

EXAMINATION OF CERTAIN PARAMETERS AFFECTING DAIRY COWS WELFARE IN BOSNIA AND HERZEGOVINA

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Abstract

Dairy cattle housing quality can significantly affect the whole structure of the factors that determine the profitability of this production. The aim of this research is to examine the housing quality of dairy cows on a number of farms in the Republic of Srpska (RS) and Bosnia and Herzegovina (BiH). The study included 80 dairy cattle farms. The capacity of these farms was diverse and ranged from 4 to 107 dairy cows. Investigated farms are located at different altitudes, and 40 farms were over 600 meters above sea level and 40 below 300 meters above sea level. Research in the field started on December 5, 2013 and ended on March 15, 2014. The next parameters being measured were, or data were recorded: number of different categories of animals, housing and feeding system, space allowance per animal and barn measures, microclimatic conditions (temperature, humidity, air velocity), light and cleanliness of animals and stalls. The dairy farms in the mountain regions are small and the mean herd size of these farms was 11.75, and in lowland farms the average number of cows was 22.9. The air temperatures inside at visited farms in the barn were higher in the “lowland farms” than in the “mountainous farms” for 2.7⁰C, and were in average 8.38⁰C in mountain farms, and 11.11⁰C in lowland farms. There is a clear evidence that farm building do not reach modern standards, especially if we considered light intensity inside the barns, but also air velocity was quite low. For further development of dairy farming in BiH will be urgent modernization in housing systems, both by reconstruction of existing or building new barns for dairy cows.

Keywords: *dairy cattle, housing, altitude, microclimatic conditions.*

Introduction

Issues of dairy cattle housing conditions are every day more and more important, especially in recent years, due to the consequences of global warming, and the increase in prices of primary fuels and electricity which more stronger influence on agricultural production. The practice, which began in the sixties, and that includes the construction of the lower-cost facilities in order to increase competitiveness is slowly losing priority. In buildings that are insufficiently protected from external climatic factors, increasing the needs for introducing a variety of accessories, such as fans, sprinklers, leads to big losses in animal health, and increased consumption of electricity and other energy that used on the farm (Erbez, 2008; 2010).

Dairy cattle housing quality can significantly affect the whole structure of the factors that determine the profitability of this production. There are various factors that can determine the efficiency of production, not taking into account the characteristics of the breed and genetic predispositions of individual animals. There are microclimatic factors, such as temperature, relative humidity, light inside the building, the presence of gases, then the architectural solution of the object for livestock and farming systems, cleanliness stall and animals, target

production and more. Given the complexity and dependence of all the above parameters among themselves, the question arises how to evaluate, understand and present the results to the farmers. It is necessary to compare the obtained data with defined standards, if they exist, or with the similar research.

The European agency for food safety for the needs of dairy cattle breeders, researchers, students and other interested drafted: „Scientific Opinion on the overall effects of farming systems on dairy cow welfare and disease“, which are defined norms by parameters which determines the housing quality of dairy cows and adopted a certain conclusions. Their goal is to formulate certain standards when it comes to the housing of dairy cows. The recommendations are based on a comprehensive survey conducted on a large number of farms in several countries of the European Union (EFSA, 2009). Ruud et al. (2011) examined the cleanliness of free stalls (cubicles) on 232 farms in Norway and concluded on what kind of design that provided the maximum hygiene and cleanliness of cows. As an important factor in determining the housing quality and the potential impact of extreme climatic factors on the productivity of animals, Erbez et al. (2010) reported an architectural solution of barns with open sides and differences in climatic conditions inside and outside the barn. The air temperature and humidity were measured during 12 months using 4 data loggers, out of which three were located inside the barn, and one outside the barn. Falta et al. (2009) examined the influence of microclimatic values on milk production of Holstein cows in second lactation and found associations between the temperature in loose housing barns and milk production.

The specified experiences of the researchers were the basis for defining the list of parameters used in the project „Evaluation of cattle welfare and housing in Bosnia and Herzegovina“. It should be noted that significant research of dairy cows welfare in BiH according to the available data are not yet carried out.

The aim of this research is to examine the housing quality of dairy cows on a number of farms in the RS and BiH and to present these results for dairy farmers.

Material and methods

The work is based on an extensive secondary data review and primary data collected from 80 dairy cattle farms. The capacity of these farms was diverse and ranged from 4 to 107 dairy cows. Investigated farms are located at different altitudes, and 40 farms were over 600 meters above sea level and 40 below 300 meters above sea level. Field research started on December 5, 2013 and ended on March 15, 2014. For defining the research area and the number of farms the Ministry of Agriculture, Forestry and Water Management of RS was contacted, which supplied a list of potential 147 farms. From documents of Ministry were chosen 80 farms in 18 municipalities all over the country, with Bileća as the most Southern municipality and Novi Grad which is situated at northwestern part of the country. This research was carried out during the winter period, in order to determine possible increasing of relative air humidity and cleanliness of the farms and animals, but also to achieve presence of animals inside the barns when observations were provided.

For field research was developed data sheet and purchased equipment (mobile laboratory). Data sheet was filled out for each farm separately, and for each farm it was also possible to distinguishing between housing system (tied, loose housing and free stalls) and housing related animal behaviour.

