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Welfare assessment of dairy cows housed in a tie-stall system

Marija Vučemilo[1], Kristina Matković[1], Igor Štoković[2], Saša Kovačević[3], Marijan Benić[4]*

[1]Department of animal hygiene, environment and ethology, [2]Institute of Animal Husbandry, Veterinary Faculty, University of Zagreb, Heinzelova 55, Zagreb, Croatia
[3]Veterinary Station Virovitica, J.J. Strossmayera 38, Virovitica, Croatia
[4]Sanatio d.o.o., Bolnička 34c, Zagreb, Croatia

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Summary

Welfare assessment methods and techniques developed as a result of great interest of scientific and consumer populations regarding the welfare of animals housed in farms. In view of the fact that welfare by definition includes both physical and mental health, the welfare quality assessment includes an extensive number of measures. Welfare assessment was performed in two stables in which cows are kept in tie-stall by using the specific method described in the Welfare Quality® Assessment Protocol for Cattle. The measures included body condition score, qualitative behaviour assessment and body hygiene. The welfare assessment confirmed the importance of quality housing for ensuring better performance from animals, thus also affecting their health and productivity. It also pointed out the necessity of freeing animals by providing them with the possibility of free movement, whereat they can exhibit their physiological behaviour. It is definitely important to continue research, expand the number of researched measures in order to confirm the most useful indicators for welfare assessment and to identify the factors that within the animals' physical and social environment affect the increase of their welfare.

Key words: body condition score, qualitative behaviour assessment, body hygiene, living quality

Introduction

Nowadays the welfare of dairy cows is one of major concerns in most developed countries due to its impact on health and productivity of cows as well as on public health. Consumers are increasingly more aware of the impact of dairy cow welfare on public health, dairy product safety and health propriety as well as environmental protection. As a result, today more and more consumers are oriented toward buying products from animals whose welfare is not threatened and where it is guaranteed that products from farmed animals are in line with the standards of good agricultural practice in farms (Broom and Fraser, 2007).

Welfare represents the long-term mental condition of an animal which is a result of its acquired experiences in particular living conditions; it is a method by which animals deal with their environment (Webster, 2005; Veissier, 2009).

There are different methods of assessing animal welfare. Four fundamental criteria on which basis an integrated welfare assessment is made are feeding, housing, health status and behaviour of animals. Feeding and housing directly, positively or negatively, affect the welfare of animals. Inadequate housing and feeding expose animals to numerous stressors and unpleasant emotions, which all affects the occurrence of diseases, injuries and behavioural disorders.

*Corresponding author/Dopisni autor: E-mail: kmatkov@vef.hr

Welfare is a multidimensional concept that includes physical and mental health, the absence of hunger, and provides a manifestation of the typical behaviour for that species (Webster, 2005). Many authors have developed methods for estimation of the welfare of cattle on farms (Bratussek et al., 1999, 2000; Keeeling and Veissier, 2005; Popescu et al., 2010). Most methods for welfare assessment include: animal-related parameters, such as behaviour, body condition score (BCS), body cleanliness, lameness, skin lesions, injuries and swellings.

Animal welfare in the Republic of Croatia is regulated by laws and appropriate regulations (Law on animal protection, NN 135/06; Regulative on protection of animals which are raised for production, NN 44/10), which have completely adopted EU legislative considering animal welfare. Therefore, the aim of this research was to evaluate the current level of welfare of dairy cows, starting with cows kept in tie-stall and to standardize welfare assessment criteria for Croatian conditions.

Materials and methods

The subjects of assessment were two stables in which cows are kept in tie-stall. In the first observed stable, cows are kept in tie-stall all the time. The stable houses 17 Simmental cows. The bedding is concrete, of medium length, covered with straw, with everyday cleaning. The second stable holds 20 Friesian cows also kept in tie-stall, but pasturing in morning hours. The bedding is short, concrete, covered with a rubber mattress. The average age of cows in both stables is between 5 and 6 years, with average milk production per cow of 4,000 to 5,000 litres. Number of performed assessments was 12, during spring time.

