Application of the Welfare Quality protocol to dairy buffalo farms: Prevalence and reliability of selected measures

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ABSTRACT

Within the general aim of developing a Welfare Quality system for monitoring dairy buffalo welfare, this study focused on prevalence and interobserver reliability of the animal-related variables to be included in the scheme. As most of the measures were developed for cattle, the study also aimed to verify their prevalence for buffaloes. Thirty animal-based measures (22 clinical and 8 behavioral measurements) and 20 terms used for qualitative behavior assessment were assessed in 42 loose-housed buffalo farms. All farms were located in central-southern Italy. Two assessors were used (1 male and 1 female). The time needed to record all measures (animal-, resource-, and management-based) was 5.47 ± 0.48 h (mean $\pm$ SD). Interobserver reliability of animal-based measures was evaluated using Spearman rank correlation coefficient test (r_s). If 0.7 is considered as threshold for high interobserver reliability, all animal-based measures were above this level. In particular, most of the coefficients were above 0.85, with higher values observed for prevalence of animals that can be touched ($r_s = 0.99$) and prevalence of animals with iatrogenic abscess ($r_s = 0.97$), whereas lower coefficients were found for the prevalence of vulvar discharge ($r_s = 0.74$) and dewlap edema ($r_s = 0.73$). Twelve out of the 20 terms used for the qualitative behavior assessment reached a satisfactory interobserver reliability ($r_s = 0.65$). Principle component analysis of qualitative behavior assessment scores was conducted for each assessor. Both principle component 1 and principal component 2 showed high interobserver reliability ($r_s = 0.80$ and 0.79, respectively). In addition, relevant proportions of animals were affected by welfare issues specific to buffaloes, such as overgrown claws (median $= 34.1\%$), withers hygroma (median $= 13.3\%$), and vulvar or uterine prolapse (median $= 9.3\%$). We concluded that most of the investigated measures could be reliably included in the final scheme, which can be used as such to monitor buffalo welfare. However, to inform consumers about the welfare status of the animals, the data should be integrated into a single overall assessment of animal welfare, as already performed in the Welfare Quality project for dairy cattle.
Key words: dairy buffalo, Welfare Quality, welfare monitoring

INTRODUCTION

The increased interest by the public in farm animal welfare has resulted in the development of several tools to monitor welfare on farm (Bartussek et al., 2000; Capdeville and Veissier, 2001; Main et al., 2007). These schemes rely on different measures; some of them (resource-based measures) are related to the physical environment and resources available to the animal (e.g., space allowance, housing facilities, flooring, and climatic conditions), others (management-based measures) concern the conduction of the farm (e.g., breeding strategies, milking routine, and health plan). However, more recently, schemes have shifted their emphasis from resource-based and management measures to animal-based measures dealing with behavior (e.g., agonistic behavior, grooming, and fear), health (e.g., body condition, injuries, and udder health), and physiology (e.g., hearth rate and respiration rate) of the animals. This shift reflects the perception that many of the welfare outcomes that vary between farms may be due to the interaction between the animals (breed, age, and temperament), the standard of housing and husbandry, and the attitudes of stockers and farm owners (Blokhuis et al., 2003). In addition, animals may experience the same environment differently. Therefore, it is now agreed that animal-based measures are direct indicators of animal welfare and allow the assessment of variations in housing design and management systems,

whereas resource and management indicators can only provide indirect measures of animal welfare as they are not able to give information on how the animals are coping with the environment (EFSA, 2012).

To fill this gap, the European Commission cofinanced the 5-yr (2004–2009) Welfare Quality project (www.welfarequality.net), aimed at developing a European standard for on-farm welfare assessment and product information systems as well as practical strategies for improving animal welfare on farm. Species selected included cattle (dairy cows, fattening bulls, and veal calves), pigs (sows and piglets, fattening pigs), and chickens (laying hens and broilers). In 2007, dairy buffaloes were also included in the project.

