Animal welfare assessment in sheep farms before the application of the Measure 215 “Animal welfare payments” in Tuscany

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SUMMARY

Introduction - The EC Regulation 1698/2005 on support for rural development by the European Agricultural Fund for Rural Development includes a specific measure for animal welfare payments. This measure requires the evaluation of the initial well-being condition of the participating farms. The Tuscany Region included the Measure 215 in its rural development program for the period 2007-2013, supporting 162 dairy sheep farms. This study aims at evaluating animal welfare on a sample of 42 dairy sheep farms.

Materials and methods - Farm surveys were performed by a trained observer to collect information on farm management and to measure structure characteristics through a checklist submitted to farmers. A software has been developed in order to grade farms after processing data built upon objective and easily measurable parameters. The check-list embraced five focal macroarea: A. management; B. farming system; C. environmental control; D. feeding and water supply; E. hygiene, health and behavioural aspects. An Excel spreadsheet was created to input the data and automatically assign both a partial and a total score to each area; then areas as well as farms were evaluated according to five classes of increasing level of animal welfare. Descriptive analysis of the data was performed and non parametric Wilkoxon test was used to verify statistical differences in levels of welfare distribution.

Results and discussion - The study displays a situation characterized by a satisfactory level of well-being, with only 10% of holdings showing deficiencies that place them at the minimum level. The Macroarea D presented more deficiency, due to the insufficient presence of water supply on pasture and the absence of at least two water drinker for group in the sheepfold. The Macroarea B showed the best situation, however some improvement related to milking procedures could be applied. No farm reached the highest rating, corresponding to an excellent condition.

Conclusion - The survey also revealed farmers’ awareness of the importance of the issue, and his/her ability to use the Measure 215 as a tool for improving animal welfare.

KEY WORDS
Animal welfare, European agricultural fund, Sheep, Tuscany Region.

INTRODUCTION

In Italy ovine enterprise is mainly based on semi-extensive system and this, along with the rusticity and frugality of these animals, is perceived as guarantee of the well-being of animals¹. However this perception is based on aspects connected with the freedom to express the behavioural repertoire, while other aspects must be taken into account to safeguard the other freedoms: access to water and feeding; appropriate environment; prevention, diagnosis and treatment of diseases, avoidance of mental suffering².

As species traditionally managed extensively, sheep have received relatively little attention from a legislative perspective, in fact this sector has not specific rules on well being. The only regulation referenced is the Legislative Decree 146/2001, executing the European Council Directive 98/58/EC, that disciplines, in a generic manner, all the animal species.

The European Community, to support the rural development, funded a specific measure for payments for animal welfare³. The Tuscany Region included the Measure 215 in its rural development program for the period 2007-2013, supporting 162 dairy sheep farms. The purpose of the Measure was to improve the level of animal welfare referring as baseline to the minimum level established by the existing legislation and the good farming practices. The Measure was structured in five commitments characterised by different actions to improve animal welfare.

Several are the systems for evaluating animal welfare: some of these are founded on behavioural, health, physiological measures taken directly on the animal (animal based systems), others are founded on parameters related to farm structure and management characteristics involved in animal welfare (resource based systems)⁴. The on farm welfare assessments are mainly based on the latter because it take into account objective, repeatable and easily measurable parameters. A group of researchers belonging to the Department of Veterinary Science of Pisa and the CRPA of Reggio Emilia developed a resource based method in order to evaluate the
level of welfare in the Tuscany dairy sheep farms that joined to the Measure 215. The present study refers the results of welfare conditions in sheep farms before the application of commitments taken by farmers.

**MATERIALS AND METHODS**

This study was carried out on a sample of 42 dairy sheep farms funded by the Measure 215 in Tuscany. Farm representative sampling was identified taking into account all the commitments assumed by the farmers and the location in the region. The sample was composed by 40 Sarda and 2 Massese breed farms.

To assess sheep welfare, three tools were developed: a check list, a technical file and an Excel spreadsheet. The check list, built upon restricted, objective and easily measurable parameters, was drawn up in order to define farm's characteristics. In accordance with European regulation5, the check list was divided in five macroareas: A. Farm management and staff; B. Farm structures and housing conditions; C. Environmental control; D. Feeding and watering; E. Health management and behaviour.

The next table summarises the parameters that contribute to provide the score.

The check list was supported by a technical file that describes all the examined parameter and assigns them a weighted score in relation to its implication with animal welfare. This system provides the assignment of a higher score to the aspects of greater relevance and more objective evaluation and a lower score to the parameters influenced by the time of survey and more subjective. The scoring baseline corresponds to the not conformity to the good farming practices.