The observed parameters were determined through specific methods described in the Assessment Protocol for Cattle (Anonymous, 2009). The body condition score was scored with regard to 4 criteria and levelled from 0-2. Zero represents regular body condition, 2 - very fat. The qualitative behaviour assessment or the visual analogous scale was determined by observing the animals' body language in the period of 20 minutes. The body hygiene was assessed by cleanliness of udder, flank and lower legs. Scale was set from 0 (not dirty) to 2 (very dirty). The assessment was performed during 3 spring months, once a week.

Determined values of measured parameters were processed by the computer programme Statistica 8. The parameters Absence of a longer period of hunger and Cleanliness of the observed body parts on two farms were compared statistically with the Chi^2 test.

Results and discussion

There are several different methods of performing farm animal welfare assessment. All are mostly based on measuring or evaluating different welfare indicators on which basis an integrated welfare assessment is made. Experts evaluate the observed indicators and adopt an exclusive conclusion. The observed and measured welfare indicators are compared to standard values and welfare is assessed based on deviation from standard values. The measured welfare indicators are then ranked and summed and converted into points, which are used to finally extrapolate an integrated animal welfare assessment (Anonymous, 2009; Whay et al., 2003).

The existing methods of farm animal welfare assessment also have several shortcomings. There is great probability that the existing farm animal welfare assessment methods are not sensitive enough, not easily implemented in all conditions of housing farm animals, and do not reflect the multidimensional nature of welfare. They are often of relative significance, not reflecting the general welfare status when a larger number of animals kept on farms, stud farms, breeding farms or experimental animals, etc. are concerned (Botreau et al., 2007a, 2007b).

Data concerning the relationship between cow behaviour, performance and welfare may be found in numerous studies (Haley et al., 2001; Regula et al., 2004; Tucker et al., 2009; Vučemilo et al., 2011, Benić et al., 2011).

Feeding provides the necessary energy to sustain bodily functions and good production (Ferguson et al., 1994). As it may be ascertained from Table 1, cows from Farm I are in an excellent body condition, while on Farm II 40 % of cows may be evaluated as very thin and the rest of the herd is of normal body condition. It was statistically determined that Farms I and II are significantly different ($p<0.005$) in all indicators of the given criterion. Cows that constantly stay in the stable were predominantly of normal body condition and very fat while the pasturing

Table 1. Body condition score

Indicators	Farm I n=12	Farm II n=12	Chi^2
Tail head	0=2 1=6 2=9	0=10 1=8 2=2	Chi^2= 31,40000 df = 2 p = ,000000
Loins	0=7 1=3 2=7	0=11 1=8 2=1	Chi^2= 40,57955 df = 2 p = ,000000
Vertebrae	0=6 1=2 2=9	0=9 1=10 2=1	Chi^2= 71,40000 df = 2 p = ,000000
Withers, ribs and stomach	0=12 1=1 2=4	0=13 1=6 2=1	Chi^2 = 13,24359 df = 2 p = ,001331

Chi^2 - all variations significant on the level $p<0.005$
0 - normal body condition
1 - very thin: emaciation indicators are present in at least three body regions
2 - very fat: obesity indicators are present in at least three body regions

cows were predominantly very thin and of normal body condition. This condition can be explained by breed differences (Frisian cattle are physiologically thinner shape) and the fact that Simmental cattle adapt much better to tie housing (Vučinić, 2006). Furthermore, the cause may be in the difference in physical activity as well as the quality of feed and pasture (Fregonesi and Leaver, 2001). Regardless of the cows' good body condition on Farm 1, the lack of free movement and pasturing may be evaluated as extremely bad, since the lack of time that cows spend in fresh air and pasturing endangers their health, conception and welfare (Keeling and Veissier, 2005). In addition, the medium long bedding does not suit the dimensions of Simmental cows whose average body mass is around 900 kg. In view of such bedding, cows have difficulties in getting up and laying down (Bracke et al., 2001).

