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STUDY OF COWS' BEHAVIOUR AND WELFARE ON DAIRY FARMS IN SERBIA

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Abstract

Modern methods for assessing the welfare of dairy cows are, among other things, often based on the evaluation of animal behaviour. In this regard, behaviour is classified as the most reliable, so-called animal-based indicator as its expression comes from the animal itself and indicates a measure in which it has adapted to the environment. Starting from the need to explore the state of welfare and the ability to demonstrate adequate behaviour in dairy farms in Serbia, the Welfare Quality® Assessment Protocol for Cattle (2009) was used in this study. The overall assessment of behaviour was carried out by analysing four main criteria: social, other forms of behaviour, human-animal relationship and emotional state. The results of the study conducted on a total of 16 dairy farms (N = 4,833 cows) show that the conditions for ensuring appropriate behaviour meet only minimum standards and that the greatest welfare risks arise from the impossibility of expressing natural behaviour, such as exploratory behaviour. The most pronounced negative tendencies within the assessment of the emotional status were those expressed to distress, frustration and boredom. Although the estimated general condition does not differ substantially from the same on EU farms, the need for its improvement is imposed first of all in terms of ensuring greater freedom of movement and more stimulating environment in cattle rearing.

Keywords: dairy cows, assessment, welfare, social behaviour, human-animal relationship, emotional state

INTRODUCTION

All manifested activities of cattle that occur as a response to stimuli from the environment and the organism itself, can be classified into nine behavioural systems that encompass a large number of behaviour strategies. The basic behavioural systems are: reactivity, ingestion, exploratory behaviour, kinetic system, behavioural association system (social behaviour, collective behaviour), body hygiene maintenance system, territoriality, behavioural reproduction system and behavioural rest and sleep system (Webster, 2005).

Behavioural strategies of reactivity in cows are simple and complex reflexes, orientation, vocalization, displacement, masking, sudden change in social status (subordination, dominance, hypotonia, stiffness, etc.), agonistic interactions, responses to sensory stimuli, response to invasion of personal space, daily and seasonal activities, activities in the appearance of the opposite sex in the mating season, etc. (Van Reenen *et al.*, 2004).

Freedom in expression of physiological forms of behaviour is achieved by providing animals with enough space for movement, enrichment or enhancement of the living space of animals with materials and objects necessary for satisfying basic life needs and facilitating communication with other animals (Munksgaard *et al.*, 2005). The ability of animals to display appropriate forms of behaviour is one of their elementary needs, so the modern concept of welfare and behaviour are closely related (Ostojić Andrić *et al.*, 2018). Provision for expression of behaviour is used as an animal-based indicator in all modern welfare assessment methods, such as Welfare Quality® Assessment Protocol for Cattle (Welfare Quality Consortium, 2009). In this method, the greatest importance in assessing the overall welfare of cows is given to the assessment of social behavioural patterns (agonistic above all), exploratory behaviour, animal-human relationship and emotional state.

The manifestation of social behaviour depends on the possibility of achieving social interactions as well as on the social structure and hierarchy in the herd. It can be both negative-agonistic and positive-cohesive (Munksgaard *et al.*, 2005). Starting from the fact that farm animals live in groups or herds, non-agonistic (e.g. licking, play) and agonistic interactions (aggression) contribute to the establishment and maintenance of the social structure. Agonistic behaviour may, to a certain extent, be considered as normal in cattle. However, its increased incidence can be an indication of unpleasant or stressful situations, and it also positively correlates with the appearance of skin alterations and hematomas (Menke *et al.*, 1999). Laister *et al.* (2009) have found that the head butting in dairy cow herds is the most frequent form of agonistic behaviour.

Exploratory behaviour is the natural and fundamental need of cattle to explore substrates and stimuli from their surrounding which is why the intensity of its manifestation is significantly related to the farming method, i.e. The possibility of movement, available space and its structure, as well as the quality of floor and bedding (Krohn, 1994). From the above, it naturally follows that the loose rearing system offers much greater opportunities for expressing the exploratory behaviour. However, Krohn (1994) further states that the increased expression of exploratory behaviour in the facilities with tied system has the character of curiosity that can be explained by insufficiently stimulating environmental conditions and lack of social contact.

