HEALTH AND WELFARE OF DAIRY COWS IN SERBIA

Dušica OSTOJIĆ ANDRIĆ[1], Slavča HRISTOV[2], Milan M. PETROVIĆ[1], Vlada PANTELIĆ[1], Dragan NIKŠIĆ[1], Aleksandar STANOJKOVIĆ[1], Violeta CARO PETROVIĆ[1]

[1]Institute for Animal Husbandry, Auto put 16, 11080 Zemun-Belgrade, Republic of Serbia
[2]Faculty of Agriculture, Nemanjina 6, 11080 Zemun-Belgrade, Republic of Serbia

Corresponding author email: andricdusica.iah@gmail.com

Abstract

Diseases and mortality of dairy cows are significant problems from the aspect of welfare as well as the economy of production. Monitoring and analysis of health and welfare conditions on farms are important prerequisites for their improvement. This paper presents an analysis of health and welfare condition on dairy farms in Republic of Serbia. The study was conducted on 16 commercial farms with total number of 4833 milking cows of Simmental and Holstein Friesian rase. The evaluation of health and welfare indicators was done according to Welfare Quality® Assessment Protocol for Cattle. Results obtained in this study showed that largest share of farms was estimated as enhanced (56.25%) and acceptable (43.75%) in terms of overall health state. The incidences for majority of the diseases below the set alert thresholds indicated no severe risk for dairy cows' welfare on examined farms. The exceptions were determined incidences of laminitis (37.65%), dystocia (4.18%) and mortality rate (6.70%) which nevertheless corresponds to their growing trend in the dairy farming. Although health of skin was evaluated as acceptable almost every fifth cow had at least a portion of the skin without hair while the presence of skin lesions was much less common (6.49%). With high share of dehorned cows in herd (78.9%) another serious welfare risk is the common practice of dehorning without aesthetics and/or analgesics implementation. Analyzing indicators of health and welfare on Serbian dairy farms it could be assumed that the most important risks derived from poor housing conditions and management omissions.

Key words: dairy cows, welfare, health, diseases, injuries.

INTRODUCTION

In the last decade, many countries, which have focused their national breeding programs primarily on increase in the milk production, were faced with major problems in the field of health and reproduction of dairy cows. Increased frequency of so-called production diseases (lameness, mastitis, metabolic disorders, technopathy infertility and shorter life expectancy) in modern dairy cattle breeding is reasonably associated with the intensive exploitation of cows in inadequate rearing conditions (Oltenacu and Broom, 2010).

Health and welfare are inseparable concepts, as good health is a prerequisite for the welfare and vice versa. However, if the welfare is viewed as a broader concept, health can be seen as an indicator of its quality. Incidence of respiratory and reproductive disease, as well as locomotive, digestive and metabolic disorders,

and the mortality can be used as the so-called, animal-based indicators of the welfare of cows in a herd (Canali et al., 2009). They essentially manifest response of the animal on provided conditions i.e. indicate the level of satisfaction of their needs which is the most important issue in assuring animal welfare. According to Broom and Johnson (1993), the need is the request, part of the biological basis of the animal, to provide adequate resources or responses to specific stimuli from the surrounding environment or its body. Animals in the absence of resources to meet their basic needs are becoming more prone to numerous welfare risks. EFSA (2009) highlighted four key risks to the welfare of dairy cows: housing, feeding, management and genetic selection. The etiology of many diseases is multifactorial and depends largely on the conditions in which animals are grown, which is why the cows must be provided an environment that reduces the occurrence of stress and weakening of

immunity (SCAHAW, 2001). The effective care for the health of cows, therefore, requires the provision of adequate rearing conditions and preventive action.