An Excel spreadsheet was created to input the data and automatically assign both a partial score to each macroarea and a total farm score. This evaluation system is subjected to offsetting of the total score resulting from the existence of several combinations of points assigned for each macroarea. Depending on the score, macroareas, as well as the whole farm, were evaluated according to five classes of increasing level of welfare: 1 = scarce; 2 = sufficient; 3 = moderate; 4 = good; 5 = excellent.

Farm surveys were performed by a trained observer. Descriptive analysis of the data was performed and non parametric Wilkoxon test was used to verify statistical differences in levels of welfare distribution.

**RESULTS AND DISCUSSION**

Table 2 shows the percentage distribution in classes of welfare for each macroarea and for the whole farm. No farm reached the excellent level in relation with the Macroarea A, the Macroarea B shows the best situation, however some improvement related to milking procedures could be applied and the Macroarea D, related with feeding and watering, displays the more deficiency. Sheep farming system is characterized by the absence of heavy deficiencies with only around 10% of farms judged at the lower score of welfare. Otherwise, some improvement actions can be realized since no farm reached the highest score, and only a few number reached the score 4.

Table 3 shows the range of values that each macroarea could record (theoretical maximum and theoretical minimum set by spreadsheet) and the mean of the effective scored values; these informa-
tion allow to identify the aspects where farmers should concentrate the efforts in order to improve the live condition of the animals. The Macroarea A, related to the farm management and staff, shows a margin of improvement since some aspects were not satisfied. Technical courses can develop good skills in the handling of animals and transfer appropriate knowledge in recognizing animal distress and optimising farm equipment and structures\(^6\). The half of Tuscan farmers interviewed attended specific technical courses organised by several associations in the last years.

A proper milking technique is fundamental to maintain the animals in a satisfactory state of health and to obtain good milk quality. Farmers know the milking machine parameters only in few cases. A mechanical milking system must be inspected at least two times a year to insure proper functionality. In the sampled farms this practice was generally performed only one time/year.

Different forms of mutilation are performed in sheep farming either to obtain particular qualitative characteristics of a specific production (castration) or to arrange the management of the flock (tail docking, dehorning, ear marking, etc.). Castration is not frequently implemented in Tuscan farms. Tail docking causes pain to the animal irrespective of the chosen method. The residual stump must be sufficiently long to cover the anus of the male and the vulva of the female and these characteristics were assured in the sampled farms. Tail docking is performed only in few cases using the knife technique rather than the rubber ring; the knife technique is a docking method rather than the rubber ring; the knife technique is a docking method. Tail docking causes pain to the animal irrespective of the residual stump. The ear cut is a traditional custom that provides farm identification of animals; it is an unnecessary mutilation; in Tuscany farmers practice it in 24% of the cases and they are going to abandon it.

Dehorning is practiced when an animal is endangered by its own horn growth or threatens to harm the other animals in the flock or when an animal has difficulty entering the self-capturing spaces to feed. In the present study, this mutilation is not practiced except in extreme cases. Shearing is helpful to maintain animal well-being; farmers commonly practice it once a year in late spring using appropriate and well-functioning equipment to reduce the risk of skin abrasions.

The presence of predators is an heavy problem in extensive sheep farms, causing severe damages: in our survey it is reported by 64% of farmers. The presence of watchdogs is needed to prevent losses of animals caused by predator species (wolves, free ranging dogs); however, any dog could be a potential hazard for the sheep and so it should be well-trained\(^8\). Anti wolf fences are additional methods to prevent attacks, especially during the night. Among the inspected farms, watchdogs are generally employed while not always there are anti wolf fences.

The Macroarea B, mainly concerning aspects related to the typology of buildings and the housing conditions, shows satisfactory characteristics (Table 3).

About space allowance some authors suggest an area of 2.0 m\(^2\)/head\(^9\) while organic sheep farming requires 1.5 m\(^2\)/ewe\(^10\). In extensive farming, the recommended space allowances can be reduced by 15 - 20%\(^11\) because animals use enclosures for limited periods. In the present investigation the indoor space allowance should be improved, resulting only 1,1 m\(^2\)/head on average, unlike stocking rate on pasture does not represent a problem.

The inspected farms did not show heavy problems related with the presence of hazards or bad equipments conditions. Sick or injured animals must be confined in separate and comfortable enclosures with water supply; these structures must be conveniently placed to assure visual contact with the flock and the ability of an adequate supervision by the farmer\(^7\). Isolation structures are present in 27% of the cases; most of farmers creates a mobile fence to put unhealthy or injured animals.

Availability of individual lambing pens provides many advantages, such as significant reduction of newborn lamb losses, especially for primiparous ewes. Areas for pregnant ewes should allow a floor space \(\geq 2\) m\(^2\) per head, whereas clean straw bedding should be always available\(^11\). In most of the sampled farms, farmers do not take care of ewes at lambing: this habit can have detrimental effects so it has been assigned

### Table 2 - Percentage distribution of farms in the class and level of welfare in each macroarea and in the whole farm.

