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Application of the ClassyFarm checklist as measurement tool to evaluate the welfare of cattle kept in tie-stalls in Aosta valley

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ABSTRACT
The growing sensitivity of consumers about animal welfare and the awareness of its impact on food security and safety recently influenced international policies and law scenario. To response to these needs, in 2018, the Italian Ministry of Health commissioned the development of a system named ClassyFarm able to categorizes the level of risk arising from farm animal welfare. The experts involved in the project provided specific checklists to analyze different animal species and housing system. The developed welfare measurement protocols consist of both resource-based and animal-based measures and are divided into three areas: (Area A) "Farm management and staff training", Area B) "Housing and equipment", (Area C) "Animal-based measures". The aim of this study was to measure welfare conditions in cattle herds reared in the Aosta Valley through the ClassyFarm checklist for tie-stall dairy cattle. The scores (%) for each area of assessment were divided into three classes (insufficient, acceptable, and optimal) while the total Animal Welfare Score (AWS), obtained by summing the scores of the 3 areas, was divided into five classes. The total AWS showed the majority of the farm included in good to optimal result.

Section: RESEARCH PAPER

Keywords: Animal welfare; checklist; ClassyFarm; tie stalls housing system; local cattle breeds

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1. INTRODUCTION

The link between animal health and welfare and their impact on animal productivity is well known: a good welfare status is, indeed, considered essential to maintain a high health state of the animals and to ensure healthy products and safe food [1], [2].

Measurements of animal welfare is a long-debated topic. Many studies focused on the development of on-farm welfare-measurement methods to be applied in different conditions. The Welfare Quality project [3] and AWIN are among the largest European projects funded and proposed scientifically based measures for farm animal welfare.

Anyhow welfare measurement still focuses only on indirect indicators, such as the evaluation of the environment and structures in which animals live and management practices to which animals are subjected [1], [4]. Resource-based measurement can fail to fully answer questions about animal welfare; for this reason, the need to perform an animal welfare measurement using direct indicators to obtain a comprehensive assessment of animal welfare was emphasized [5]. To face this need, EFSA published a scientific opinion including the direct measurements applicable to dairy cows, such as the prevalence and severity of lameness, mastitis, collision with facilities in laying

down and getting up, poor physical conditions among others [6]. In order to monitor and categorize farms, the Italian Ministry of Health commissioned the Istituto Zooprofilattico Sperimentale della Lombardia e dell'Emilia Romagna (IZSLER), where the Italian National Reference Centre for Animal Welfare (CReNBA) is located, the development of ClassyFarm. ClassyFarm is an innovative on-line based system actually representing the only officially recognized Italian tool to categorize farms based on their risk in the context of veterinary public health and, actually, the only one recognized at European level. For the first time, information about biosecurity, animal welfare, animal nutrition, antimicrobials usage and resistance, health and productions parameters, along to injuries found at the slaughterhouse are collected and elaborated in a unique tool to obtain the risk categorization. Focusing on animal welfare, expert knowledge elicitations (EKE) have been used to obtain checklists [7],[8] for most of the farmed animal species and for different breeding systems, in order to support official controls, collect data, promote the implementation of welfare and biosecurity levels, and provide consumers the information required. EKE provided items to be included in the different checklists based on a modified Delphi technique.

Every single item is weighted within the checklist and assigned to a different macro area. A dedicated algorithm elaborates the answers to provide a percentage corresponding to the risk level related to animal welfare. Based on the percentages and the single answers, the veterinarian can easily define the critical points to be implemented to increase animal welfare and farm management and decrease drug usage.

In this context, a specific checklist has been carried out for assessing welfare conditions of dairy cows in tie-stall housing systems.

Tie-stall are nowadays under scrutiny because perceived with low level of welfare. The welfare of tied animals can be impaired by the lack of exercise, social interactions, and the inability to show a complete pattern behaviour [9]. Neverthless, IZSLER/CReNBA decided to include this specific target population in the ClassyFarm system since it still represents the predominant housing type (even more than 98 % of total barns) in many Italian Alpine regions [10] and European countries (e.g., 75 % of all Swedish dairy herds and 88 % of Norwegian dairy cattle [11]). Moreover, in Italian mountain areas, these animals can experience the positive balance of living outdoors on a pasture for most of the year (semi-extensive systems) resulting tied indoor only for short periods [4]. The Aosta Valley is an Italian region located in the northwest Alpine territories of Italy, where mainly small-scale farms exit, rearing autochthonous local cattle breeds which include the Aosta Red Pied (Valdostana Pezzata Rossa), the Aosta Black Pied (Valdostana Pezzata Nera) and the Aosta Chestnut (Valdostana Castana) for a total of 36000 subjects registered in the stud book. All three are dual-purpose cattle breeds and possess a considerable milk production (24 kg/cow/die on average) in proportion to their body size (450-700 kg on average). Farming practices usually include a tie-stall housing system in the autumn-winter period and mountain grazing on high pastures (up to 2500 m above sea level) during the spring-summer period, taking advantage of the cow's functionality and capability to cope with severe environmental conditions [12].