Monitoring and analysis of welfare conditions on farms are important prerequisites for welfare quality improvement. Regarding this, Welfare Quality Network is a scientific group that enables collection and exchanging of information about farm animals' welfare in order to provide recommendations for its enhancement. Their web-database (2009-2014) contains informations on different aspects of dairy cows' welfare, including a final assessment of the welfare in selected farms of nine EU countries and it is based on the Welfare Quality® Assessment Protocol for Cattle (Welfare Quality Consortium, 2009).

Animal Welfare Law and related regulations for the animal welfare protection on farms, during transport and in the slaughterhouses were adopted in Serbia in 2009. but technical and scientific analysis of their application are still expected. Previous national studies in the field of dairy cows' welfare are mostly fragmented and analyze certain aspects of their welfare while not sufficiently investigated the relation of health and welfare.

Therefore, the main objective of this study was to analyze health and welfare of dairy cows in Serbia, to compare it with established results of Welfare Quality Network, to define the most important welfare risks and propose measures for its improvement.

MATERIALS AND METHODS

The study was conducted in Serbia during 2012 on 16 dairy farms in which the cows of Simmental and Holstein-Friesian breeds were reared (N=4833). Minimum number of cows in the sample was 30 and the average per farm was 64 animals in two repetitions - during winter and summer season. Health condition and welfare of dairy cows were evaluated according to Welfare Quality® Assessment Protocol for Cattle (Welfare Quality Consortium, 2009) where detailed information about the methodology of assessment can be found.

Protocol includes 29 indicators that are used to determine four basic principles of welfare:

good nutrition, good housing, good health and appropriate behavior. This paper focused on Principle of good health (PGH) as a part of overall welfare assessment on Serbian farms. Obtained data, indicators, were expressed as the number of animals affected out of the total number of animals assessed on each farm. Total score of PGH was determined by aggregation of corresponding indicators and criteria using the Welfare Quality® scoring system software program. Established values for criteria and principle were then compared to stated welfare categories (not classified, acceptable, enhanced and excellent) in order to provide information about health and welfare condition on Serbian dairy farms.

Data processing and categorization of welfare quality of the investigated dairy farms was conducted using software specially developed under the Protocol, and the respective statistical parameters were analyzed with the program StatSoft.Inc (2004), Statistica for Windows version 7.

RESULTS AND DISCUSSIONS

Distribution of farms according to PGH score is given in Figure 1. Acceptable health condition (21 - 50 point) was estimated on 81.25% of farms, while 18.75% of farms were estimated as enhanced (51 - 60 poena). PGH average value of 41.17 points was similar to those determinated on EU farms of 37 points (Welfare Quality Network, 2012) where, however the 2% of farms had unacceptable and only 13% enhanced evaluation of dairy cows health state. Poorer health of cows on European farms may be linked to breeding under higher selection pressure and higher milk yield as stated by Oltenacu and Broom (2010).
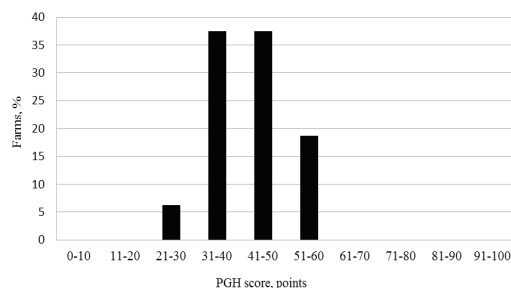

Figure 1. Distribution of farms according to PGH score

Average score for Criterion absence of injuries (CAI) indicate no severe risk from injuries for dairy cows' welfare (Figure 2). The largest share of farms (56.25%) was estimated as enhanced and acceptable (43.75%). Mean value for CAI was 57.57 points, similar to Welfare Quality Network (2012) results of 48.10 points for EU farms.
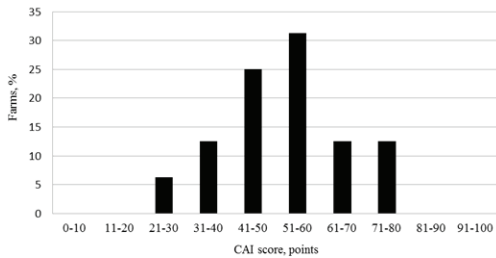