<table>
<thead>
<tr>
<th>Class</th>
<th>Level</th>
<th>Macroarea</th>
<th>Farm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Scarce</td>
<td>A</td>
<td>19 a</td>
</tr>
<tr>
<td>2</td>
<td>Sufficient</td>
<td>B</td>
<td>23.8 b</td>
</tr>
<tr>
<td>3</td>
<td>Moderate</td>
<td>C</td>
<td>26.2 c</td>
</tr>
<tr>
<td>4</td>
<td>Good</td>
<td>D</td>
<td>31 d</td>
</tr>
<tr>
<td>5</td>
<td>Excellent</td>
<td>E</td>
<td>0 ^</td>
</tr>
</tbody>
</table>

\(^{\wedge}\) non estimable due to small sample; means followed by different letters in the same column were significantly different: \(p < 0.05\).

### Table 3 - Range of theoretical scoring, mean values and standard deviation and corresponding class of welfare for each macroarea and for the total score.

<table>
<thead>
<tr>
<th>Macroarea</th>
<th>Mean</th>
<th>SD</th>
<th>Class</th>
<th>Theoretical maximum</th>
<th>Theoretical minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1.1</td>
<td>2.56</td>
<td>2</td>
<td>8.5</td>
<td>-12.5</td>
</tr>
<tr>
<td>B</td>
<td>6.6</td>
<td>3.74</td>
<td>3</td>
<td>22.0</td>
<td>-12.0</td>
</tr>
<tr>
<td>C</td>
<td>2.9</td>
<td>1.89</td>
<td>2</td>
<td>11.0</td>
<td>-3.5</td>
</tr>
<tr>
<td>D</td>
<td>0.6</td>
<td>2.99</td>
<td>1</td>
<td>10.5</td>
<td>-8.5</td>
</tr>
<tr>
<td>E</td>
<td>3.2</td>
<td>1.82</td>
<td>3</td>
<td>15.0</td>
<td>-6.0</td>
</tr>
<tr>
<td>Farm</td>
<td>14.5</td>
<td>5.99</td>
<td>2</td>
<td>67.0</td>
<td>-42.5</td>
</tr>
</tbody>
</table>
a negative score. However, most of farmers separate the ewe with the offspring after birth to improve the mother-progeny bonding.

Proper flock management at milking has positively repercussion on health status and productivity and a stable hierarchy allow to reduce stress and phenomena of competition14. To allow an easy management of the pre-milking phase, groups of animals could be arranged to properly approach to the milking parlour; this area must be suitably designed, offer protection from inclement weather in case of outdoor location and provide drinkers15. In the present investigation, few are the cases where pre-milking areas were provided and ewes approach to milking parlour at the same time. It is important that the connection way to reach the milking parlour must be as simple and linear as possible and free from hazards (slippery and sloping floors and protruding equipment).

The Macroarea D concerns the environmental control. Presence of sufficient lightning and ventilation represent basic requisites. Illumination should be guaranteed by natural light: a window area equal to 1/20 the floor surface is considered enough to provide adequate natural lighting16. Sheepfolds must also be furnished with supplemental artificial lighting17. A ventilation system in the fold, either natural or artificial, is needed to prevent excess humidity, condensation and contaminant concentration in farm environments (harmful gases, microorganisms, dust) that can have negative repercussions on the health and productivity of the animals. This problem is particularly felt in the winter season when animals are kept indoor for long periods18.

To prevent the detrimental effects of high temperatures in summer, structural intervention guaranteeing thermal insulation are recommended. The thermo neutral zone of the animals varies from 5° to 25°C for adult animals19. Excessive heat can cause a significant alteration of physiological and immunological traits and of quanti-qualitative milk parameters20.22. Our study revealed some deficiency regarding this macroarea, especially regarding the lack of insulation of roof and cooling system (91% of survey). On pasture, the availability of shelters are provided by the natural shadow of trees and shrubs.

The Macroarea D involves in feeding and watering. Water requirement is quite difficult to assess because of the influence of several factors: moisture content of diet, environmental temperature, sun exposure, grass availability21. Ruminants and specially sheep can tolerate a water loss greater than 20%22 because the fore stomach is able to cumulate water to use in periods of low water supply, however water restriction can cause metabolic disorder21, live weight reduction23, milk production decrease24. To safeguard animals’ health and productivity, water should be free from contaminants and pathogens. Animals, either housed or on pasture must have access to clean, fresh water at every moment. Water troughs or bowls must be easily cleaned and possibly insulated at least once a day.

