

<p>The Density of Sheep in Stables as a Risk Factor with Considerable Influence on Their Morbidity</p>		<p>Healthcare</p> <p>Keywords: Density, Overpopulation, Necrobacillosis, Respiratory tract pathology.</p>
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Abstract

The density of animals in stables constitutes an essential risk factor in the scale of their affected from diseases with dispersive character of hooves and respiratory tract. The study includes the period from 2011 until 2014, extends in four flock with over 200 head of sheep and aims to clarifying the correlation between the density of animals and tangibility from some diseases. For the study was selected Necrobacillosis of hoof and inflammatory diseases of the respiratory tract. The data showed that the increase in the density of the animals in the stables affects significantly in growth of potential for the spread of disease from the various causes microbial and viral. Statistical processing and data regression of monofactorial equations showed the impact and correlation connections of average hardness and negative character. This is expressed by hardness of connections expressed through the correlation coefficient (respectively $R^2 = 0.471$ and $R^2 = -0.542$). With high tangibility of sheep from Necrobacillosis (33-35%) it was found in stables No.2, where to each sheep ensured 0.39 m² of surface. Results confirmed statistically ($R^2 = 0.899$). From the inflammatory pathologies of the respiratory tract lower tangibility (0.04 to 0.11%) were found in stables No.3 where to each animal was provided 4.45m³ attitude of space. Correlation between factors even in this case it proved statistically ($R^2 = 0.562$).

INTRODUCTION

For animals that are breded in flock are distinguished several pathologies affecting the large number of heads and that the veterinary service frequently encounter. In the small ruminants Nekrobacillosis of hooves and inflammation of the respiratory tract constitute the most characteristic pathologies. These pathologies overcome the border of a specific cause and generally treated as multifactorial, *Berberi P. e bp., (2009); Radostits M, et al. (2005)*. At the birth of pathologies such causes are complex and usually with the random combinations including infectious agents, *Egerton, J. R. et al. (2002)*, environmentally and animal immune condition that coexist in the herd, *Radostits M, et al. (2005)*. According *Smith Thomas (2013)*, in the birth of diseases in the herd besides stressors factors, *Wassink, G.J, et al. (2003)*, plays a major role and overcrowding of animals in environments stables, *Ghimire, S.C et al., (1999)*. Such pathology followed by considerable economic damage and require special attention for treatment and control, *Patricia C. Blanchard, (2012)*. The density of animals in the stables constitutes an essential risk factor in the scale of of their tangibility to the dispersive character diseases and especially from ones respiratory tract, *Miller bp.,(1980)* Increasing the density of animals in coexistence brings increasing opportunities for the spread of disease from various causes microbial and viral *Virtala of bp.,(1999)*.

In various publications are identified evidence that overcrowding with large number of animals, keeping them closed for a long time, and the presence of ill animals in the same environment are the most likely causes of the outbreak of pathologies with dispersive character, *Wassink, GJ, et al.(2003)*.

From our studies the presence of Necrobacillosis in sheep's hooves in the area of Malisheva is on average up to 33.9%, with the uttermost limits in different flock from 24.2 to 40.3%. For respiratory tract pathologies in the small livestock do not have data from our studies, but by *Blood, DC et al.(2005)*, respiratory tract diseases constitute the main cause of economic losses and have increased up to level 34% in the last 20 years causing 21% of total economic losses, *Alvaro Garcia and Russ Daly, (2010);Nick Costa et al. (2003);Pugh, D.G. (2003)*.

With the intent to supplementary framework the influence of risk factors in the scale of tangibility and the spread of pathologies with the carrier character pathologies in the small livestock we directed attention to the density of the animals environment in the stables. The final aim of the study was to clarify how affects the factor of density of animals in the stable in the tangibility of animals from Necrobacillosis of hooves (a disease with

causing specific) and the pathologies with inflammation of the respiratory tract, pathology accepted influenced by the ambient conditions .