This study represents the first attempt to apply the ClassyFarm checklist for the evaluation of welfare conditions of cattle belonging to Valdostana breed reared in semi-extensive alpine farming systems.

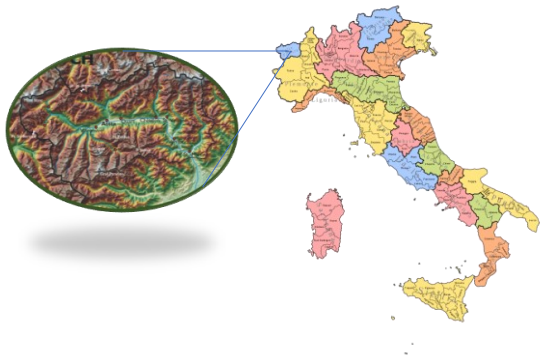

Figure 1. Aosta Valley identification in the national Italian territories.

2. MATERIALS AND METHODS

2.1. Experimental design and population

The study has been conducted in Aosta Valley (Figure 1) for two consecutive years involving the 66 % farms in 2021 (n = 581) and 66.7 % farms in 2022 (n = 587) belonging to the National Association of Farmers of the Valdostana cattle breeds (A.N.A.Bo.Ra.V.A.), an institutional association devoted to the genetic improvement, the promotion and enhancement of local cattle breeds [13]. The majority of the evaluations was conducted on-farm during autumn and winter (November and December). Herd size ranged from a minimum of 2 to a maximum of 174 animals in 2021 (average of 41 cattle).

2.2. Animal welfare measurement

Eighteen trained veterinarians visited the farms in 2021 and 2022 assessing animal welfare through the ClassyFarm checklist.

Training of the veterinarians was ensured by specific courses organised by A.N.A.Bo.Ra.V.A. in collaboration with CReNBA experts.

The total welfare section of the checklist is composed of resource- and animal-based indicators listed in a multiple-choice checklist including 75 indicators divided into three areas of assessment: Area A: farm management and staff training (25 items of inspection); Area B: housing and equipment (28 items of inspection); Area C: animal-based measures (22 items of inspection). Thirty-eight items out of 75 are based on minimum requirements established by current national and European legislation [14],[15],[16]. Each indicator has two or three answer options: insufficient and acceptable or insufficient, acceptable and optimal, respectively. The thresholds between the different levels of judgment are identified on the basis of the possibility for animals to meet their biological needs and to enjoy the five freedoms. Each indicator level has a different weight according to its potential impact on dairy cow welfare [7].

The answers recorded for each item are elaborated by a tailored algorithm returning the final percentage of each of the abovementioned areas. Based on the measurement performed on-farm, area (or section) scores are calculated by summing up the scores of the indicators belonging to each area. The total welfare score is then calculated considering a 50 % contribution by Area A and Area B and the remaining 5 % by the Area C. Section and total welfare scores are expressed in percentages from 0 to 100, which represents the level of risk of the farm [17]. According to farms' score distribution obtained, the total welfare scores were divided into five categories: insufficient with a value up to 59 %, sufficient from 60 to 69 %, good from 70 to 79 %,

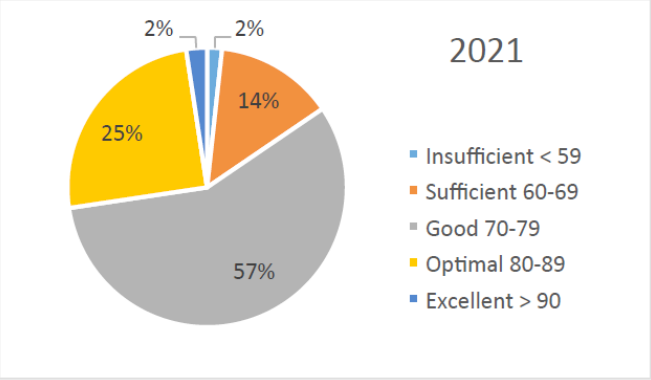

Figure 2. Percentage of farms in the different scoring classes in 2021.