The majority of dairy cows in Croatia are held in extensive conditions in small and medium-sized farms, so it can be assumed that the welfare of those animals is better than the ones held in an intensive farming system (Hemsworth et al., 2002; Waiblinger et al., 2003). It may be observed from the visual analogous scale (Table 2) that on both farms cows are neither frightened nor upset, agitated, and expressed no discomfort or distress. On Farm I cows were frustrated, bored and indifferent. The cause may be their constant stay in the stall, lack of space, lack of movement and lack of social interactions. Cows from Farm II were relaxed, satisfied, occupied, alert, somewhat uninterested, but in close contact with humans they were sociable and looked content. These cows are going to pasture every day, where they are free to move and interact. Forming of small groups was observed on the pasture, with pronounced hierarchy of older cows which also exhibited dominance in the stable.

Generally, body cleanliness provides us with information about the comfort of animal housing and attention which the farmer gives to hygiene of the stable and animals in it. On Farm I all cows were clean in the area of udder and groin, while 40 % of cows had clean legs and 60 % had individual spots and fully dirtied hooves, especially on hind legs (Table 3). The insufficient length of bedding and lack of straw padding caused the dirtiness of lower parts of hind legs, as it was exhibited by Cook (2002) in his research.

On Farm II 70 % of cows were dirty in the udder area, 95 % in the groin area and 95 % around the lower part of legs. In comparison of the two farms,

