamline the sheep and goat breeding and to obtain certain performance results it is necessary to assure optimum conditions of sheltering with the purpose to maintain the health estate of the animals and to increase the obtained productions.

The shelter for the sheep and goat species have been neglected under the aspect of the environment factors and that is why the made progresses in improving and creating new sheep lines with performance productions were not expressed at their level of productive capacity.

The concern for the improvement of the conditions to shelter the sheep and goats was influenced by the system of breeding and maintenance in various periods. So, the microclimate from the interior of shelters must be assured and maintained in optimum limits for the sheep and goats species.

### MATERIAL AND METHOD

In order to know the quality of the ambient environment for sheep and goat

breeding and exploiting in certain types of shelters from the various areas of the country, the values of the factors of microclimate represented by temperature, humidity, luminosity and the chemical factors represented by carbon dioxide and ammoniac, and also certain biologic factors were determined.

The shelters to be studied to watch the evolution of the microclimate parameters during winter, being nine shelters, where situated in three various climatic areas those of north-west, north-south and south. The values of the main determined factors of microclimate were compared with the normal ones and on their basis the indicator of temperature-humidity (ITU) was calculated in order to establish the zone of thermal comfort for each shelter. There are two categories of microclimate factors, those which depend on the organism of the animals being represented by the requirements beside a certain temperature, humidity and by producing and eliminating neat, vapors of waters and gases, these factors being independent and conditioned and the second

category of factors which can be regulated and coordinated and which characterizes the climate from the area where the shelter is situated, its location and orientation. Also, in the second category of factors there are also included the used materials of construction, and also the way of making the various construction elements.

## RESULTS AND DISCUSSIONS

On the basis of the made statistic study regarding the influence of the main factor of microclimate with values over the limits of thermal comfort, there were established the types of shelters with constructive and functional parameters which are adequate to the various sizes of sheep and goat exploitations.

On the basis of the statistic study it was established the size of exploitations for which it is necessary to elaborate constructive solutions as follows:

- For sheep effectives of 150, 300, 500 and 750 mother sheep;
- For goat effectives of 50, 100 and 150 goats;
- For these sizes of exploitations there were established the types of adequate shelters as follows:
- For exploitations of 150 mother-sheep – the adequate shelters are those which are rectangular-shaped, closed and semi-closed with stacked hay-feeder and without hay-feeder;
- For exploitations of 300 mother-sheep – there are adequate the shelters with the shape of „L” letter, with a closed side for droppings;
- For exploitations of 500 and 750 mother-sheep – the shelters have the shape of „U” letter with the central side closed;
- For goats – the shelters are those which are rectangular-shaped;
- In order to establish the constructive parameters of the shelters the total effective was calculated depending on the optimum structure of reproduction, it was calculated the total volume of air in shelters depending on the hygienic norms, taking into account the volume occupied by the body of sheep and goats and the necessary surface of shelters appropriate to the effective of animals. To achieve these fundamental parameters in assuring an optimum microclimate, the shelters should have the following constructive dimensions:
- For exploitations of 150 mother sheep (volume of 770 m<sup>3</sup>, surface of 234 m<sup>2</sup>):– 39 m;– 6m; height of front wall– 2.50m; back wall– 1.50m.
- For exploitations of 300 mother sheep – the closed side (volume of 394m<sup>3</sup>, surface of 152 m<sup>2</sup>)– 20m;– 6m; height of front wall – 2.50m; back wall – 1,50m; point – 3.70 m; open side– 32m;– 7.0 m.
- For exploitations of 700 mother sheep – volume of 600 m<sup>3</sup>, surface of 315 m<sup>2</sup>:– 20 m;– 7.50 m; height of front wall – 2.80m; back wall–1.80 m; point–3.70m; open side– (surface – 2 x 288 m<sup>2</sup>) – length– 2x 30 m; width – 2 x 7.60m.
- For exploitations of 750 mother sheep – the close side (volume of 900 m<sup>3</sup>, surface of 450 m<sup>2</sup>): length – 45 m; width – 10m; height of front wall – 2.80 m; point – 4.0 m; the open side (surface– 2 x 315 m); length – 2x 45 m; width – 2x 7.0 m.

In order to assure and maintaining an appropriate climate in shelters, a special importance is that of location and orientation of the shelters, so the location must be on lands with the water table at a depth of over 0.50 m and with the slope of 3-5 % to South. The orientation of shelters must be made depending on the land conditions in order to be protected from the dominant wind direction.

A special importance in assuring and maintaining an optimum microclimate in the shelters is that of construction materials used for the elements of closing the shelters, which have to satisfy a series of conditions: to assure a good thermal isolation in conditions of a relative high humidity of 80-90%; to assure a good acoustic isolation; to be resistant to a high humidity of the air in the shelters and at disinfections.

Table 1  
THE VOLUME OF A SHELTER FOR 150 MOTHER SHEEP

No.	Specification	UM	Category of sheep		
			Sheep with lambs	Rams	Youth for reproduction
1.	Volume of air needed per one single sheep	m.c.	3.50	5	3.5
2.	Number of sheep per age categories	cap.	150	5	45
3.	The total volume of air needed per categories of sheep	m.c.	525	25	157.5
4.	The volume occupied by the body of a sheep	m.c.	0.15	0.20	0.12
5.	The total volume from shelter which is occupied by sheep	m.c.	22.50	1.0	5.40
6.	The total necessary volume of the shelter	m.c.	548	26	163

Table 2  
THE CONSTRUCTIVE PARAMETERS OF THE STUDIED SHELTERS OF SHEEP AND GOATS FROM THE SMALL EXPLOITATIONS

No.	Constructive parameters	UM	The small exploitations of sheep					Exploitation of goats
			Comana	Dumbrăveni	Ion Corvin	Carcaliu	Horia	
1.	Length of shelter	m.	10.0	13.0	16.0	12.0	15.0	8.0
2.	Width of shelter	m.	6.0	6	6	6.0	6.5	6.0
3.	Height of back wall	m.	1.5	1.6	1.7	1.6	1.8	1.5
4.	Height of front wall	m.	2.2	2.25	2.3	2.20	2.35	2.0
5.	Length of window	m.	1.5	1.7	2.0	1.2	1.8	1.2
6.	Width of window	m.	0.8	1.0	1.0	1.0	1.0	0.9
7.	Height of doors	m.	1.50	1.8	1.95	1.80	2.0	1.80
8.	Width of doors	m.	1.50	1.70	1.85	1.70	1.9	1.50

## CONCLUSIONS

The shelters for breeding and maintaining the sheep and goats must accomplish the following conditions:

- To assure the optimum natural lighting in the interior of the shelter;
- to assure an optimum temperature of the air in the shelter no matter what season or climatic conditions are;
- to assure a humidity of the air in the shelter not to exceed the speed of the air currents by ventilation;
- to assure the necessary space for accommodation depending on sheep category, according to which it is established the sheltered surface for the entire effective;
- to assure the necessary volume of air for each sheep and depending on the accommodation surface and the sheltered effective an appropriate volume of air to be assured;
- to allow an easy circulation of sheep;
- to allow an easy feeding and cleaning.

By assuring certain optimum conditions and maintenance for sheep and goats in the small and medium exploitations the mortality of animals is reduced with 12%, the milk production increases with 20-25 liters / animal, the meat production increases with 10-15%; the expenses of production decrease with 8-10%.

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