The welfare is closely related to the emotional state, i.e. The feelings that the animals experience. Negative feelings (fear, frustration, pain, boredom, depression, discomfort, etc.) of severe intensity or long duration result in the suffering of animals that can significantly disturb the physiological and behavioural reactions of animals and lead to a decline in productivity (Roche *et al.*, 2009). The attitude of animals to humans, i.e. their perception of people and mutual interaction, have a major impact on the health, productivity and welfare of farm animals, which makes it an important indicator in the welfare assessment (Hemsworth and Coleman, 2011).

Different types of abnormal behaviour – etopathy may develop in an attempt of animals to adapt to inadequate farming conditions. Pathological behaviour is any behaviour that has lost its adaptive function and which, as a conclusion of its manifestation, does not lead to the establishment of the homeostasis of the organism, nor to the achievement of the behavioural goal, i.e. satisfaction of the instinct. From the standpoint of the bad influence of etopathy on the welfare of cattle, the effects of stereotypies such as twisting of the tongue or redirected behaviours – mutual sucking or chewing equipment in calves have been studied. However, the study of Brörkens *et al.* (2009) shows that none of the investigated ethopathies is sufficiently reliable as a measure for determining the quality level of welfare on dairy farms.

The aim of this study was to investigate the behaviour indicators on dairy farms in

Serbia in the context of ensuring the quality of animal welfare, as well as to compare the results obtained with the results achieved on dairy farms in European Union countries in which welfare standards are applied over a longer period of time.

MATERIALS AND METHODS

The study was conducted on 16 selected commercial dairy farms (Mean ± SEM, 301 ± 71.6 lactating cows) in Serbia. Farms were selected according to management practices, farm size, veterinary records and availability of different information necessarily for assessment. The cows had access to outdoor loafing area in 4 of 9 tie-stall farms and pasture only on one farm (24 hours a day for 60 days a year). Each farm in this study was visited twice a year, in the winter and summer season, and the average value of each welfare measure was calculated.

The assessment of the welfare and behaviour were done according to the Welfare Quality® Assessment Protocol for Cattle (2009) where detailed information about the methodology can be found. Three trained assessors evaluated the cows on each farm. Prior to each farm assessment, the agreement with animal unit's manager was made in order to avoid disturbing of usual farm activities. The behaviour of cows was assessed by considering four criteria: expressing social and other forms of behaviour, the relationship between man and animal and the emotional state. The evaluation of each of the above criteria was obtained on the basis of relevant indicators such as: the frequency of head butting, the number of days on pasture, the proportion of cows that cannot be accessed, the tendency toward activity, anxiety, frustration etc. The observation of positive emotional state (twenty descriptors) was done first followed by other behavioural observations such is agonistic behaviours.

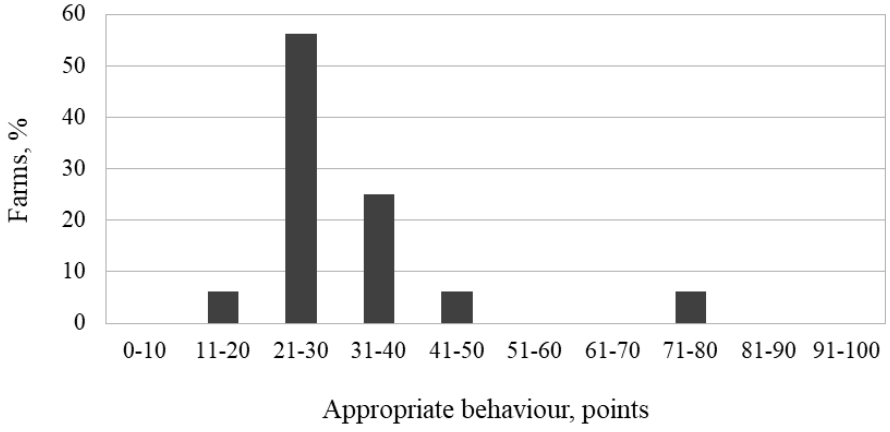
Processing of data collected on the farms was carried out using the Welfare Quality® Scoring System Software Program (2016) so according to the calculation of the scores for each behavioural criterion they were classified in one of the four welfare categories:

1) Excellent (81–100 points) – the welfare of the animals is of the highest level.
2) Enhanced (56–80 points) – the welfare of animals is good.
3) Acceptable (21–55 points) – the welfare of animals is above or meets minimal requirements.
4) Not classified (under 20 points) – the welfare of animals is low and considered unacceptable.

