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Application of Methods to Assess the Welfare of Dairy Cows on Farms in Serbia

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Abstract. The last few years, in Serbia are carried out researches in order to collect data of farm animals welfare in different systems of breeding. This paper presents the results of the analysis of the welfare of dairy cows on a farm with free system of rearing. The assessment is based on the degree of satisfaction of animal needs, while the scoring was carried out for appropriate physical, microclimatic and hygienic conditions of housing, social needs, health of animals and the relationship of owners/workers to animals.

The results show that the inclusion of a number of parameters can contribute to obtaining more accurate assessment. Also, parameters used for assessment should be adapted to the breeding system and can be used for continuous monitoring of the animal welfare status on the farm.

Key words: welfare assessment, dairy cows

INTRODUCTION

Last two decades the welfare of dairy cows and methods of its evaluation are discussed through a number of studies (Hörning, 2001; Johnsen *et al.*, 2001; Keyserlingk *et al*., 2009). All methods of welfare assesment are based on basic animal needs and on a range of welfare parameters, and according to Keeling and Veissier (2005) welfare criteria in assessment should give answers on following questions: 1) are the animals properly fed and supplied with water, 2) are the animals properly housed, 3) are the animals healthy, 4) does the behaviour of the animals reflect optimised emotional states? In principle these parameters include all aspects that may contribute to the analysis of the level of animal's adaptation to the rearing system. For this reason is important to know conditions in which animals live, which is the one group of parameters related to the environment, while the second group consists of parameters related to the animal (data on production, reproduction, health and behavior). Regarding to facts that environment greatly affect welfare of animals, and environmental parameters are relatively easy and quick to record (Johnsen et al., 2001), data about housing conditions are often used in methods for welfare assessment. However, in practical conditions is not simple to collect data about all specified parameters, and universal, easy and everywhere applicable method of assessment is still not defined.

In European countries such as Austria, Germany, France and Italy some (prototype) systems of assess and monitoring of cattle welfare have been developed (Blokhius, 2008). In Serbia, welfare of farm animals, especially cattle welfare, becomes an important issue, parallel with process of harmonization of legislation to the EU regulations. Accordingly, in recent years process of collecting data about welfare status of cattle on farms in Serbia is started, and the results were published in the papers of Hristov *et al.* (2006), Lazic and

Petrovic (2007), Maksimovic *et al.* (2007), Relic *et al.* (2007), Hristov and Relic (2009), and Hristov *et al.* (2010).

The goal of this paper is to show the method of collecting and scoring data about housing conditions, as well as assessment of the welfare status at one of the dairy cows farms in Serbia according to one of the known method. Furthermore, the short review of present situation in our country regarding welfare status and protection of dairy cows is also given in this paper.

MATERIALS AND METHODS

In this research housing conditions and welfare of Holstein-Frisian cows on the farm with free stall system of rearing are analyzed. Each category of cattle is placed in separate facility, and all facilities except for calves younger than 15 days, maternity barn and stall for fattening bulls are without feed yard. Only cows in maternity barn i.e. before and after partitution (period of aproximatly 15 days) are tied.

Collecting data on the spatial, microclimatic and hygienic conditions of housing was done in the manner described in the works of Hristov and Relic (2009), and Relic *et al*. (2009). In assessing were taken into account minimal standards for rearing conditions and needs of animals (Anon., 2005; Bartussek *et al.*, 2000; Fregonesi and Leaver, 2001; Palmer, 2006; Webster, 1995; 2001), and for each parameter of housing conditions the detailed instruction for scoring is given.

For assessment of spatial conditions dimensions of barns, space for resting, windows, doors, feed yard, fences and feeders was measured. Furthermore, position of barns in relation to cardinal directions and main winds direction, type and condition of the system for ventilation, and properties of material for the construction of walls, ceilings and floors, their current status in terms of functionality and potential damage, as well as the type and amount of bedding were taken in consideration.

Estimation of microclimate conditions was done based on data obtained by measuring air temperature, relative humidity and air flow (measured by multifunctional digital apparatus), light intensity measured by digital Lux-meter, by visual determination of the amount of dust particles and the subjective impression of the intensity of noise and vibration, and the presence of harmful gases in the air.

Hygienic conditions estimation was made on the basis of visual assessment of hygiene of bedding, floors, walls, ceilings, windows, feed yard, fences, feeders and waterers, channels and corridors for manure, as well as hygiene of ventilation channels.

