



Characterization of hazards, welfare promoters and animal-based measures for the welfare assessment of dairy cows: Elicitation of expert opinion

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ABSTRACT

An expert opinion elicitation, based on a modified Delphi technique, was organized to collect the opinion of 16 Italian veterinarians with the aim of conducting a hazard and a welfare promoter characterization for defining and weighing a list of management and housing factors potentially associated with negative or positive welfare outcomes in dairy cows kept in loose housing systems. In addition, the 16 experts judged a set of animal-based measures in order to rate them by appropriateness and by the level of animal pain and suffering due to the welfare consequences they measure. Veterinary experts were asked to score 52 hazards, 47 welfare promoters and 18 animal-based measures. Management and housing hazards, that were determined to be associated with a very high impact on the welfare of dairy cows, were mainly referred to lactating cows (absence of bedding material, presence of inadequate or slippery floor in walking areas, wrong design of the lying area), but also the use of harmful tools for animal handling and the lack of scheduled foot inspection, trimming and foot bathing reached very high impact scores. Management and housing welfare promoters dealing with optimal cow comfort around resting obtained the highest ratings, together with the presence of experienced and trained stockpersons, the implementation of an attentive animal grouping strategy and the control of temperature, humidity and ventilation. Considering animal-based measures, the highest ranking of importance was given to observation of lameness, records of mortality of adult cows and calves, observation of integument alterations and body condition scoring. This study has been the starting point for the development of the first Italian national protocol for the assessment of the welfare of dairy cows farmed in loose housing systems.

1. Introduction

At European Union level there are currently no specific rules for dairy cow welfare (EFSA, 2012b, Section "Background as provided by the European Commission", p.6) and the Council Directive 98/58/CE (European Union Council, 1998) for the protection of animals kept for farming purposes is considered general, vague and non-efficient in protecting animals throughout Europe (Broom, 2017). In addition, public concern over livestock production is rising and most of the Europeans would like to receive more information about the conditions under which farmed animals are kept (European Commission, 2016). To fill these gaps and to efficiently safeguard animal welfare at farm

level, researchers in this field are currently trying to develop assessment methods that are practical but also scientifically valid (Walker et al., 2014). In the last years, research on animal welfare assessment has been focused mainly on the use of animal-based measures (ABMs), which are directly related to the animal's experience and its ability to cope with the given environment (de Vries et al., 2013). ABMs were chosen by the European Welfare Quality project (WQ) as the best tools to assess the actual welfare state of farmed animals and to identify the most critical and urgent welfare problems (Welfare Quality, 2009). However, WQ protocols cannot be applied with high frequency at farm level, because they are too time-consuming (Heath et al., 2014). In fact, ABMs are assumed to be more valid than resource and management-based

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indicators (also referred to as non-animal-based measures – N-ABMs), but their use could make farm audit schemes complicated, less feasible, and costly (de Vries et al., 2013; Andreassen et al., 2014; Grandin, 2014). In several cases, N-ABMs could be more efficient than ABMs and they could help to identify hazards potentially associated with the observed welfare outcomes (EFSA, 2012b, Section 2.3.2, p.32; Lundmark et al., 2016). Both ABMs and N-ABMs are necessary in an assessment protocol for achieving an effective overall classification of animal welfare at farm level. The choice of the measures and the most appropriate mix between ABMs and N-ABMs depends on the aim of the welfare assessment (EFSA, 2012b, Section “Conclusions and recommendations”, p.44).

To date, in Italy there are not protocols including both ABMs and N-ABMs that can be used routinely at farm level to assess the welfare of the over 1,800,000 dairy cows present within the national territory (ISTAT, 2017). Thus, in order to support the official controls, to promote the implementation of on-farm assessment of dairy cow welfare and to provide consumers with information, the Italian National Reference Centre for Animal Welfare (CRENBA) carried out a study aimed at developing a feasible and simplified on-farm animal welfare assessment protocol for dairy cows in loose housing systems. This study tried to fill the gap between research and on-farm application and to define public standards that go beyond the minimum legislative requirements, for actually improving dairy cow welfare at national level and for overcoming the recently outlined problems linked to the proliferation of private standards (More et al., 2017).

Guidelines for the risk assessment for animal welfare have been published by the European Food Safety Authority (EFSA), adapting the well-established risk assessment methodologies for animal diseases and food safety (EFSA, 2012a). The proposed methodology can be used to assess not only factors that could be associated with negative welfare outcomes, but also factors that could positively influence the welfare of the animals (EFSA, 2012a, Section 3.4, p.15). Following these guidelines, CRENBA carried out an expert opinion elicitation in order to conduct both a hazard characterization (HC) and a welfare promoter characterization (WPC), as a first step of a “risk-benefit assessment” for the welfare of dairy cows in loose housing systems. The aim was to characterize and weigh a set of management and housing factors and to include them as N-ABMs in a welfare assessment protocol that will be used at national level. In addition, the experts were asked to weigh a list of ABMs, which will be integrated in the same protocol, in order to assess the actual animal welfare state, too. To our knowledge, this is the first time that data from a WPC for dairy cows farmed in loose housing systems are published.