Figure 2. Distribution of farms according to CAI score

Estimated value for Criterion absence of disease (CAD) indicated low welfare risk in terms of frequencies of examined diseases. The largest share of farms was estimated acceptable (43.75%) or enhanced (37.5%) and almost fifth as excellent (Figure 3). Average value for CAD of 59.53 points was somewhat higher than on EU dairy farms (42.5 points) where 8% of farms had unacceptable and only 4% excellent estimation of cows health (Welfare Quality Network, 2012).
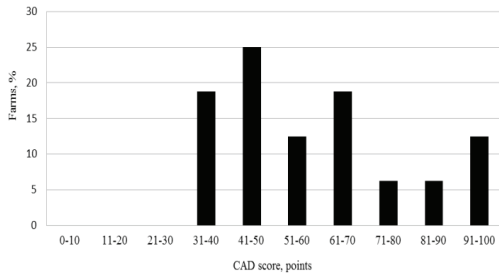

Figure 3. Distribution of farms according to CAD score

Value of the Criterion absence of pain caused by management procedures (CAPIMP) was determined based on the intensity of the implementation of zoo technical procedures, such as tail docking and dehorning. In the defining of the final value of the assessment, the manner of its execution (chemical, thermal, physical) and the application of anesthetics and analgesics were of great importance.

Survey results (Figure 4) show that only 6.25% of farms were rated as unacceptable, 18.75% excellent and most of them -75% were acceptable in relation to this criterion. In the EU, the situation is somewhat better considering that the majority of farms (59%) are rated adequate, as well as higher average value of criterion of 45.9 points in relation to the average of 41 points identified in Serbia. Better assessment of this criterion in the EU countries can be explained by more frequent application of anesthetics and analgesics (Gottardo et al., 2011) than is the case in our country where this practice was absent on studied farms.
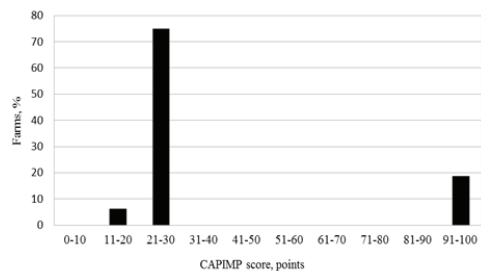

Figure 4. Distribution of farms according to CAPIMP score

Diseases and mortality of dairy cows are significant problems from the aspect of welfare as well as the economy of production. Effective care for the health of cows, therefore, requires the provision of adequate farming conditions and health care and protection. Canali et al. (2009) suggest that the diseases of the highest importance for assessing the welfare of cows can be divided into several groups: respiratory diseases (cough, sneezing, discharge from the nose, rapid breathing), digestive disorders (diarrhea, enteritis), diseases of the eye (discharge from the eye), reproductive diseases (metritis, mastitis, dystocia) and metabolic disorders (downer cows). In addition, the health condition of cows can be estimated on the basis of skin lesions (Schulze et al., 2009) and locomotor disorders (Borderas et al., 2004) and by the intensity of pain arising from the various zoo technical interventions (mutilation), such as shortening the tail or dehorning (Vickers et al., 2005; Anderson and Muir, 2005).

The results of studied indicators included in the PGH (Table 1) show that the average incidence of diseases such as discharge from the nose and

vagina, cough, difficult respiration, tachypnea, mastitis, diarrhea and downer cows is not a risk to the welfare of farmed cows. Those diseases are below the alert threshold (2.25-5.00%) in terms of welfare according to the recommend-dations of Forkman and Keeling (2009). Interestingly, poor cow hygiene that was also determined earlier in this research (Ostojić Andrić et al, 2015) did not increase the incidence of mastitis corresponding to the results of Ellis et al. (2007).