On the basis of obtained data, each parameter was evaluated with a minimum of 0 to a maximum of 5 points (5 – excellent, 4 – very good, 3 – good, 2 – sufficient, 1 – insufficient, but with resources to be improved, 0 - insufficient, but with no resources to be improved). Final grade was formed on average grade of indicators, and following scale: 0.00 – 1.99 insufficient, 2.00 - 2.49 sufficient, 2.50 - 3.49 good, 3.50 - 4.49 very good, and 4.50 - 5.00 excellent. Finally, SWOT analysis was performed in order to establish advantages, limitations and possibilities to improve dairy cows' welfare.

These data served to assess the welfare of cows by method of the Animal Need Index, ANI (Bartussek *et al.*, 2000). The method is based on the assessment of the five indicators of importance to the welfare of animals, such as: the possibility of movement, the possibility of achieving social relations with other individuals, type and condition of floors in facilities, lighting and air quality in facilities and the relationship of breeders to animals. Each of these indicators include certain elements that are graded by appropriate number of points.

Elements that are taken into account in determining the characteristics of floors are softness i.e. hardness, cleanliness and slipperiness of surfaces for moving and resting in the stalls and outside. Assessment of freedom of movement is based on the available surfaces in m^2 for cow of 500 kg in the stall for loose housing, surface for lying and the possibility of rising, the size of stall, comfort and mobility of the chain in tied system, as well as the length of stay outside of the stall during the year. Parameter related to the microclimate includes the amount of lighting in the stall and air quality, the existence of drafts around the resting area, the intensity of the noise and the number of hours or days of stay outside. Within the scope of social relations available space for different categories of cattle in barns with free and tied rearing system is considered, as well as structure of the herd (in terms of the formation of age or production group), the way of housing calves (the possibility of contact with the mother) and length of stay outside of the barn. In the assessment of relations between owners or breeders to animals are taken into account: hygiene of the stall, resting area, and feeders and waterers for animals; technical accuracy of the equipment; condition of skin and hoofs of animals, cleanliness and general health of animals, as well as the appearance of technopathies.

Score of all indicators gives a final evaluation of animal welfare, and higher score indicates that conditions of rearing are better for animals.

RESULTS AND DISCUSSION

Table 1 shows the average points given on the basis of collected data of the spatial, microclimatic and hygienic conditions in the stalls for each category of the animals.

Table 1.

Results of assessments of spatial, microclimate and hygiene on dairy cows farm

Facility (category of cattle)	Conditions for assessment			Total average number of points for each facility (category of cattle)
	Spatial	Microclimate	Hygiene	
Maternity barn	2.81	2.43	2.56	2.60
Calves under 15 days of life	3.63	2.71	3.17	3.17
Calves 15 to 1 month of life	3.44	3.43	3.78	3.55
Calves 1 to 3 months	2.80	1.86	2.40	2.35
Older calves and heifers	3.50	4.14	2.77	3.47
Cows	2.50	3.71	2.80	3.00
Average number of points at farm level	3.11	3.05	2.91	**3.02**
0.00 – 1.99 insufficient, 2.00 - 2.49 sufficient, 2.50 - 3.49 good, 3.50 - 4.49 very good, 4.50 - 5.00 excellent				

The data in Table 1 show that conditions of accommodation at the farm are average rated as good (3.02 points). The lowest average score (2.60 points, good) was given for the conditions in the maternity barn, and the greatest (3.55 points, very good) for the conditions in facility for 15 days to 1 month old calves. The lowest average rating of spatial conditions (2.50 points, good) was given to the facilities for cows, and highest (3.63, very good) for the facility for calves younger than 15 days. Microclimatic conditions are the worst rated in the facility for calves of age 1 to 3 months (average 1.86 points, insufficient) and the best in the facility for older calves and heifers (14.4 points, very good). The best score for hygiene is given for the conditions in facility for 15 days to 1 month old calves (3.78 points, very good) and the worst for hygiene of stall for old calves 1 to 3 months (2.40 points, sufficient).

These marks are mostly the result of technical characteristics of facilities, which have a negative impact on the microclimatic conditions and the possibility of adequate cleaning and use of mechanization. In this context, SWOT analysis of the data revealed that the biggest problem represents failure in construction and operation of natural ventilation in buildings, lack of fans and hygiene of straw as bedding material. Organization of work on the farm influences the level of hygiene in the stalls, as well.

