Volume 4, issue 6, 2015 • e-ISSN: 1857-8187 • p-ISSN: 1857-8179

Research Article

Hygienical Factors of the Environment and Bronchopneumonia in Calves

Healthcare

Keywords: pneumonia, temperature, humidity, CO2, NH3.

Shefki Ajdini		**Veterinarian, Prishtina – Kosovo** **Faculty of Veterinary Medicine, Tirana, Albania**
Petrit Berberi		**Faculty of Veterinary Medicine, Tirana, Albania**
Vangjel Ceroni		**Faculty of Veterinary Medicine, Tirana, Albania**
Kurtesh Sherifi		**Veterinarian, Prishtina – Kosovo** **Faculty of Veterinary Medicine, Tirana, Albania**

Abstract

Bronchopneumonia is problematic pathology especially in the farms of growing up to the calves which reared in groups and staying at byre.The level of temperature and relative humidity, quality and air currents into byre, type of floor as well as the residence of the animals and other factors, according to Jonathan Statham et al.(2013), constitute the most important environmental factors affecting the prevalence and severity of pathologies to the respiratory system in young cattle. The study was conducted at four farms and aimed to assess the extent of the impact of some environmental indicators in respiratory pathologies.To conduct the study there has been done the measurements of temperature, relative humidity, concentration of CO2 and NH3, for three months, three times a day to 3 days of the month.The data obtained were processed statistically. The impact of each factor was determined by simple regression's equation and so factorial.The details were as follows: For the farm Besi: R2 = 0.46 (P = 0.052) and for the farm Leban-2, R2 = 0.07 (P = 0.36). At the farm Besi where the average temperature in the two years it has been in the first quarter of 9.46;11.05and 11.02oC and humidity 92%, 65% and 92.08%, morbidity was respectively 8.5%, 6.34%;7.81%.At the farm Leban-2, where like 4 monthly temperature was 10.38;13.44;11.99, 11.89oCand humidity 85.98;86.7;91.23 and 90.18% morbidity was found in 11:53;10.86;10.90 and 6.81%.

Introduction

Bronchopneumonia is one of the main pathologies to the respiratory system.It is clinically characterized by increased respiratory rate, depth and character changes in breathing, cough, and in many cases with heavy toxemia, *the O.M.Radostitset al. (2007).* Moreover this disease observed in calves aged 1-4 months and less frequently in older calves, *P. Berberi et al. (2009);Berberi.P., Ceroni V. (2009);Patricia C. Blanchard (2012).* Pathology came across in all seasons of the year, but more often in winter and spring.Failure to comply with hygiene rules, there is insufficient ventilation in the calf barn and environmental congestion, bronchopneumonia appear at any time of year. *Geni Wren (2011),* estimates calves ventilation in byre as a major problem for the respiratory system's diseases.The ventilation system helps remove moisture, keeping control of the byre's temperature and body temperature of calves, as well as to prevent increase of NH_3, etc., *Animal Health, Cattle, News, Veterinary News (2013).*

Data on the incidence of bronchopneumonia by different authors show that the disease poses a serious problem. *Waltner-Toews D, et al.(1986)* report that 15% of calves, Holstein breed of the Ontario were treated for pneumonia before secession. *Van Donkersgoed J. et al.(1993),* disclose that the risk of pneumonia was 39% according to the farmer's diagnosis and 29% by veterinary diagnosis. *Virtala C.A. et al.(1996),* in their study they have found that pneumonia in calves was 11% according to farmers and 25,6% according to the veterinarians.

From the data obtained in studies conducted before it has been confirmed that the incidence of bronchopneumonia in calves have been increasing.The study aims to identify the extent of the environmental impact of several indicators of the show's degree in respiratory pathologies in systems calves reared for meat production concentrated.

Material and Method

To conduct the study in four selected farms were became regular measurements of calves breeding'sbyre of different ages.Controlled indicators had been ambient temperature, relative humidity, the concentration of NH_3 and CO_2. Measurements were made for the years 2013 and 2014, 3 times a day, at 7 o'clock (in the morning without getting employees at byre), at 12 o'clock and at 18:00 o'clock.

Measurements also were performed 3 times per month.Temperature, humidity and CO_2 were measured with the camera set **"VAISALA"** and NH_3 was determined by direct smelling qualitatively, as well as apparatus set **"Drager"** with corresponding respective tubes at the level of the body to the calves. The data obtained from the study were analyzed statistically with the regression analysis method to the more factorial and attachments were defined between indicators of morbidity into calves with bronchopneumonia and level of the parameters hygienicto the byre.