Estimated prevalence of dystocia of 4.18% corresponded to the range from 1.9 to 13.7% global prevalence indicated by Mee (2008), but still exceeds the threshold of high risk for the welfare of 2.75% (Forkman and Keeling, 2009). In study by Webster (2005) it is stated that the incidence of dystocia on farms with best quality of welfare (A, B) was zero while in the other categories (C, D, E) it ranged from 1% to over 40%. With regard to the causes of dystocia and its consequences for health, welfare and production economy (Mee, 2008) possibility for diminishing its occurrence in herds of dairy cows lies in the implementation of adequate breeding - selection programs, providing of good rearing conditions and comfort, balanced diet and the professional and timely veterinary supervision and monitoring of cows.

Mortality of cows was determined based on the number of dead, euthanized and emergency slaughtered cows in one-year period. The value of this indicator of 6.7% determined for the studied farms is alarming in terms of the welfare of farmed animals (Forkman and Keeling, 2009) but also corresponds with the growing trend in the dairy industry (McConnell et al., 2008). Thomsen and Houe (2006) report diseases of legs and reproductive organs, metabolic disease and fractures as the most common causes of mortality of cows.

Lameness is one of the most important welfare problems in cattle production because it causes pain (Whay et al., 1997) and changes in normal behaviour (Singh et al., 1993). Identified high prevalence of lameness of 37.65% on the farms included in the study indicates a significant risk to the welfare, as well as the derived consequences. Studies of lameness prevalence in dairy cattle in European countries show that it ranges from 22% (Whay et al., 2003) to 45%

(Winckler and Brill, 2004) in free housing systems, and from 1% to 21% in housing systems where the cattle are periodically kept tied (Sogstad et al., 2005). In the study of Webster (2005), lameness prevalence ranged from 0 - 23% on farms with a satisfactory quality of animal welfare (A - C) as compared to 31 - 50% on farms with endangered welfare (E). In dealing with this disorder great care must be taken to remove the cause which may be genetic (breed, selection) but they are often induced by the influence of an unbalanced diet and poor comfort in housing (Nocek, 1997; Donovan et al., 2004).

Skin alterations may be due to various causes (infectious diseases, technopathy) but it is important to emphasize that in addition to keeping and housing conditions (Groth, 1985), parity (Kielland et al., 2009) also the effects of an unbalanced diet negatively affect the condition of skin and hair creating a predisposition to the formation of lesions (Schulze et al., 2009). The research results for this indicator of welfare showed that almost every fifth cow had at least a portion of the skin without hair while the presence of skin lesions was much less common (6.49%). According to study by Webster (2005), the hair loss was present in 33 - 88% cows on farms with poor assessed welfare (E), while its frequency on the best farms (A and B) amounted to 7%. It can be concluded that this phenomenon on studied farms was within acceptable levels in terms of ensuring the welfare of animals.

Dehorning as management-based indicator shows the intensity of the pain which the animals are exposed to during the performance of this procedure. To sustain the welfare of cows it is important to prevent a chain reaction of pain-stress-distress whose activation endangers the physical condition and behaviour of animals (Anderson and Muir, 2005). A number of authors (Vickers et al., 2005; Anderson and Muir, 2005) have studied the impact of dehorning on the welfare of cattle, and found that its negative impact is reflected in the physiological, neuro-humoral and behavioral changes as a result of pain and distress. Additional risks of implementation of such mutilations are increased possibility of infection by viruses and the development of

diseases such as tetanus and leucosis (Karatzias, 1981; Lassauzet et al., 1990).

According to Table 1, dehorning procedure was applied in the studied farms in 79% of cows without the use of anesthetics and analgesics (pain-killers), with the most commonly used procedure of thermo-cauterization (75%) as a better choice of procedure, while the chemical dehorning was much less used (6.25%). In case of three of the surveyed, sixteen farms that represent the best assessed in terms of this criterion, the procedure of dehorning was not applied. Study of Gottardo and al. (2011) showed that in Italy dehorning is carried out on 80% of dairy farms, where the heat dehorning is implemented in 91% of cases and the remaining is chemical dehorning. Using local anesthetic was part of the protocol in 10% of farms, while only 5% of farms practiced application of analgesics (pain-killers).