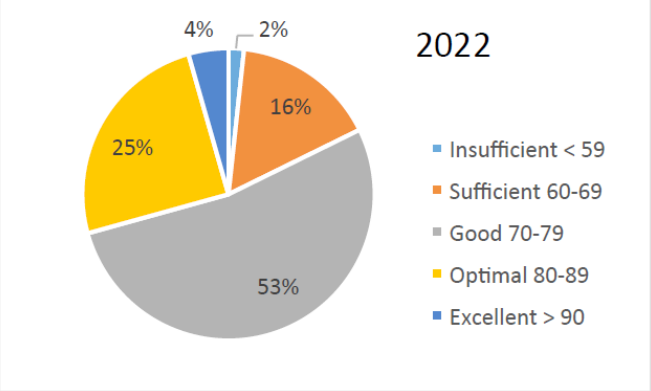

Figure 3. Percentage of farms in the different scoring classes in 2022.

optimal from 80 to 89 % and excellent above 90 %. The individual area (Areas A, B and C) scores were also divided into three classes: insufficient (score < 60 %), adequate (score between 60 % and 80 %) and optimal (score > 80 %); the same subdivision has also been provided for individual items.

3. RESULTS AND DISCUSSION

The overall welfare scores gained by the farms are showed in Figure 2 and Figure 3.

Average scores obtained in 2021 and 2022 for the overall welfare level and for each Area of assessment are shown in Figure 4. Distribution of farms in "insufficient", "adequate" and "optimal" classes, according to individual area scores, is reported in Table 1.

The results of the study highlighted the weaknesses and the strengths of the Aosta Valley breeding system characterized by tie-stall housing in the autumn-winter period and access to grazing in the spring-summer period. The data analysis showed a completely overlapping picture between the years 2021 and 2022. The farms included in the study changed between years as the objective of the study was not a comparison between the same farms in time, but the welfare measurement of animals reared in a typical farming system in the alpine territory of Italy (Figure 1). So, the data are intended so describe a whole geographic area more than the single farms.

As showed by results, more than half of the farms obtained an optimal score in Area C – animal-based measures (ABMs) (> 80 %; 390 farms in 2021 and 418 in 2022; Table 1). The items constituting Area C did not indicate a specific risk but reflected the health and welfare status of the animals. In fact, ABMs describe the level of animal pain and suffering due to the impairment of animal welfare [7]. Even if perceived as less welfare friendly, the registered data in Area C highlighted the good condition of the animals breed in tied stall. It is possible to speculate that, after long period on high pasture, the time spent tied could ensure proper nutrition for each cow and avoid hierarchical phenomena. This, in particular, is evident when analysing the excellent score obtained by farms in the body condition score items of all the animal categories which showed how the management of feeding, the quality of feed and the formulation of rations are adequate. Animals' injuries are an important welfare parameter because they reflect the interaction between environment and dairy cow, as they are consequence of space restrictions, inadequate stall surface and conflicts between animals. The fact that cows in tie stalls are restrained or tied in their individual stall does not allow animals to face or confront each other, thus avoiding hostile behaviour and the possibility of getting injured: optimal scores, in fact, were registered in the items relating to skin lesions which were not observed and on the absence of the practice of mutilations, in particular dehorning. Animal mortality was also at optimal values.

As for Area B on housing and equipment, most of the farms resulted adequate (60-80 %; 342 in 2021 and 420 in 2022) or optimal (> 80 %; 160 in 2021 and 102 in 2022; Table 1). To confirm this data, a percentage between 6.8 % and 10.1 % of the farms didn't use any type of litter, while most of the farms obtained, instead, an acceptable score for the hygiene and cleaning of the stall. According to EFSA recommendations [6], the animals should have a resting area with bedding in sufficient quantity, dry, compressible, not slipper and that does not cause injuries. This aspect of litter and stall hygiene also affect footpad lesions. Among the main causes of foot lesion in tie-stall farms, together with the risk of prolonged permanence of the feet, especially the rear ones, in the manure, there is also the lack of exercise and poor wear of the hooves [18]. Almost the totality of the farms, however, obtained an optimal score for the items regarding foot lesions even though as many as 10 % of the farms do not implement any type of prevention plan but use pasture for more than 90 days a year allowing movement and therefore the nail wear. Although it is a legal requirement [14], in the 2021 19.13 % of the farms didn't have no stall or fence to be used as an infirmary for the management of sick animals; however, the scenario improved markedly in 2022 (10.2 %), highlighting the great sensibility of the farmers who took solutions to solve the problem and adapt the legislation. Considering both the years, 81.9 % of the farms obtained an adequate score regarding external shore; for this item the achievement of an optimal

Table 1. Distribution of farms in classes according to individual area scores.