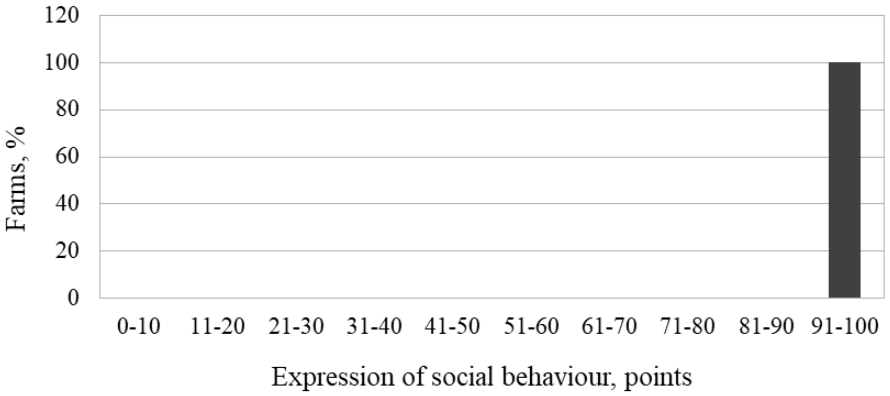
RESULTS

According to the results shown in Fig. 1, the largest number of investigated farms (87.5%) was evaluated in the range 21–50 points for the principle of appropriate behaviour indicating that only the minimal conditions for the provision of appropriate behaviour were met.

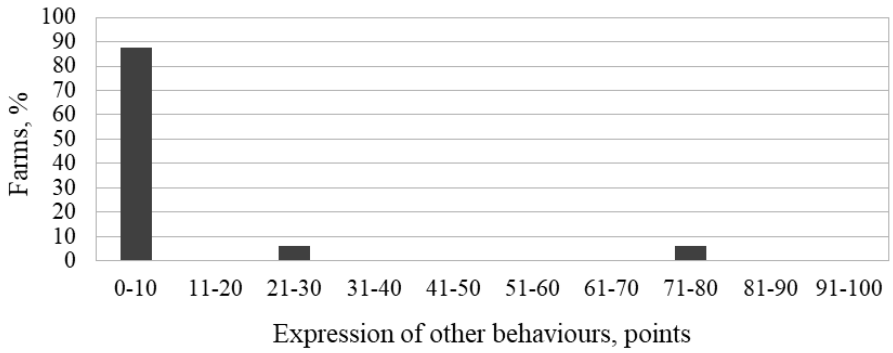
The criterion of expression of social behaviour is evaluated based on the frequency of social contacts i.e. indicators - the frequency of head butting and the frequency of displacement of cows as consequence of head butting. Fig. 2 shows that this criterion in the analysed dairy herds is met to the maximum given that 100% of the farms are rated in the range 91-100 points, on average 99 points. The average incidence of head butting and displacement was 0.03 per cow/hour and 0.01 per cow/hour respectively.



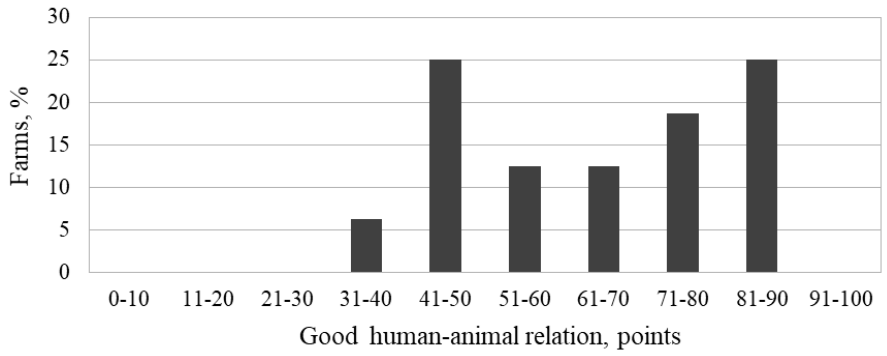
1: *Distribution of farms according to score for principal appropriate behaviour, %.*