Results and Discussion

The study's data of the factors to the environmental hygiene in farms in the study are as follows: Chart 1, shows that the average temperature of the environment in the months January - March (for the two farms Besi-1 and Leban-2), was lower.This indicator increased during the months of May to September and decrease again in November and December.

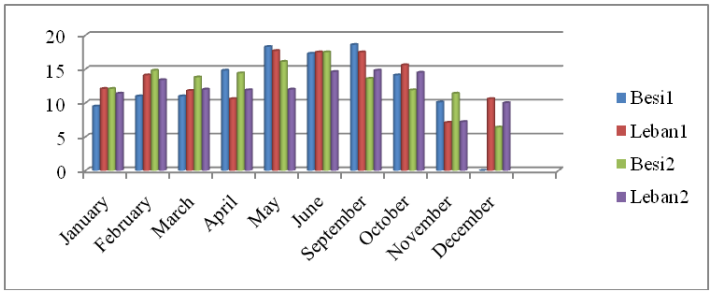

Chart 1. Dynamics of the temperature to the environment into different farms by the month, for the years 2013-14

The same occurrence goes for relative humidity, Chart 2. Index of the relative humidity into environment was higher in the first four months (for farm Besi-1 and Leban-1), in January, February, March and April.In these periods of the year, relative air humidity reaches also the levels up to 90%.In the other months of the year on four farms in the study, the relative humidity reaches the optimal values (recommended values faced by *Lagoet al, (2006).*Passingof the values relative humidity to the air reach above 90% appears to be a strong risk factor, especially when the phenomenon was associated with higher temperature and especially with frequent temperature of the fluctuations over 24 hours.

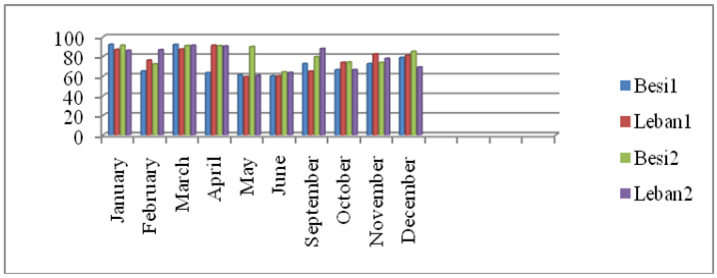

Chart 2. Dynamics of relative humidity according to the farms and months, years of 2013-14.

The concentration of CO_2 suffers relatively large changes in different periods of the year (chart 3).In September was observed significant increase in the concentration of CO_2 in the environment of the byre.In this

month the value spent over 0.1 mg/l.in the other months of the year, the concentration of CO_2 ranged from 0:03 to 0.9 mg/l.

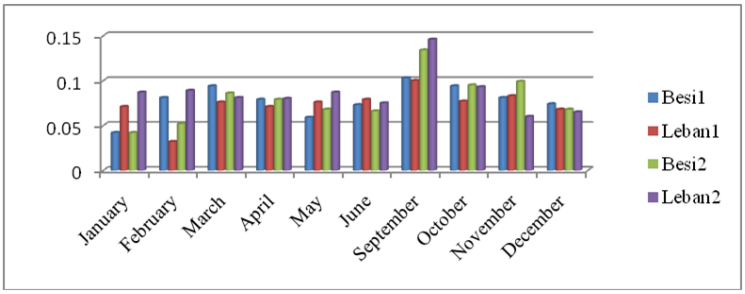

Chart 3. Dynamics of CO_2 according to the farms and months, years of 2013-14.

The dynamics of the concentration of CO_2 in the byres to the calves of all farms in the study was almost within minimum and maximum rates recommended by, *Lagoet al. (2006).* The exception to this assessment took months of September, November and December at the farm Besi-1, October and December at the farm Besi-2 and May and September months Leban-2 farm.Lebanfarm-1, the concentration of CO_2 in September was slightly above the maximum permissible rate.

The concentration of the level to the ammonia in byres of the farms in the study appears in chart.4.Upon the data obtained according to the farms (chart 4) seems that higher concentration of ammonia was higher in farm Besi-2 and Leban-2 and lower in two other farms during September.This concentration had been downing up in the month of October while maintaining the same dynamics according to the farms.In November there was an increase in the concentration of ammonia on farms Besi-1 and Leban-1 and decrease in farms Besi-2 and Leban-2.In December it was found increased levels of ammonia on farms Besi-1 and Leban-2 and state of nearly stationary for two other farms in comparison with the previous month.