MATERIAL AND METHODS

The study was limited to four flocks of sheep in the area of Malisheva. The flock No.1 (Mirushë), flock No.2 (Gurëbardh), flock No.3 (Bubavec), and flock No.4 (Vërmicë). For the years 2011 to 2014 were followed up clinically cases presented with Necrobacillosis and with respiratory tract inflammation. Clinical cases were registered in each period of the year. According to the methodology, premises housing the animals were measured and accounted surfaces and volumes for 2011; 2012; 2013 and 2014. Each month were held notes for the amount of animals in the stable and for those which have been ill, and was calculated average load the surface area animals in m^2 and the space for animals in m^3 . Clinical assessment of diseased animals was based on the principles of propedeutica and degree of lameness, while for diseased animals from inflammatory pathology of the respiratory tract in the occurrence of cough and leaks from the nose. Depending on the number of clinically affected animals of the hoof pathologies and inflammation of the respiratory tract was calculated with statistical methods of impact factor scale density of animals in the stable in their tangibility. Statistical refinements was realized by ANOVA program and the correlation coefficients were determined graphs and equations of linear regression monofactorial, the degree of deviation and the authenticity of change.

RESULTS AND DISCUSS

The average results of four years in flocks of animals in the study are given in Table No.1. The data it appears that the stables of sheep changes in surfaces and in the available volume for each animal are visible. Economic interests often dominate over scientific criteria of animals breeding. In the stable No.3 for example has low density of animals compared with this indicator in the other stables (not with standard). For every animal in this stable has available approximately $1m^2$ surface.

Table 1: Dimensions of stables in the study and the average surfaces and volume for animals.

Flock	Length	Width	Height	Surface/ m^2	Vol. m^3	No.Head	$m^2/$ Head	$m^3/$ Head
No. 1	15 m	6 m	2.8 m	90	252	220 - 250	0.4 – 0.36	1.14 – 1.01
No. 4	12 m	7 m	2.5 m	84	210	215 - 230	0.39 – 0.36	0.97 – 0.91
No. 3	22 m	12.4 m	2.7 m	273	736	250 - 300	1.09 – 0.91	2.34 – 2.45
No. 4	15 m	8 m	2.5 m	120	300	200 - 230	0.60 – 0.52	1.50 – 1.30

In the stables No.1 and No.2 the surface of animals available is about two times smaller or the number of animals is nearly twice as large, for the same surface of standing. This indicator is such and standing space volume. In confronting the percentage of animal morbidity by stables and groups of disease study data, presented in Table No.2.

Table 2: Average scores animal morbidity in the 4 years from Necrobacillosis and inflammation of respiratory tract.

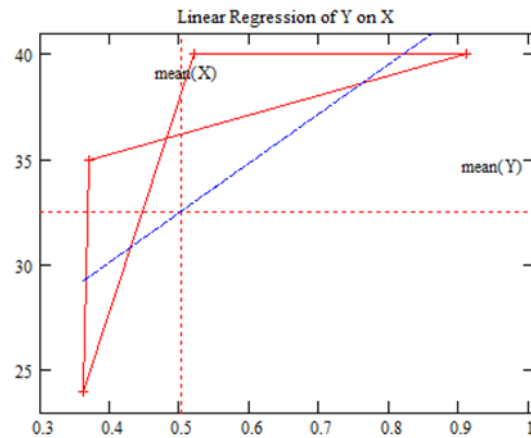
Flock	Ill with Necrobacillosis	in % (min – max)	With inflammation of respiratory tract	In % (min – max)
No. 1	47 – 62	21.3 – 24.0	98 – 121	0.44 - 0.48
No. 2	71- 88	33.0 – 35.0	51 – 86	0.23 - 0.37
No. 3	13 – 72	0.05 – 37.0	12 – 34	0.04 - 0.11
No. 4	29 – 60	14.5 – 40.0	35 – 42	0.17 - 0.18

The data above were processed statistically to prove the common connection between density of animals in the stable (calculated in m^2 for animal) and the morbidity rate of the sheep from the hooves Necrobacillosis. The data are in linear graph (red colored) and it in regress (blue colored), with No.1. Graphs are constructed with average indicators for the four flocks in the study and the four years.