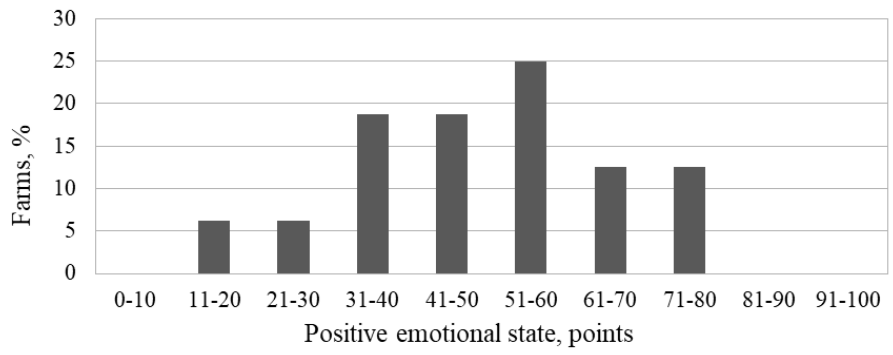
2: *Distribution of farms according to score for criterion expression of social behaviour, %.*



3: *Distribution of farms according to score for criterion expression of other behaviours, %*



4: *Distribution of farms according to score for criterion good human-animal relationship*



5: *Distribution of farms according to score for criterion positive emotional state*

The situation with the expression of other forms of behaviour evaluated based on the possibility of pasture use as an indicator is absolutely unfavourable according to Fig. 3. The largest number of farms in Serbia (87.5%) do not provide cows with the possibility to manifest these forms of behaviour, of which the most important is the exploratory behaviour. Cows spend on average 17 days a year on grazing, or about 2 hours a day.

The allowed distance test is used to assess the quality of the human – animal relationship. In this study, it was established that two thirds of the cows had allowed the approach of a man and his touch, while only 7% of the cows had avoided contact. Accordingly, the average score for the criterion good human - animal relationship was 64.1 points with 43.75% of the farms classified as enhanced and even 25% of the farms classified as excellent (Fig. 4.).

The value of the criterion positive emotional state was determined on the basis of a qualitative assessment of 20 forms of behaviour in selected dairy herds. The results presented in Fig. 5 show that 6.25% of the farms had unacceptable values for this criterion, 12.5% were rated excellent while the majority of farms rated as acceptable (43.75) and enhanced (37.5%). Tendencies towards different forms of behaviour are estimated according to the visual – analogue scale from 0–125 mm. Within the negative forms of behaviour, the most pronounced tendencies are expressed in distress (45.8 mm), boredom (39.43 mm) and frustration (27.63 mm).

DISCUSSION

By calculating the value of four criteria, the average score for the principle appropriate behaviour was obtained of about 32 points, while a slightly higher value (43 points) was established on EU farms (Welfare Quality Network, 2016) with a similar variability -S (13 vs. 15 points respectively). Similar to the assessment results obtained in the present study, in the EU, the majority of farms (59%) was rated acceptable for this principle, however, only 6.25% of the farms in Serbia were rated enhanced compared to the EU where 35% of the farms were rated as enhanced. Unclassified estimation of the principle of appropriate behaviour had an 6.25% of farms in Serbia and 7% of European farms. It can be concluded that the opportunities for ensuring appropriate behaviour on farms in Serbia are on average lower than in the EU.