Table 2. Qualitative behaviour assessment - visual analogous scale

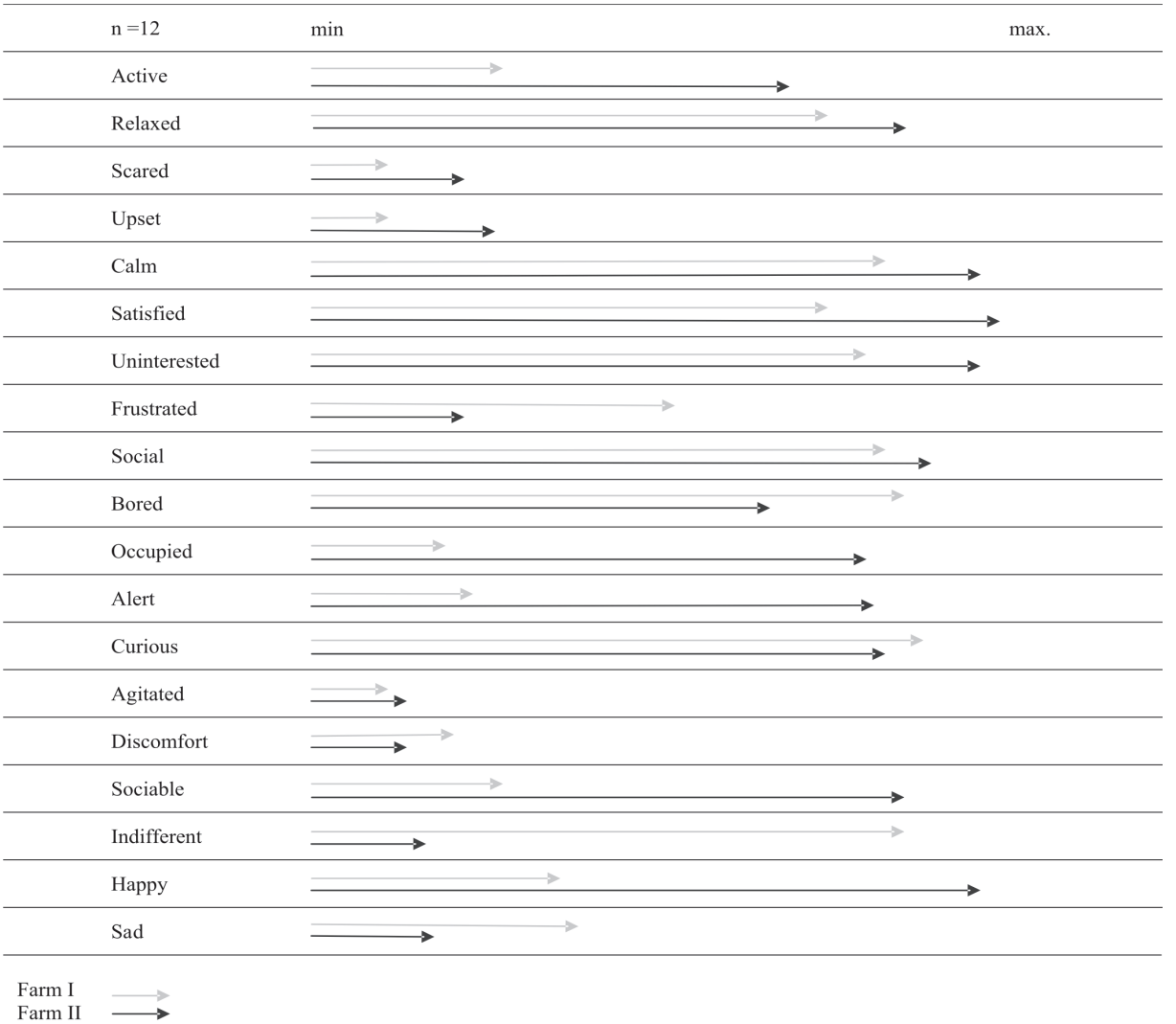

Table 3. Body hygiene

Cleanliness	Farm I n=12	Farm II n=12	Chi²
udders	0=17 2=0	0=7 2=13	Chi²= 27,28571 df = 1 p = ,000000
loins	0=17 2=0	0=2 2=18	Chi²= 130,5000 df = 1 p = 0,000000
lower parts of legs	0=7 2=10	0=2 2=18	Chi²= 16,05556 df = 1 p = ,000062

Chi² - all variations significant on the level $p<0.001$

Udders:
- 0 - not dirty or less dirty on udder and teats
- 2 - dirty areas on udder or any dirtiness of teats

Loins:
- 0 - not dirty or less dirty
- 2 - individual spots and complete dirtiness above hooves

Lower parts of legs:
- 0 - not dirty or less dirty
- 2 - individual spots and complete dirtiness above hooves

a significant variation ($p<0.001$) was statistically proven in all indicators of animal cleanliness. Cows that spent all the time in the stable were significantly cleaner which indicates good housing with enough straw flooring on which they like to lie.

Conclusion

The welfare assessment of dairy cows kept in permanent tie-stall and, in other case, with going to pasture has, through the measures "Body condition score" and "Cleanliness of the observed body parts", successfully pointed out the importance of quality housing to ensure better performance of animals which in turn affects their health and productivity. The measure "Qualitative behaviour assessment" has conclusively shown the importance of freeing animals, providing them with the possibility of free movement, whereat they can exhibit their physiological behaviour. It is definitely important to continue research, expand the number of researched measures in order to confirm the most useful indicators for welfare assessment and to identify the factors that within the animals' physical and social environment affect the increase of their welfare.

Procjena dobrobiti mliječnih krava držanih na vezu

Sažetak

Zbog velike pozornosti znanstvene i populacije potrošača na dobrobit životinja smještenih na farmama razvile su se tehnike i metode procjene dobrobiti. Obzirom da dobrobit kao pojam uključuje i fizičko i mentalno zdravlje, veliki je broj mjera koje su uključene u kvalitetnu procjenu. Procjena dobrobiti provedena je u dvije staje u kojima se krave drže na vezu, specifičnim metodama opisanim u Welfare Quality® assessment protocol for cattle. Mjere su uključivale stanje kondicije krava, kvalitativnu procjenu ponašanja i higijenu tijela. Procjena dobrobiti potvrdila je važnost kvalitete smještaja za osiguravanje boljih performansi životinja, čime se utječe i na njihovo zdravlje i proizvodnost. Ukazala je i na nužnost oslobađanja životinja, osiguravajući im mogućnost slobodnog kretanja, pri čemu one mogu ispoljiti svoje fiziološko ponašanje. Svakako je važno nastaviti istraživanja, proširiti broj pretraženih mjera, da bi se potvrdili najkorisniji pokazatelji za procjenu dobrobiti te identificirali čimbenici unutar fizičkog i društvenog okoliša životinja koji utječu na povećanje njihove dobrobiti.

Ključne riječi: stanje kondicije, kvalitativna procjena ponašanja, čistoća tijela, kvaliteta življenja

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