Table 1. Indicators of Health and Welfare on Dairy Farms in Serbia

Number of farms, N			N=16		
Principle, criteria and indicators	x	SD	S^2	Min	Max
Principle: Good health (PGH)	41.17	8.11	65.78	23.90	56.60
1. Criterion: Absence of injuries (CAI)	51.57	14.85	220.40	21.00	81.10
Not lame cows, %	64.56	17.59	309.40	20.60	90.00
Lame cows, %	26.50	13.73	188.45	6.98	61.80
Severely lame, %	10.95	15.00	225.06	0.00	86.55
Cows with at least one part of skin without hair, no lesion, %	17.80	16.45	270.48	0.00	73.68
Cows with at least one skin lesion, %	6.49	6.95	48.24	0.00	30.00
Cows without skin lesion, %	93.51	6.95	48.24	70.00	100.00
2. Criterion: Absence of disease (CAD)	59.53	21.67	469.70	30.20	100.00
Cows with nasal discharge, %	0.94	3.06	9.34	0.00	15.18
Cows with hampered respiration, %	0.06	0.25	0.06	0.00	1.00
Cows with ocular discharge, %	3.98	7.06	49.87	0.00	29.17
Cows with diarrhoea, %	2.01	2.44	5.97	0.00	8.16
Cows with vulvar discharge, %	1.45	1.51	2.28	0.00	5.55
Frequency of coughing per cow per 15 min	0.10	0.30	0.09	0.00	1.00
Frequency of mastitis, %	2.29	1.02	1.03	0.70	5.26
Frequency of dystocia, %	4.18	5.38	28.94	0.00	21.30
Frequency of downer cows, %	1.10	1.40	1.95	0.00	5.10
Frequency of mortality, %	6.69	5.91	34.89	0.00	21.30
3. Criterion: Absence of pain induced by management procedure (CAPIMP)	41.00	28.86	833.03	20.00	100.00
Share of dehorned cows, %	78.69	39.13	1531.03	0.00	100.00

CONCLUSIONS

The results presented in this paper are very encouraging when compared with estimates in EU countries for given year (2012). Namely, taking into account poor estimation of housing conditions (from previous researches known as major welfare risk in Serbia) health and welfare of dairy cows in our country may be considered as satisfactory. The cows' health was rated as acceptable to enhanced and on average better than on the farms in the EU, probably due to higher selection pressure and milk yield of cows on EU farms. The frequency of injuries and diseases that threaten the welfare of dairy cows was within the acceptable values. The exception was determined by incidences of laminitis and dystocia which represents a serious risk to the welfare of cows on examined farms. High average mortality rate of 6.7% corresponds to its growing trend in the dairy industry, but also exceeds the alarming level in terms of providing welfare. The common practice of dehorning without the use of anesthetics and analgesics in Serbia, presents a serious risk to the welfare as opposed to European countries where their application is increasingly common. However, ensuring the cows welfare in our country certainly contributes to the fact that the tail docking is almost entirely eradicated in breeding practice. In general, it can be concluded that the most important health and welfare risks on Serbian dairy farms derived from poor housing conditions and management omissions.

Analysis of welfare state in European countries in the period 2009-2014 showed that significant progress has been made in welfare ensuring as a result of monitoring, implementation and compliance with welfare standards. In Serbia recent years also, the growing importance is paid to respect for the principles of welfare, the implementation of legalislations and strengthening the organization for farm animal welfare protection. For promoting and ensuring farm animals' welfare of great importance is development of consumer awareness about the impact of animal welfare on the quality of foods of animal origin. In this way, the welfare becomes an important part of the contemporary concept of food quality.

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