In this research, the presence of an expert in animal nutrition is not often recorded (41%), advices on sheep feeding are carried out mainly by the feeding company. The score reached in this macroarea was due to the insufficient presence of water supply on pasture and the absence of at least two water drinker for group in the sheepfold.

The Macroarea E involves health management and behaviour. A comfortable environment is really important for sheep, both from welfare and hygienic sides.

The bedding management influences the health of animals since concurs to limit the incidence of mastitis and improve the hygienic characteristics of milk25. The addition of straw to permanent bedding creates a sufficiently clean, insulated and comfortable environment4. The complete removal of the bedding, followed by disinfection and disinfestation of the area, should occur at least two times a year. Most of farmers regularly add straw to guarantee a comfortable area, but provide the bedding removal only one time/year, that contributes to obtain a low score in this macroarea.

Another key aspect is the arrangement of an health plan that allow to check the animals and not only to intervene in emergency. The presence of an health plan lacks in almost all the farms, its adoption could provide an improvement in the safeguard of animal welfare26; our study highlighted the limited recurring to this practice, with only two farms that adopted it.

An increase in the somatic cell count of the bulk flock milk can be considered an efficient indicator of distress in lactating ewes. This result is due to factors directly related to the animals (age, lactation phase, mastitis, traumas) and to the environment (inappropriate milking technique, inadequate maintenance and cleaning of the milking machine, high animal density, bad conditions of the bedding, incorrect handling, unbalanced ration)27. About this topic, we investigated the frequency of SCC monitoring and the actions implemented for problem solving in case of overcoming the threshold. Our findings reviled a strict correspondence with good zootechnical practices since almost all the farmers monitor SCC two time/month, as imposed by the cheese factory. In the cases of overcoming SCC threshold, that occur rarely, the farmers act to solve the problem.

One of the main health problem in extensive farming system is the internal parasite infestation that can cause a notable reduction of productive and reproductive performance, and compromises animal welfare28. The parasite burden can be profitably reduced through environmental measures related with rational grazing management and agronomic interventions29 while chemical anthelmintic treatments must be preventively confirmed by faecal examinations. Unfortunately, common practice is to treat with chemicals 1-2 times/years without laboratory findings.

Other useful practice should be the presence of a flies and rats control plan, rarely adopted in our sample. Quarantine is a preventive measure of animal health31 that occurred only in case of introduction of young rams, because farmers generally manage internal replacement.

The look of animals could give a first hint about animal status so that the evaluation system take into account this aspect. It would be recommended to check animals’ health, looking at physiological expression as alertness, appetite, rumination, regular gait and fluid movement, uniform and luxuriant fleece, absence of skin and foot lesions32.

In the inspected farms generally animals appeared quiet, clean, in good condition, without evident lesions33. In the inspected farms generally animals appeared quiet, clean, in good condition, without evident lesions33. In the inspected farms generally animals appeared quiet, clean, in good condition, without evident lesions33. In the inspected farms generally animals appeared quiet, clean, in good condition, without evident lesions33. In the inspected farms generally animals appeared quiet, clean, in good condition, without evident lesions33.
the class of welfare. This class corresponds to a intermedi-ate level from sufficient to moderate; this result reflects the situa-tion of each macroarea and highlights the need of actions aimed at increasing the level of animal welfare.

CONCLUSIONS

The results indicated that in Tuscany some sectors of sheep farming need intervention aimed at increasing the level of animal welfare.

A greater understanding of animals’ needs, which the farmers can acquire through training courses, could contribute to improve farm standards.

Correct milking operations have a decisive role for high production levels in respect of animal well-being; unfortunately producers are not used to a regular check of the milking machine.

The study underlined the need to satisfy the minimum space/head indoor requirements, to control the microclimate and to maintain the bedding in satisfactory hygienic conditions. A greater presence of a suitable pre-milking parlour could guarantee the animals to minimize the stress of a prolonged waiting in crowded places exposed to atmospheric forces. The quality of life must be guarantee also at pasture: farmers must furnish fresh water to the animals and assure them access to natural or artificial shelter.

Maintaining animals in a good state of health is essential to safeguarding their well-being; from this point of view, arrangements for a veterinary assistance plan could be a valid approach to a continuous assessment of the animals’ health and a timely intervention.

The somatic cell count in milk constitutes an efficient index of animal well-being strictly linked to the health state of the mammary gland and in few cases the Tuscan farms overpass the threshold.

An effective anthelmintic treatment programme could be implemented for the knowledge of the epidemiological condition of the flock in order to verify the need of deworming or rationally select the proper treatments to run.

In conclusion, the developed method not only meet the requirements of the Measure 215 but also could be a tool for the farmer to assess the deficiencies in the farm and consequently to act efficiently to improve animal welfare.

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References