

# AASRP Small Ruminant Session

## Overview of indicators to assess on-farm welfare of sheep and goats

**M.N. Hempstead**,<sup>1</sup> BS (Hons), PhD; **G. Stilwell**,<sup>2</sup> PhD, DVM, Diplom ECBHM; **P.J. Plummer**,<sup>1</sup> PhD, DVM, DACVIM, DECSRHM

<sup>1</sup>Veterinary Diagnostics and Production Animal Medicine, College of Veterinary Medicine, Iowa State University, Ames, IA 50011

<sup>2</sup>Animal Behavior and Welfare Laboratory, Center for Interdisciplinary Research in Animal Health, Faculty of Veterinary Medicine, Lisbon University

Corresponding author: M. Hempstead; mnh3@iastate.edu

### Abstract

The objective of this paper is to provide an overview of a number of useful indicators to assess on-farm welfare of sheep and goats in commercial systems. Assessing the welfare of production animals is vital to ensure that optimal conditions are provided by animal managers. Welfare is a multifactorial concept that is difficult to describe as there are multiple definitions and interpretations. However, welfare is generally concerned with an animal's quality of life and includes natural living, affective state, and biological functioning. Animal welfare assessment protocols for sheep and goats use a variety of animal-, management- and resource-based indicators of welfare. Management- and resource-based indicators are useful for on-farm welfare assessments, as they can be reliably and quickly measured; however, animal-based indicators may give a more accurate indication of specific welfare conditions, as they directly focus on the animal. Useful indicators should be valid, reliable, and feasible, and some examples include body condition scoring, hair/fleece condition, skin lesions, claw overgrowth, lameness, and the human-animal relationship. Identification of areas of welfare compromise is the first step in order to improve the welfare of sheep and goats on-farm.

**Key words:** welfare, animal-based indicator, goat, sheep, management

### Résumé

L'objectif de cet article est de donner un aperçu d'un certain nombre d'indicateurs utiles pour évaluer le bien-être à la ferme des moutons et des chèvres dans un élevage commercial. L'évaluation du bien-être des animaux de production est essentielle afin de s'assurer que des conditions optimales soient fournies par les gestionnaires des animaux. Le bien-être est un concept multifactoriel qui est difficile à décrire car il existe plusieurs définitions et interprétations. Toutefois, le bien-être a généralement pour objet la qualité de vie de

l'animal et inclus le milieu de vie naturel, l'état affectif et le fonctionnement biologique. Les protocoles d'évaluation du bien-être animal pour les moutons et les chèvres incluent une multitude d'indicateurs de bien-être centrés sur l'animal, la régie et les ressources. Les indicateurs centrés sur la régie et les ressources sont utiles pour les évaluations du bien-être à la ferme car ils peuvent être mesurés de façon fiable et rapide. Toutefois, les indicateurs centrés sur l'animal pourraient donner une idée plus précise sur des conditions de bien-être spécifiques car ils concernent directement l'animal. Des indicateurs utiles devraient être valides, fiables et pratiques comme par exemple l'indice de condition corporel, la condition du poil/manteau, les lésions sur la peau, la surcroissance des onglons, la boiterie et la relation humain-animal. L'identification de situations compromettantes pour le bien-être est la première étape afin d'améliorer le bien-être des moutons et des chèvres à la ferme.

### Introduction

Public concern for high standards of animal production has resulted in an increased demand for animals that are raised in a manner which encompasses good health, food safety, and respect for animal welfare.<sup>45,51</sup> Practices carried out on-farm that negatively impact animal welfare can affect consumer preference for animal products and whether they purchase them at all.<sup>20,28,44</sup> Although increasingly there is evidence to suggest that there is a discrepancy between ethical concerns for animal welfare and purchasing behavior, where despite consumers' concerns for animals, they make purchasing decisions based on price.<sup>10</sup> However, high standards of welfare are vital for improved animal performance, higher product quality and profit,<sup>48</sup> thus demonstrating the importance of good animal welfare for not only animals, but producers as well.