Currently, no Welfare Quality protocol exists for dairy buffalo. However, there are some similarities between dairy cattle and buffalo production. Therefore, the protocol developed for dairy cattle was used as starting point. The Welfare Quality protocol for dairy cattle comprises about 30 measures (Welfare Quality, 2009). The measures are aggregated into 12 criteria that are grouped into 4 principles. Then the principles are integrated into one final score indicating the level of animal welfare in a given farm (Figure 1). The protocol is primarily based on measures taken on animals (e.g., integument alterations, body cleanliness). Resource (e.g., cleanliness of water points, access to pasture) and management (e.g., tail docking and dehorning standard operating procedures) measures are also included in the monitoring system because they may help identify causes of poor welfare and advice farmers on possible improvements. Most of the animal-based measures included in the Welfare Quality monitoring scheme were evaluated with regards to their validity (meaningful with respect to animal welfare), reliability (reflecting the tendency to give the same results on repeated measurements), and their feasibility (Winckler et al., 2007; Windschnurer et al., 2008; Plesch et al., 2010).

During the last 4 decades, due to the economic interest in mozzarella cheese, the number of buffaloes in Italy has increased from 103,000 in 1980 to approximately 378,000 head in 2015 distributed in about 2,455 farms, which are mainly located in the Campania, Lazio, Apulia, and Molise regions (Italian Ministry of Health, 2015). This geographical area is designated to produce the cheese Mozzarella di Bufala Campana registered in the European Union's list of Protected Designation Origin products, which can be exclusively made with milk from Italian Mediterranean buffalo. The average production in 2013 was 2,222 kg of milk per 270-d lactation (AIA, 2013). As a consequence, buffalo farming has moved from traditional techniques based on the extensive use of marshland environments

to intensive systems with no access to grazing areas and water for wallowing. Such changes have negatively affected buffalo behavior (e.g., impaired expression of species-specific behaviors; De Rosa et al., 2009a) and welfare (e.g., increased incidence of uterine prolapses; Napolitano et al., 2013), and little research has been conducted in objectively assessing and improving dairy buffalo welfare on farm (Napolitano et al., 2005; Saltalamacchia et al., 2007; De Rosa et al., 2009b). Thus, development of a monitoring system for assessing buffalo welfare is critical.

Utilizing the dairy cattle Welfare Quality protocol, the objective of our study was to determine the interobserver reliability of animal-based measures applied to dairy buffaloes for on-farm welfare assessment. We also aimed to provide baseline information on prevalence of selected animal-based measures in water buffalo farms and to identify critical issues that could result in poor welfare.
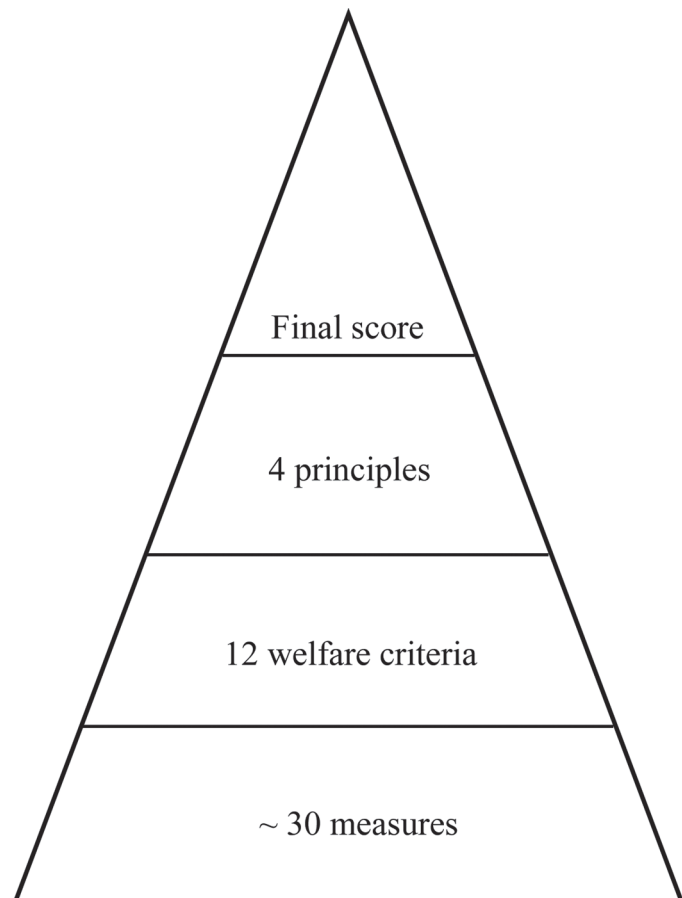

Figure 1. Welfare Quality integration process followed to aggregate ~30 measures into 12 criteria, 4 principles, and a final score.