Review article

On-farm welfare monitoring of small ruminants☆

M. Caroprese [a,*], F. Napolitano [b], S. Mattiello [c], G.C. Fthenakis [d], O. Ribó [e], A. Sevi [a]

[a] Dipartimento di Scienze Agrarie, degli Alimenti e dell'Ambiente, Università di Foggia, Via Napoli, 25, 71122 Foggia, Italy
[b] Scuola di Scienze Agrarie, Forestali ed Ambientali, Università della Basilicata, Via dell'Ateneo Lucano 10, 85100 Potenza, Italy
[c] Dipartimento di Scienze Veterinaire e Sanità Pubblica, Università degli Studi di Milano, Via Celoria 10, 20133 Milano, Italy
[d] Veterinary Faculty, University of Thessaly, 43100 Karditsa, Greece
[e] FEED Unit, European Food Safety Authority (EFSA), Parma, Italy

ARTICLE INFO

ABSTRACT

The paper discusses assessment of animal welfare in small ruminant production systems and reports on developments regarding various monitoring schemes, which are used to assess small ruminant welfare at farm level. Further, welfare assessment protocols are presented; these have been derived as results in the Animal Welfare Indicators ('AWIN') project, which had been funded within the European Commission's 7th Framework Program. The role of the European Food Safety Authority (EFSA) in providing a scientific basis for future legislation on animal welfare is described. Finally, emergency medicine to reduce small ruminant suffering and support appropriate decisions to promote welfare of individual animals or populations of animals is also discussed.

1. Introduction

Market demand from consumers for assurance schemes for high quality animal products (in terms of health, safety and respect for animal welfare) is increasing. In response to this demand, assessment of animal welfare at farm level is still an outstanding issue in the field of animal husbandry. Therefore, development of on-farm welfare monitoring schemes to assess welfare of farmed animals has become a need for production systems as an advisory and management tool for farmers, as a tool to verify compliance with legislation or regulatory standards and as a component of quality assurance schemes for consumers (Fraser, 2008).

Many different European regulations have been issued regarding animal welfare. Although no rules specific to small ruminants have been implemented, Commission Decision 2006/778/EC (European Commission, 2006) has reported that inspections of animals kept for farming purposes should cover requirements laid down in specific acts, as well as general animal welfare requirements as laid down in Council Directive 98/58/EC which relates to all farmed species (European Commission, 1998). The animal welfare issue, however, is also addressed by the European Food Safety Authority (EFSA), which is required to provide scientific and technical support to Community legislation through development of scientific opinions on risk factors related to all fields with direct or indirect impact on food and feed safety, plant health, environment and animal health and welfare.

Since the beginning of the 21st Century, this topic has been widely discussed at international level, in international workshops (e.g. Sørensen and Sandøe, 2001; Webster and Main, 2003) and in specific working groups, e.g. the European Action 846 of the COST Framework 'Measuring and monitoring farm animal welfare' (Blokhuis et al., 2003). That COST action had led to the Welfare Quality® EU project, which had been funded by the European Commission in 2004 with the aim to developing on-farm welfare monitoring schemes. The project involved 43 establishments (from 13 European and four Latin American countries) and resulted in the publication of welfare assessment protocols for cattle, pigs and poultry; however, the development of on-farm welfare assessment protocols for small ruminants was not addressed. In 2011, the EU's 7th Framework Program for Research (FP7) funded the 'AWIN' (Animal Welfare Indicators) project, which aimed at improving animal welfare by developing, integrating and disseminating information regarding animal welfare indicators in animal species that had not been previously covered in the Welfare Quality® project, including small ruminants.

Development of awareness and of regulations regarding farm animal welfare follows closely changes in under- and post-graduate teaching in the field in tertiary education. However, often animal welfare teaching is not associated with clinical skills and diagnostic

or monitoring procedures in farms do not always take into account welfare considerations of individuals or populations under consideration (Illmann et al., 2010).

In order to develop effective welfare assessment schemes, the role of the scientific community should be enhanced through the involvement of the relevant stakeholders, e.g. producer associations, animal breeding organisations, retailer and consumer organisations, policy makers and veterinarians. In particular, veterinarians are required to evaluate, in cases of small ruminant emergency, which are remedial options for sick animals or for animals at risk of becoming sick promote their welfare status. The present review discusses welfare assessment from various perspectives applied to small ruminants.

2. Monitoring schemes

According to Scott et al. (2001), monitoring schemes should include indicators that are valid, reliable and sensitive. In addition, they should be practically feasible to apply in the field. Two broad categories of indicators can be used to assess animal welfare at farm level (Main et al., 2003): (i) animal-based welfare measures (e.g. behavioural measurements, productivity, health issues) and (ii) resource-based influencing factors (e.g. stocking density, feeding regime, milking procedures).

Animal welfare monitoring schemes are generally based on the assessment of negative consequences of farming factors on animals, while there are only few examples of positive aspects being evaluated (e.g. the positive terms of qualitative behaviour assessment in the AWIN and Welfare Quality® protocols). However, possible links between these adverse effects on animal welfare and risk factors (e.g. poor flooring as risk factor for lameness) have seldom been investigated. Therefore, albeit valid and reliable, such schemes can only be used to express a scientifically-based judgement on the welfare state of the animals, whereas little is done to promote a continuous process of animal welfare improvement (Whay, 2008).