SWOT analysis of this farm also indicates that possible consequence of such rearing conditions in long period could be outbreak of some diseases and health disturbance in cattle, such as heat stress in summer (due location of some stalls and poor ventilation system), respiratory diseases (where high air humidity and draft exist), mastitis (if cows lay on dirty bedding), hoof diseases (due to walking on concrete floor, retention of water in feed yard around malfuntioned automatic waterers, as well as wet bedding).

However, observation of the animal's environment alone does not address the potentially profound effects of the way the farmer manages the animals (Blokhuis, 2005). Assessing the welfare of cows on the farm by ANI system, which takes into account other parameters together with rearing conditions, showed that conditions for animals are most probably still comfortable, i.e. suitable in terms of which they are enabled on the farm (26 of ANI points). The results of this assessment are shown in Table 2, and the interpretation of the results in Table 3:

Table 2.

Marks of ANI system parameters

Parameter	ANI points
Floor characteristics	4
Feedom of movement	8
Lighting and air quality	6
Social relations	5
Relations between breeders to animals	3
Total	26

Table 3:

ANI-welfare categories on the basis of the ANI-35L-system with a range of minus 10 to plus 45 points (according to Bartussek, 2000):

Sum of ANI points	Names of categories of housing conditions with respect to welfare	Verbal school grades
< 11	Not suitable	Insufficient
11-16	Scarcely suitable	Sufficient
16.5-21	Little suitable (mediocre)	Satisfactory
21.5 -24	Fairly suitable	Good
24.5-28	Suitable	Very good
> 28	Very suitable	Excellent

The data in Table 2 show that the minimum number of ANI points (3) is given for the relationship of breeder to animals, which was influenced by cleanliness and condition of the skin and hoofs of animals. Freedom of movement is evaluated with the greatest number of points (8), because all cattle on the farm have enough free surface to move, except cows in the maternity barn.

In general, in ANI system of assessment possibility of movement could compensate some bad characteristics of accommodation for animals, why the fulfillment of rearing

conditions in terms of welfare can be assessed with greater grade. This is one of merits of ANI system, considering that freedom of movement is important for achieving better condition and health status of animals, as well as for expression of normal behaviors pattern of cattle, what is described in the paper of Hristov *et al*. (2010).

ANI system has number of other advantages as well, which are given in the paper of Bartussek (2000). That is one of the reason why we started our analysis of dairy farms using this system. Results of previous research showed that welfare status of cattle was sufficient (scarcely suitable) on 60% of examined farms, good (fairly suitable) on 20% of farms, satisfactory (little suitable) on 10% of farms and insufficient (not suitable) on 10% of farms (Relic *et al*., 2008). However, during the research using ANI system we found that it is not completely adequate for our farms. The greatest objection relates to the possibility of opt for a certain number of points, primarily because system offered the options which are not always fit with conditions prevailing on our farms, which are mostly the combination of traditional and modern way of breeding. For example, the farm which is examined in this research has changed the system of holding cattle (from tied to free system), what is reason that many stalls were adapted. Unfortunatelly, adaptation of facilities very often does not meet minimal standards. Producers are not sufficiently informed about needs of animals, not only in terms of ethics, but also in terms of consequences for the health of animals and their production results. Manufacturers usually do not take into account the impact of the lack of movement, microclimate conditions and unappropriated floors in stalls on health and welfare of cows. Production technology is outdated and breeders when building new or adapting existing farms are rarely guided by new scientific and professional knowledge. This condition is the result of adjusting the manufacturer's current finantial capabilities, without long-term production planning (Hristov and Stankovic, 2009). On the other side, there is a certain number of dairy farms which are built based on EU standards, and their owners are very interested in improving the knowledge about dairy farms management and status of their cows welfare as well.

This complexed situation makes number of varieties in cow's rearing systems. For this reason, in the previous period data about housing conditions have been intensively collected, and in assessment was included various indicators that are discussed in the literature (Sundrum *et al.*, 1994; Bartussek, 2000; Keeling and Veisseir, 2005; Blokhuis, 2008). In that way, existing methods were modified for domestic conditions, but not finally defined.

CONCLUSIONS

- The facts shown in this paper point out to the improvement of dairy cows welfare in Serbia in recent years, brought about by collecting data concerning rearing conditions on farms. Based on the data obtained it is possible to carry out a detailed SWOT analysis and define advantages, limitations and possibilities for improving dairy cows' welfare and to continously monitor the situation on a farm.
- Assessment of the welfare on the basis of data collected started the evaluation based on known systems, such as the ANI system. However, the specifics in the way of growing and building facilities required the involvement of a large number of parameters. For this reason, in order to improve cattle welfare assessment system, the researches continue to be performed.

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