The average value of the criteria expression of social behaviour on European farms is 66 points (Welfare Quality Network, 2016) with 26% of the farms rated in the range of 91–100 points and 8% of farms outside the classification. The same criterion on farms in Serbia was rated as excellent and on average better compared to farms in the EU. However, in our sample there was a slightly higher share of farms with tied system in accordance with the situation in cattle farming in Serbia. In the EU, the free system is increasingly used and according to Laister *et al.* (2009), the frequency of agonistic behaviour (head butting) is twice as high in free compared to tied systems (0.54/cow/h vs. 0.24/cow/ h).

Rearing of cows on pasture is the most natural form of farming, since it enables the manifestation of natural and original forms of behaviour (nutritional, exploratory, social, etc.) inherent to cattle as a species (Von Keyserlingk *et al.*, 2009). In addition, keeping cows on pasture positively affects their overall daily activity, also enables more harmonious synchronization of the diet and rest patterns, which has a favourable effect on the health and productivity of cows (Tucker, 2009). On the other hand, the inability to manifest these forms of behaviour can lead to the development of various types of sociopathies, such as stereotypies (Krohn, 1994). Based on the analysis of these forms of behaviour, it is clear that there is a very unfavourable situation on the farms in Serbia, since cows are mostly tied within the facilities. The situation in the EU is completely different with only 15% of the not classified assessed farms and even 69% of the farms where the condition of this criterion is rated as enhanced (Welfare Quality Network, 2016).

In cattle breeding, fear and anxiety are most often caused by people and their actions as well as changes in the environment (e.g. new equipment for food, change of a boxes or facilities), which is why the assessment of the intensity of fear of people is included in human-animal relationships as a reliable indicator of welfare (Forkman *et al.*, 2007). According to the results of the Welfare Quality Network (2016), the average rate for this criterion on farms in the EU was 51.5 points, with only 8% of farms rated as excellent and 50% farms rated as acceptable. This suggests that the relation between animal breeders and cows in Serbia is satisfactory and on average better compared to the same established on farms in EU countries. However, taking into account the prevalent tied system in Serbia, as in our sample, the so-called

learned helplessness syndrome could also be considered in the interpretation of the results.

Feelings motivate animals to express their needs (e.g., the need for food and water is expressed by the sensation of hunger and thirst while loneliness is associated with a lack of social contact). There are many examples where negative feelings of high intensity or long duration result in animal suffering. Such is the case with sensations of fear, illness, fatigue, anxiety, boredom, depression, sorrow, paranoia, agony, etc. (Gregory, 2004). The results of the research of the emotional state of dairy cows carried out in the EU (Welfare Quality Network, 2016) are similar to results established in the present study with respect to the average determined scores for the criteria of 49.7 and 50.7 points respectively. However, in Serbia, compared to the EU, less farms (6.25% vs. 13%) were considered unacceptable, while the share of excellent rated farms was also higher in our research (12.5% vs. 6.0%).

CONCLUSION

Ten years have passed since the implementation of legislation in the field of animal welfare in Serbia. In the implementation of the welfare standards so far the most important aspect has been to draw public attention to the problems of the welfare of farm animals, as well as to respect the minimum conditions for its provision. It is well-known that welfare and behaviour are very closely linked and mutually conditioned. This study showed that only the minimum requirements for appropriate behaviour were ensured on farms in Serbia, which is not significantly different from results established on EU farms. The most unfavourable situation has been established in regard to enabling forms of behaviour, such as exploratory and any other forms of behaviour which cows can manifest outside or on pasture. Namely, dairy cows in Serbia are kept mainly in tied systems, especially in small and medium-sized farms. In such restrictive conditions, they are impaired not only in terms of manifesting their natural forms of behaviour, but also in achieving social contacts. It is therefore not surprising that the most common negative tendencies within the assessment of the emotional status were those expressed in distress, frustration, and boredom. The provision of social forms of behaviour and human-animal relationship was assessed as satisfactory and on average better than on the EU farms. This interpretation, however, should be taken with the reservation, bearing in mind that in tied systems the possibilities of agonistic interactions are reduced as well as the "masking" of a good relationship with so called learned helplessness of cows. In general, it can be concluded that the assessed state is not alarming, but that it imposes the need for improvement primarily in terms of greater use of loose housing systems (grazing, outbreaks, and laying boxes) in order to increase freedom of movement and provide a stimulating environment in cows rearing.