Blue curve shows the tendency of the average correlation relationship between indicators for animal m^2 (density) and % of morbidity from the hooves Necrobacillosis. From the data table and graph of linear regress appears that the more heads to coexist in a unit surface of the greater the chance of spreading the infection. Between these two indicators have related correlation, statistically proven ($R^2 = 0.471$), the average hardness and negative character. The relation between indicators is variable in different stables shows and the dependence and other indicators. However the density of animals on the environment must be assessed and requires respect of recommended standards for breeding animals.

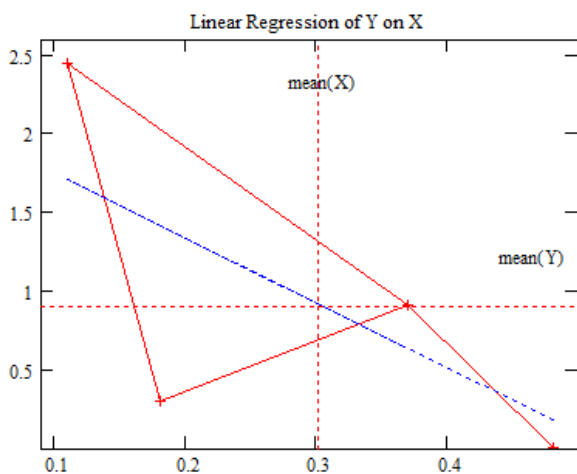
Graph 1: Correlation between the average surface for animals in m^2 and percentage of sheep morbidity from Necrobacillosis of hooves, for the years 2011-2014.

$R^2 = 0.471$
 $Y = 20.752 + (23.508 \times X)$
 $Y = \text{Morbidity of animals in \%}$
 $X = \text{The average surface stables in } m^2 \text{ for animal.}$



In the same logic goes and spatial correlation between volume m^3 (density) the average for each animal and pathologies with respiratory tract inflammation in animals reared in the stables, but with the opposite effect. The more spatial volume (m^3 air) be available to the animals in the stable how much less reduced the risk of the spread of inflammatory pathologies respiratory tract.

For correlation between spatial volume indicators of available animal in m^3 in the stables and the % of morbidity data were as shown in the linear graph with No.2.



Graph 2: Correlation between volume for head of the stables in m^3 and percentage of sheep morbidity of the respiratory tract inflammation, for the years 2011-2014

$R^2 = - 0.542$
 $Y = 2.159 + (- 4.116 \times X)$
 $Y = \text{Morbidity of animals in \%}$
 $X = \text{Volume of stables for animal}/m^3.$

In the study are grouped data and in every stables separately. The data obtained were processed statistically and drafted graphs and equations of regression monofactorial for expressing the dependence of morbidity from Necrobacillosis and inflammation of the respiratory tract in the frequency of animals in stables (average area in m^2 and volume spatial m^3 for animal).

For Graphic demonstration of correlation to existing we present Graph No.3 with data of stables No.1 and graph No.4 with data of stables No.2.

Graph 3: Correlation between for heads of stables surface in m² and the morbidity percentage of the sheep from Necrobacillosis of hooves in the stall No.1, for the years 2011-2014.

R² = 0.217

Y = 13.714 + (23.243 x X)

Y = Morbidity of animals in%

X = The average surface stables in m² for animal

The regression of equations monofactorial are full given to all stables, especially for animal density correlation with disease of Necrobacillosis and especially for attachment of density of animals in stables with inflammatory pathologies of the respiratory tract in Tables 3 and 4.

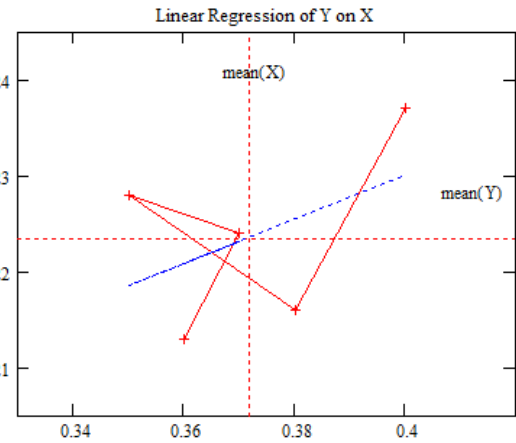


Table 3: Equations of monofactorial regression for correlation between surface for heads of the stables in m² and the morbidity percentage of the sheep from the hooves of Necrobacillosis for the years 2011-2014.