Sheep welfare has been investigated in a number of studies, in which the effect of management stressors has been assessed. Conversely, on-farm monitoring schemes for assessing the welfare of small ruminants had not been available until a few years ago. Napolitano et al. (2009) have adapted a protocol scientifically validated for cattle, termed 'Animal Needs Index (ANI) 35 L 2000' (Bartussek et al., 2000), for the welfare evaluation of sheep. The protocol used resource measures, which included structural and technical elements (e.g. space allowance, feeding facilities) and showed to be feasible (mean time required to perform welfare assessment was 85 min per farm, with no sophisticated equipment necessary in both time-consuming and financial terms) and reliable (inter-observer reliability of the scores was high). As the ANI was a system mainly based on resource variables, several animal-based variables were tested for possible inclusion in the protocol. Avoidance distance showed high levels of convergent and scientific validity and intra-observer reliability (defined by Waiblinger et al., 2006). Lameness, integument alterations and body condition score were not tested for validity, but showed excellent intra-observer reliability (Napolitano et al., 2011), whereas good inter-observer reliability was noted for integument alteration, hoof overgrowth, lameness and dirtiness (Napolitano et al., 2009). Subsequently, monitoring systems with animal-based measures, dealing with behaviour, health and physiology of the animals or a combination of resource- or animal-based measures, have been developed to obtain a valid assessment of animal welfare (Welfare Quality® project).

The main objective of the AWIN was the development of animal welfare indicators in sheep, goats, horses, donkeys and turkeys. The overall research objectives were pursued through four work-packages (WP1: development of animal welfare protocols; WP2: study of the impact of pain and disease on animal welfare; WP3: study of the effects of pre-natal factors on development and welfare of the offspring; and WP4: promotion of research and education in animal welfare). These objectives focused on species that, although commercially relevant worldwide, had been overlooked in previous animal welfare assessments. Both for sheep and goats, the AWIN protocols were developed following a four-stage process: stage 1 included literature review (Battini et al., 2014a) and expert panel meetings to select the most promising candidate indicators for inclusion into the protocols, stage 2 included tests of selected indicators for validity, reliability and feasibility, stage 3 included development and testing of prototype protocols in commercial farms in various European countries and stage 4 included refinement of the prototypes, taking into account the outcome of the tests and advice from stakeholders. Stakeholders were involved during all these stages, through participation in conference meetings and participation to direct or on-line surveys, in order to increase the acceptability of the final protocols (Battini et al., 2014b).

AWIN welfare assessment protocols for sheep and goats used a two-level approach; the first level welfare assessment protocol consisted of a quick screening of the flock, including a selection of robust and feasible animal-based indicators collected with no or minimal animal handling. Depending on the outcome of the first level assessment, a second level, which consisted of a more comprehensive and an in-depth assessment requiring restraint of the animals and collection of individual data, was recommended. That approach was chosen, in order to increase the feasibility of the assessment.

For both species, selection of the indicators was based on the four principles and twelve criteria defined by the Welfare Quality® project, which covered all aspects of animal welfare. Animal-based indicators were selected whenever possible; when no valid, reliable and feasible animal-based indicators were available to cover welfare criteria, resource-based indicators were used.

For sheep, the animal-based measures taken at the first level were: qualitative behaviour assessment, quantitative behaviour assessment (e.g. social withdrawal, panting, stereotypy, and excessive itching), fearfulness assessed using human approach (minimum distance, flight distance, time to resume normal behaviour), physical assessment of fleece (cleanliness, quality), tail length (full, docked well, docked short) and lameness, whereas the environment was assessed outdoors (in terms of water supply, shelter provision, landscape) and indoors (in terms of water supply and stocking density). In addition, lamb mortality was recorded. At the second level, the following aspects were evaluated: gingival and eye mucosa (colour), eyes (e.g. presence of ocular discharge), body and head lesions, respiratory quality (e.g. coughing), fleece quality (e.g. fleece loss), coat (cleanliness), legs (e.g. injuries), body-condition scoring (as described by Russel et al., 1969), udder lesions and mastitis, tail (length), faecal soiling (on a 5-point scale), lameness (on a 4-point scale) and overgrown hoof (AWIN, 2015a,b). Details of welfare assessment indicators for first and second level assessment are described in Table 1 (sheep) or Table 2 (goats).

An innovative aspect of the AWIN protocols was the presentation of the outcome to farmers. First, in contrast to previous welfare schemes, the AWIN project decided to provide positive feedback to farmers by presenting the results of the assessment in terms of animals that did not present welfare problems. Further, the AWIN project aimed at giving results that could be of help to farmers to improve the welfare level, therefore the outcome was informative about the main welfare problems on the farm and did not produce an overall assessment score as in the Welfare Quality® project. For these reasons, the outcome consisted of a visual output that highlighted positive conditions and plotted the farm situation against that of a reference population, giving the possibility to the