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REFERENCES

BRÖRKENS, N., LAISTER, S., LOLLI, *et al.* 2009. Reliability of Measures of Injurious and Abnormal Behaviour in Dairy and Beef Cattle. In: Forkman, B. and Keeling, L. (Eds.). *Assessment of Animal Welfare measures for dairy cattle, Beef Bulls and Veal Calves*. Welfare Quality Reports No.11. Uppsala, Sweeden: Cardiff University, pp. 57–69.

FORKMAN, B., BOISSY, A., MEUNIER-SALAÜN *et al.* 2007. A critical review of fear tests used on cattle, pigs, sheep, poultry and horses. *Physiology and Behavior*, 92(3): 340–374.

GREGORY, N. G. 2004. *Physiology and Behaviour of Animal Suffering*. Oxford, UK: Blackwell Science.

HEMSWORTH, P. H. and COLEMAN, G. J. 2011. *Human-Livestock interactions: the stockperson and the productivity and welfare of intensively farmed animals*. 2nd Edition. Wallingford: CAB International.

KROHN, C.C. 1994. Behaviour of dairy cows kept in extensive (loose housing/pasture) or intensive (tie stall) environments: III. Grooming, exploration and abnormal behaviour. *Applied Animal Behaviour Science*, 42(2): 73–86.

LAISTER, S., BRÖRKENS, N., LOLLI, S. *et al.* 2009. Reliability of Measures of Agonistic Behaviour in Dairy and Beef Cattle. In: In: Forkman, B. and Keeling, L. (Eds.). *Assessment of Animal Welfare measures for dairy*

cattle, Beef Bulls and Veal Calves. Welfare Quality Reports No.11. Uppsala, Sweeden: Cardiff University, pp. 95–112

MENKE, C., WAIBLINGER, S., FÖLSCH, D.W. *et al.* 1999. Social Behaviour and Injuries of Horned Dairy Cows in Loose Housing Systems. *Animal Welfare*, (8): 243–258.

MUNKSGAARD, L., JENSEN, M.B., PEDERSEN, L.J. *et al.* 2005. Quantifying behavioural priorities-effects of time constraints on behaviour of dairy cows, Bos Taurus. *Applied Animal Behaviour Science*, 92 (1–2): 3–14

OSTOJIĆ ANDRIĆ, D., HRISTOV, S., ĐEDOVIĆ, R. *et al.* 2018. Farm animal welfare concept: From beginnings to integration in modern production systems. *Biotechnology in Animal Husbandry*, 34(3): 269–277

ROCHE J. R., FRIGGENS N. C., KAY J. K. *et al.* 2009. Body condition score and its association with dairy cow productivity, health and welfare: a review. *Journal of Dairy Science*, 92(12): 5769–5801.

TUCKER, C. B., ROGERS, A. R. and SCHUTZ, K. E. 2008. Effect of solar radiation on dairy cattle behaviour, use of shade and body temperature in a pasture - based system. *Applied Animal Behaviour Science*, 109: 141–154.

VAN REENEN, C. G, ENGEL, B., RUIS-HEUTINCK, L. F. M, *et al.* 2004. Behavioural reactivity of heifer calves in potentially alarming test situations: a multivariate and correlational analysis. *Applied Animal Behaviour Science*, 85(1–2): 11–30.

VON KEYSERLINGK, M. A. G., RUSHEN, J., DE PASSILLE, A. M. and WEARY, M. 2009. The welfare of dairy cattle – Key concepts and role of science. *J. Dairy. Sci.*, 92(9): 4101–4111.

WEBSTER, J. 2005. *Animal Welfare. Limping towards Eden*. Universities Federation for Animal Welfare (UFAW) Oxford: Backwell Publishing.

WELFARE QUALITY NETWORK. 2016. *Welfare Quality® scoring system*. [Online]. Available at: from http://www1.clermont.inra.fr/wq/index.php?id=farms [Accessed: 2016, August 15].

WELFARE QUALITY. 2009. *Welfare Quality Assesment Protocol for Cattle*. Lelystad, Netherlands: Welfare Quality Consortium.

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