2. Materials and methods

In this study, semi-quantitative HC and WPC applied to dairy cow welfare and based on an expert opinion elicitation were carried out following the EFSA “Guidance on risk assessment for animal welfare” (EFSA, 2012a) and the EFSA scientific opinions on the welfare of dairy cows and sheep (EFSA, 2009a, 2014a). In addition, a set of ABMs was submitted to the judgment of the experts involved in the elicitation process. The opinion of each expert was gathered using a modified Delphi technique (Lees and Lievaart, 2013). The Delphi process is a very useful method for collecting, in a formalized and transparent way, the opinions and the judgments of experts and practitioners on a particular subject (Yousuf, 2007). In this survey, a modified Delphi process was used, that means the first step of this method was omitted, because the list of factors (hazards and welfare promoters) and of measures (ABMs), that had to be judged by the experts, were previously prepared by a different group of veterinarians and not provided directly by the experts (as in Lees and Lievaart, 2013). Thus, pre-selected factors and measures were submitted to the experts for collecting their opinion and the obtained data were analyzed (first round of the expert opinion). Then, the experts received back their questionnaires (together with the

average scores of the group) and they had the chance to modify their answers (second round of the expert opinion) (EFSA, 2012b, Section 2, p.11). According to the Delphi process, this second round was carried out in order to reach a better consensus within the group of experts (EFSA, 2012b, Section 2.4.4, p.37).

2.1. Identification of the target population

Dairy cows farmed in loose housing systems (both cubicle houses and straw yards) were the target population identified for the survey. This choice was justified by the fact that these are the most common farming systems for dairy cows in Italy. All the animal life stages within an ordinary dairy farm were taken into account: calves (animals from birth to 6 months of age), heifers (young non-productive animals, from 6 months of age to the 7th month of pregnancy), lactating cows (considering an average lactation period of 305 days) and dry cows (considering an average dry period of 60 days and including heifers between the 8th month of pregnancy and the calving).

2.2. Selection of the factors and of the welfare consequences

The selection of the factors, to be submitted to the experts for the HC and the WPC, was previously carried out by a team of 10 Italian veterinarians, during a focus group. This interview technique generally involves 8–12 participants, who discuss a clear topic under the direction of a moderator (Stewart and Shamdasani, 1990). The participants were CRENBA’s collaborators and advisors, who were involved in 12 sessions of interview at CRENBA’s headquarters, during a whole year. The credentials of the members of the focus group are reported in Supplementary Table S1.

During the focus group, the list of recommendations published by EFSA (2012b, Appendix A, pp.51–69) was used as a guideline for the selection of the factors and the related N-ABMs. In fact, this list can be considered as a “toolbox” from which picking out the most appropriate measures according to the aim of the animal welfare assessment (EFSA, 2012b, Section 2.1.2, p.25). Measures able to identify the fulfillment of EFSA’s high priority recommendations for dairy cow welfare (EFSA, 2012b, Appendix A, pp.51–69) were preferred during the selection process together with measures able to verify the compliance with the requirements of the Italian laws (D. Lgs. N. 146/2001; D. Lgs. N. 126/2011). Only factors related to dairy cow management and housing were taken into account. Genetic selection was not considered since its effects are lifelong and they cannot be managed in the short period (Smulders, 2009). During the focus group, for each selected management and housing factor, 3 different intensities of animal exposure were defined, based on scientific publications (e.g. EFSA, 2009e; Welfare Quality, 2009) and national laws. If no data could be extracted from these sources, national databases and individual expertise were discussed and used. Starting from an intensity of exposure considered not to influence dairy cow welfare (baseline level), a critical level and a benefit level were established and specified for each factor. According to EFSA (2012a, Appendix A, p.19), the baseline level corresponds to an intensity of exposure that could be associated with animal welfare outcomes usually recognized as standard in an average husbandry system; the critical level (hazard) is an intensity of exposure that could be potentially associated with a state of harm; while, the benefit level corresponds to an intensity of exposure that could make a factor a potential welfare promoter. The chosen management and housing factors and the corresponding intensity specifications are listed in Supplementary Table S2.

In total, 52 factors were selected by the focus group to be proposed to experts during the elicitation process. These factors could potentially influence the welfare of either the entire herd or a specific group of animals (i.e. calves, heifers, lactating cows or dry cows). For each factor, a hazard level and a baseline level were identified, while a benefit level was specified only for 47 factors, since for 5 factors (i.e.

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