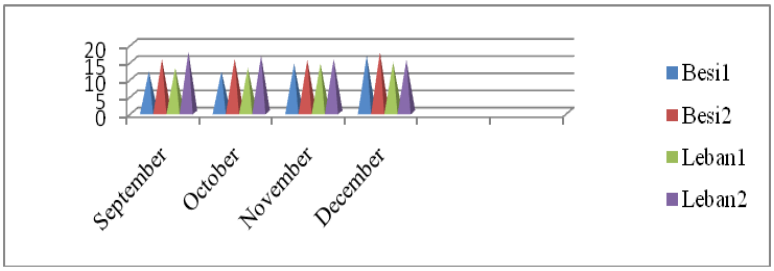

Chart 4. Dynamics of N_3according to the farms and months into byres of the calves,years of 2013-14.

The critical level of the ammonia, according to *Nick Costa et al.(2003),* observed when crossing the limit of 25 ppm and calves which stay for long time in this byre's environment.Based on these data of the literature we can conclude that values of the ammonia's concentration in the studied farms are reduced.The mentioned-above source of the literature addressing harmful mechanism and irritant to the ammonia into receptors of the respiratory apparatus that these receptors are insensitive to low doses of ammonia, *Nick Costa et al.(2003).* Receptors of the bronchi and bronchioles are less sensitive receptors located in the larynx and trachea.This leads to a moderate increase in the concentration of ammonia initially provoke coughing birth to calves and then as a complication may arise and develop bronchopneumonia.

In conclusion, facing the data obtained have been noted that morbidity of calves with respiratory system pathologies resulted higher in farm Leban as for the year of 2013, and in 2014 the study, respectively for the year of 2013: January 11.53%, February's 10.86 March 10.90%, and for the year of 2014: January 14.3%, 15.9% February, March and December 28.12% 12.28%.

It is an acknowledged fact that the environment where calves have been growingup must provide them thermal comfort, physical, satisfy and adapt their behavior.In all cases, ventilation is crucial in health maintenance calves.The result of bad ventilation will always have high incidence of diseases of the digestive tract and the respiratory, *Dale A. Moore et al. (2010).* According to *Bradford P. Smith, (2002),* occurs when active bronchopneumonia factors risk in a certain combination of animal, environmental and infectious agents.Furthermore, according to a study conducted by *Russ Daly of Isidro Stokka* who cites *Smith Thomas, (2013),* pneumonia is seen as a constant risk of calves, since many of the agents that cause bacterial pathogens are present in the upper respiratory tract,*Alvaro Garcia (2013); Fiona McGillivray (2013); Ingrid Lorenz et al. (2011).*They come as soon as convenient case when the immune system usually lower viral infections or stresses have been activated.

However, at the farm of Leban, all obtained data show that the temperature rise associated with increased relative humidity in the premises of the farmyard was followed by a moderate increase in morbidity in calves.In addition to studying the impact of the environmental and microclimatic factors to the byres, the data obtained were processed on these factors indicate that data statistically. Thedate evidence thatamongst the environmental indicators and morbidity have slight changes and statistically validated.The data obtained have been presented in Table 1.

Table 1. Dynamics of morbidity and environmental indicators according to the farms.

Farms	Morbidity	Temperature	Humidity	CO_2	NH_3
Besi	4	13.62	70.96	00:08	9.96
Leban	4.5	13.64	72.73	0.076	10:23
t (Test)	12:18	0.95	12:31	12:39	12:26

Referring to the Student's (s) criterion proved that morbidity among farms as well as links with the environmental indicators have not been verified statistically (P <0:05).

In addition to studying the impact of environmental microclimatic factors of the byres, the data were acquired on these factors and regression equations developed a factorial and they manifold.For this purpose they were used the data above charts.