Welfare assessment programs utilize multiple indicators to evaluate the welfare status of animals. Welfare assessment has certain benefits including quantification of the impact of husbandry practices (e.g., disbudding, castration,

hoof trimming), legislation around animal management, and highlighting areas where animal managers are having success and also areas that could be improved.<sup>9</sup> Welfare Quality®, was a large-scale science-based European program designed for use in many production animals including cattle, swine and poultry, but did not include assessments for sheep and goats.<sup>6,9</sup> The Animal Welfare Indicators program was designed to evaluate welfare of production animals (e.g., sheep, goats, horses, donkeys and turkeys);<sup>1,2</sup> until such programs, assessment protocols for these species was limited.

Interpretation of animal welfare can be difficult, as there are many and varying viewpoints (e.g., The Five Freedoms,<sup>13</sup> 3 overlapping areas<sup>16</sup>). An inclusive model of animal welfare that depicts the quality of life of animals, encompasses ‘natural living’ where the animal is provided an environment to live as it would naturally, ‘feelings-based’, which concerns the affective state or feelings and emotions and ‘functioning-based’, which relates to health and functioning of an animal’s biological systems.<sup>16</sup> Animal welfare cannot be directly measured; however, it can be assessed by using a multifactorial approach and quantifying many variables to provide an accurate assessment. Welfare indicators must be valid (evaluate what they are meant to), reliable (consistent over time), and feasible (simple and practical to use on-farm).<sup>5</sup> In order to achieve accurate science-based information from welfare assessment, indicators should include 3 broad categories: animal-based, management-based, and resource-based indicators. The objective of this paper is to provide an overview of a number of useful indicators to assess on-farm welfare of commercially reared adult sheep in extensive systems and goats in intensive systems.

### Animal-based Indicators

Animal-based indicators assess the animal’s responses to husbandry conditions and may provide a more accurate indication of welfare than management- and resource-based indicators, as they focus directly on the animal.<sup>43,51</sup>

Body condition scoring (BCS) assesses the amount of muscling and fat development, and is a simple and repeatable method of monitoring changes in body fat reserves.<sup>14,46</sup> For sheep and goats, a numerical rating scale of 5 points is commonly used.<sup>30,31,32</sup> However, using a 3-point scale from obviously fat to thin may be sufficient, and improve reliability (between and within observers), which is important for all welfare indicators.<sup>4,8,36</sup> A low score is determined when energy expenditure exceeds nutritional status due to decreased intake, which may reflect an inadequate feed supply (or disease) or increased energy output.<sup>9</sup> Conversely, a high BCS can indicate overfeeding or excessive confinement.<sup>9</sup> Both extreme conditions significantly impact health and welfare.

Hair or fleece condition has been evaluated as an indicator of welfare for sheep<sup>2,30,31,36</sup> and goats.<sup>1,3,4,32</sup> In goats, poor hair coat can reflect the presence of ectoparasites, poor nutrition or ill health including chronic diseases such

as pneumonia or a mineral imbalance,<sup>1</sup> whilst poor fleece coverage in sheep can also indicate ectoparasites, disease, and rough handling,<sup>2</sup> which may result in thermal stress if the weather is bad.<sup>37</sup>

Thermal stress including prolonged excessive heat or cold can reduce welfare, health and production. Appropriate housing design (e.g., insulation, cross-wind ventilation, ceiling vents, electric fans) can reduce the effects of thermal stress. Heat stress may be present if animals have an elevated respiration rate or show signs of panting, and may reduce feed intake and production efficiency.<sup>1,2</sup> Goats affected by cold stress may have bristling hair along the back (i.e. horripilation) and may shiver with a cramped posture where the head and neck are lowered;<sup>1</sup> however, note that animals that undergo agonistic confrontations with others or are suffering from an illness may appear similarly.