Scores	2021			2022		
	Area A	Area B	Area C	Area A	Area B	Area C
Insufficient < 60 %	159	79	6	139	65	15
Adequate 60 %-80 %	388	342	185	407	420	154
Optimal > 80 %	34	160	390	41	102	418

Area A: farm management and staff training; Area B: housing and equipment; Area C: animal-based measures.

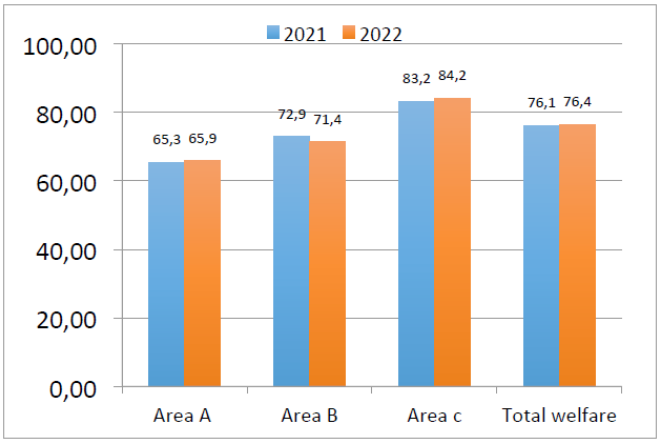

Figure 4. Average overall welfare score (%) and average scores (%) for each area of assessment in the different years.

condition could perhaps be difficult given the impervious territory.

A different situation has been recorded for Area A "farm management and staff training" in which, even if most of the farm resulted "adequate", a total of 159 farms in 2021 and 139 in 2022 were classified as "insufficient" reaching, anyhow, average scores of 65.3 % in 2021 and 65.9 % in 2022. About 20 % of the farms obtained an insufficient score in the items regarding management of animal groups and biosecurity. The management of animal groups in homogeneous groups by age and production period is important to respond to the different physiological needs, in order to guarantee assistance, space and feeding related to specific needs [6]; however, this could be difficult to apply or ever counterproductive in small farms like these. Conversely, the improvement in biosecurity is nowadays the most important tools to prevent the entry and the spread of infectious diseases within the herd. More in particular, considering that when reared on pasture biosecurity represent one of the critical points to be controlled, during wintertime, in the indoor phase, the general level of biosecurity in the farms should be increased to allow a proper control of pathogens and parasites spread and to allow tailored containment measures (quarantine, treatments and vaccination). This will allow to have a herd in good health condition able to face eventual difficulties related to pasture breeding. This result was properly interpreted by the A.N.A.Bo.Ra.V.A by which courses were implemented to support farmers in increasing or improving weaknesses identified in the herds.

To conclude we can say that the application of the ClassyFarm checklist has allowed to obtain a positive view of tie-stall farming system as the score obtained from the inspections were more than sufficient. The only limit we can highlight is that none of the farms were visited in the summer during grazing period. Carrying out two inspections, one in the summer in the pasture and one in winter in the stable could be the best solution to really obtain the general picture of the semi-extensive farming in Aosta Valley.

The present study is part of a larger project on farm monitoring in Aosta Valley, where data recorded through the use of this checklist will be linked to milk quality and safety and to antimicrobial usage data.

In the era of Precision Livestock Farming, it is crucial to provide researchers and stakeholders with non-invasive tools for investigations on animal welfare.

4. CONCLUSIONS

The checklist presented in this study fully match this goal. Data obtained could be advantageously integrated in a big-data system together with sensors-derived data and other measurements to detect good practices in animal breeding and decrease the risks related to poor welfare conditions.

ClassyFarm resulted a useful tool to provide a highly defined picture of the livestock scenario of the Aosta Valley. A proper dissemination and communication of the data obtained could contribute to redefining the consumer's perception of the semi-extensive system typical of the area in terms of animal welfare.

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