The next parameters being measured were, or data were taken: number of different categories of animals, housing and feeding system, space allowance per animal and barn measures, temperature, humidity, air velocity, light and cleanliness of animals and stalls. Estimation of microclimatic conditions was done based on data obtained by measuring air temperature and relative humidity by Thermo Anemometer PCE-423, temperature and air velocity measured by Anemometer PCE-AM82 and light intensity measured by Lux-meter PCE-MLM1. Light was always measured when artificial light was switch off. These parameters were measured

on three parts of a barn (in north, south and in the middle part of a barn), then calculated averages. For assessment of space allowances dimension of barns were measured by Laser distance meter PCE-LDM50. Hygienic conditions estimation was made on the basis of visual assessment of the cleanliness of animals, beds and water trough's cleanliness. For the aim of cleanliness assessment was developed model, according to level of cleanliness of cows. The cleanliness of cows and stalls was assessed from 1-clean to 4-very dirty.

Results and discussion

In total 84-89 different parameters were recorded on each farm, or a total of about 7.000 single observations.

Mean values for investigated parameters are presented in Table 1. It's evident from results, that the dairy farms in lowland regions are bigger than “mountainous farms”. The dairy farms in the mountain regions are small and the mean herd size of these farms was 11.75, and in lowland farms the average number of cows was 22.9.

Table 1. Average values for investigated parameters

Parameters	„Mountainous farms“	„Lowland farms“
Mean herd size	11.75	22.9
% of tie-stall farms	100	80
% of farms summer grazing	95	47.5
Area per animal	9.55	8.98
Mean stall temperature, °C	8.38	11.11
Mean humidity, %RH	44.73	49.52
Air velocity, m/s	0.26	0.12
Light	24.78	17.02
Mean cow cleanliness	1.9	2
Mean stall cleanliness	1.9	2.1

*Source: Authors' elaboration based on survey results

According to German research the optimal size of breeding herd in dairy production with tied housing is 40 dairy cows (Stipić et al., 2000). According these studies, the breeding herd at visited farm is much lower to ensure profitability of this production.

In all farms in the hilly-mountainous regions the cows are kept in tied housing systems, but during the summer period farmers let their cows out to pasture on 95% (38 farms) of visited farms. In the lowland regions farms were different in breeding systems (loose, tied housing), but also majority of farms (80% or 32 farms) keep cows tied. In lowland farms, just 47.5 cows have access to the pastures in summer period. According to EFSA research (2009), if dairy cows are not kept on pasture for parts of the year, i.e. they are permanently on a zero-grazing system, there is an increased risk of lameness, hoof problems, teat tramp, mastitis, metritis, dystocia, ketosis, retained placenta and some bacterial infections.

The optimal temperatures in dairy farms are between 0 and 20°C (Stipić et al., 2000.) The air temperatures inside at visited farms in the barn were higher in the “lowland farms” than in the “mountainous farms” for 2.7°C, and were in average 8.38°C in mountain farms, and 11.11°C in lowland farms.

The average relative humidity in the “mountainous farms” was 44.73 % and in the “lowland farms”, the average humidity was 49.52 %. Stipić, et al. (2000.) suggested that optimum values of humidity for dairy cows are between 60 and 80.

Bouška et al. (2006) suggested that dairy cows during the 16 hours a day should have light intensity of 200 lx. There is substantial evidence that a longer light duration (16L: 8D, intensity at least 150–200 lux) promotes milk production (European Food Safety Agency,

2009). At visited farms, there was found higher light intensity in mountain farms, and it was 24,78 lx., whereas in lowland farms, the average light intensity was 17.02 lx.

Air velocity in normal temperature conditions in the barn should have maximum of 0.3 m/s (Chloupek and Suchy, 2008). Results of this research showed air speed 0.26 m/s in mountain and 0,12 m/s in lowland farms.

The results showed that farms in both regions have the optimal area pre animal. The mean cow cleanliness in farms in the mountain regions was estimated with 1,9 (low dirty) and 2 (some dirt) in the farms in the plain regions. The cleanliness of stalls in the mountainous regions were 1.9 (low dirty) and stalls in the plain regions were 2.1 (some dirt).

Conclusions

So far conducted research indicate on more intensive breeding system in the plain than in the mountainous regions. In the mountain regions of BiH the dairy farms are small. In all visited farms in mountain regions the cows are kept tethered, and during part of the spring, summer and part of autumn, the cows graze during the day, considering that a large part of the territory in this region disposes with pastures. In the plain regions the dairy farms are bigger, and the cows are more frequently being kept in loose housing systems. There is an clear evidence that farm building do not reach modern standards, especially if we considered light intensity inside the barns, but also air velocity was quite low. Positive finding were in percentage of farmers providing to cows grazing during summer, and that was almost 75% of all farms. That cows were more clean in mountain areas, could be related to time spend on pastures during the year.

Based on preliminary data, and data gathered through direct interviews with farmers the awareness of farmers on issues of quality of dairy cattle housing and its impact on production and animal health, seems low.

For further development of dairy farming in BH will be urgent modernization in housing systems, both by reconstruction of existing or building new barns for dairy cows.

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