For flock 1	Y = 13.714 + (23.243 x X)	R² = 0.217	P = 0.982
For flock 2	Y = 14.477 + (52.931 x X)	R² = 0.899	P = 0.0245
For flock 3	Y = - 20.673 + (31.038 x X)	R² = 0.621	P = 0.084
For flock 4	Y = 19.457 + (7.103 x X)	R² = 0.111	P = 0.008

Y = Morbidity of animals in%

X = The average surface stables (density) in m²for animal

Graph 4: Correlation between volume for head of the stable in m³ and percentage of the sheep morbidity from respiratory tract inflammation, for the stable No.2, for the years 2011-2014

R² = 0.932

Y = - 1.271 + (0.56 x X)

Y = Morbidity of animals in%

X = Volume of stables for animal/m³.

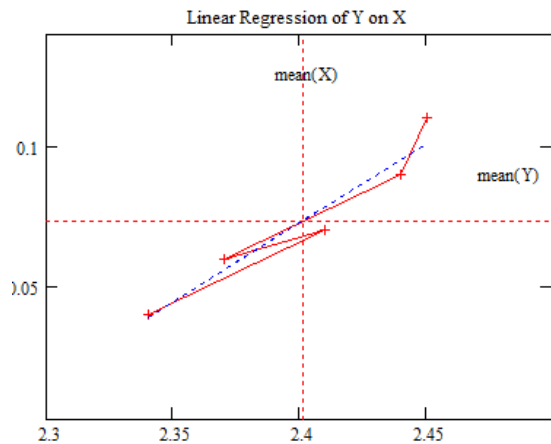


Table 4: Equations of monofactorial regression for correlation between wolume for heads of the stables in m³ and the morbidity percentage of the sheep from respiratory tract, for the years 2011-2014

For flock 1	Y = 0.245 + (0.201 x X)	R² = 0.883	P = 0.003
For flock 2	Y = - 1.271 + (0.56 x X)	R² = 0.932	P = 0.004
For flock 3	Y = 2.111 + (0.08 x X)	R² = 0.562	P = 0.084
For flock 4	Y = - 2.021 + (0.78 x X)	R² = 0.437	P = 0.008

Y = Morbidity of animals in%

X = Volume (density) of stables for animals/m³.

Study data indicate that between morbidity and density of animals in the stables has inverse relationship. As more surface and volume available to have animals in the stable, much more reduced the morbidity percentage of animal from disease with the spreading character. The data obtained and expressed in the regression equations indicate that the impact of the density of animals is real and with high degree of probability. This is expressed by hardness of connections expressed through the coefficient of connectivity (R^2). In some flocks it shows that the impact is greater. This coefficient is higher in the flock No.2 (according to the indicators respectively $R^2 = 0.899$ and $R^2 = 0.932$). The regression equations in all cases confirmed statistically. Changes of animal morbidity scale with respiratory tract inflammation confirmed with greater statistical reliability compared to the level of animal morbidity by Necrobacillosis. Apparently the disease of Necrobacillosis the role of specific microbial factor is more evident.

CONCLUSIONS

1. In the different flocks of sheep the stables provide surface in m^2 and different space in m^3 , random and not based on scientific standards recommended. From flocks in study relatively better conditions for animal accommodation were in the stable of flock with No.3.

2. The level of vulnerability of the sheep from Necrobacillosis and inflammation of the upper respiratory tract are in varying degrees and significantly influenced by the density of animals in the stable.

3. The stables with animal overpopulation followed with the increase of their morbidity.

4. Most significantly impact the density of animals in the stable is the extent of their morbidity by inflammation of the respiratory tract.

5. The dependence of animal morbidity degree from their density is statistically proven. Connections of dependency are hardness average and negative character.

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