After processing there was taken these equations of the multiple regressions:

Y (Morbidity) = 21.41- 0.56Temp. + 0.01 Humidity - 12:41 CO_2 - 0.74 NH_3
R^2 = 0:46 F calculated = 3.93 P = 0.052 Farm Besi
Y (Morbidity) = 18:22 - 0.05Temp.- 0.077 Humidity - 0.41 CO_2 -0.57 NH_3
R^2 = 00:19 12:51 F calculated = P = 0.73 Farms Leban
Y (Morbidity) = 8.91 - 0:34 NH_3
0:07 F calculated R^2 =. = 0.9 P = 0:36 Farm Besi
Y (Morbidity) = 15.9 - 0.78 NH_3
0:12 F calculated R^2 =. = 1.69 P = 0:22 Farm Leban

From the equations of the multiple regression with four parameters obtained in the study it seemsobviously that the farm Besi, statistically proven influence of microclimate parameters of the level to the morbidity of calves, farm and in Lebanthere is no reliable statistical truth.

As noted in multiple regression equations, the internal temperature of the environment's negative impact onmorbidity of calves.Any decrease or increase the temperature beyond the optimum values followed by

changes in the level of morbidity of calves with bronchopneumonia.Increased relative humidity with increased morbidity followed by bronchopneumonia calves, while lowering the relative humidity decreases the morbidity of calves.Impact indicators of CO_2 and ammonia are less visible and statistically verifiable.

Conclusions

From the preliminary results of the study there have been reached the following conclusions:

1. Bronchopneumonia into calves seems more in the season of the winter.

2. At thefarm of Leban, the temperatures coupled with increasing relative humidity in byre, it brings moderate increase in morbidity in calves. Any reduction or increase in temperature beyond the optimal values of morbidity associated with changes calves with bronchopneumonia.

3. Passing of the values to the relative air humidity above 90% is a strong risk factor especially when associated with high temperature and especially frequent temperature fluctuations during the 24- hour.

4. Hygienic factors of the environment should be taken not detached from each other but in interaction with each other.

5. Higher morbidity results at the farm of Leban as in the year of 2013, and in the year of 2014 of the study, respectively for the year of 2013: 11.53% January, February and March 10.86 10.90%, while for the year of 2014: January 14.03%, 09.15% February, March, December 12.28% and 12.28%.

6. Design and implementation of new construction for calves must be made in accordance with conditions climatic-ground and micro-zone area where are built, in order to guarantee the necessary parameters of the microclimate.

References

1. Alvaro Garcia (2013): Respiratorydisease in Young Dairy Calves. Extensiondairy specialist, Russ Daly, Extension veterinarian.
2. Animal Health, Cattle News, Veterinary News, (2013).
3. Berberi P. e bp. (2009): Sëmundjet e kafshëveripërtypëe.
4. Berberi P., Ceroni V. (2007): Sëmundjet e viçave, Monografi.
5. Bradford P. Smith (2002): Large animal internal medicine, Third edition.
6. Dale A. Moore, et al. (2010): Effects of Hutch or Pen Environmenton Pre – weaned Calf Health, Welfare and Performance, Veterinary Medicine Extension.
7. Fiona McGillivray (2013): Animal Health, Cattle, News, Veterinary News.
8. Geni Wren (2010): Knock out respiratory disease in beef calves.
9. Ingrid Lorenz et al. (2011): Calf health from birth to weaning. III. Housing and management of calf pneumonia.
10. Jonathan Statham and Jamie Robertson (2013): Better Management of bovine respiratorydiseases Pneumonia.
11. Lago et al. (2006): Calf respiratory diseases and pen microenvironments in naturally calf barns in winter. J.Dairy Sci. 89: 4014-4025.
12. Nick Costa et al. (2003): Determining critical atmospheric ammonia levels for cattle, sheep and goats-a literature review. Published by meat & livestock Australia ISBN 1740362969.
13. Patricia C.; Blanchard (2012): Pneumonia in Dairy cattle, Reprinted from California Dairy Newsletter, Vol. 4, Issue 1.

14. Radostits O.M. et al. (2007): Veterinary Medicine, 10th.
15. Russ Daly and JeryStokka (cites of SmithThomas),(2013): Researchers obelize to Whip summer- Pneumonia in calves.
16. Van Donkersgoed J. et al. (1993): Epidemiology study of enzootic pneumonia in dairy calvesin Saskatchewan,Can J. Vet. Res 57: 247.
17. Virtala AK. et al. (1996): Epidemiologic and pathologic characteristics of respiratory tract disease in dairy heifers during the first three months on life, J Am Vet. Med. Assoc. 208:2035.
18. Waltner-Toews D. et al. (1986): Dairy calf management, morbidity and mortality in Ontario Holstein herds: Age and seasonal patterns, Prev. Vet. Med. 4: 125.