Animal cleanliness is used as an indicator of welfare in cattle<sup>22,38</sup> and can impact the risk of mastitis.<sup>12,40</sup> Udder and teat cleanliness was identified as a key issue affecting lactating dairy goats on 24 farms in the UK.<sup>3</sup> Goats generally prefer dry, clean bedding when lying.<sup>5</sup> The effect of cleanliness on goat welfare has not yet been investigated. Coat cleanliness in sheep has been shown to be a useful indicator of welfare.<sup>30,36</sup> The presence of dirty sides, limbs, and udders may indicate inadequate management of bedding.<sup>9</sup>

Fecal soiling in goats and sheep is characterized by fecal material becoming attached to the hair/wool surrounding the tail and anus area. It is generally more common for sheep than goats to have loose, moist feces that can stick to the wool and become dags, which can dry without falling off.<sup>39</sup> Dags increase the risk of cutaneous myiasis or flystrike,<sup>7,24</sup> which is a significant welfare concern in sheep.<sup>35</sup> Fecal soiling can indicate a nutritional imbalance or endoparasites in goats.<sup>1,2,5</sup>

Mastitis is a painful condition in lactating animals that negatively affects animal welfare, health, and production.<sup>15,29</sup> Feasible on-farm assessment of mastitis includes evaluating udder asymmetry, which may indicate a previous bout of mastitis. For dairy goats, if one-half of the udder (not including the teat) is 25% longer than the other, that denotes asymmetry.<sup>1</sup> Of course, there are slight udder asymmetries that occur naturally and may not necessarily be associated with mastitis, therefore only exaggerated differences should be recorded.

Counting the number of animals with lesions (including damaged skin and swellings) or abscesses in a herd can be a useful indicator of poor health in sheep and goats.<sup>3,5,31</sup> Previous welfare assessments of sheep and goats observed lesions/abscesses that resulted from injuries or sunburn,<sup>31</sup> infection,<sup>32</sup> and diseases such as caseous lymphadenitis in goats or sheep.<sup>4,53</sup> High prevalence of lesions or abscesses in goats may also result from heat stress, inappropriate housing conditions or injuries caused by other animals with horns/scurs.<sup>5</sup> In sheep, causal factors may be related to age (i.e. older than 1 year increases prevalence), increased duration with other sheep shortly after shearing, and dips for ectoparasites.<sup>53</sup>

Ocular and nasal discharge can reflect either an inadequate environment, such as excessive particulate in the air, high ammonia levels or disease states (e.g., infection) and can be observed clearly without the need for restraint.<sup>1,3</sup> Ocular and nasal discharge was reported in 1.9% and 5.7%, (respectively) of goats on 30 Italian farms,<sup>4</sup> and 9% and 4.5% (respectively) of goats on 30 Portuguese farms.<sup>8</sup>

In sheep, tails are routinely docked to reduce the risk of flystrike; however, tails may be docked too short. A recent study reported that 85.7% (5318/6200) of sheep had excessively shortened tails.<sup>31</sup> A tail should be long enough so that it covers the anus and vulva. Therefore, scoring tail length based on a 3-point scale (undocked, docked, and short-docked) can evaluate the efficacy of the tail docking procedure.<sup>2,31</sup>

The human-animal relationship (HAR) is vitally important as animal managers have a key role in sustaining the health, welfare, and production of the animals in their care.<sup>17</sup> For a comprehensive review of the human-animal relationship in farmed species see Waiblinger and others.<sup>49</sup> Fear of humans, often caused by negative handling, can lead to reduced milk yield or milk let-down in dairy goats, and gentle handling of lambs during rearing resulted in greater weight gains.<sup>27,33</sup> Sheep that are fearful of humans due to limited human contact and handling, may be more challenging to manage during transport and pre-slaughter periods.<sup>18</sup> It is possible to assess the HAR of commercial sheep and goats by either recording the minimum distance between an approaching familiar human and sheep or a latency to approach test, which measures the time taken for goats to approach and contact an unfamiliar human in their pen.<sup>1,2</sup> Goats that are more fearful of humans due to negative or rough handling are more likely to have a larger distance or latency to approach time than animals that have been positively or gently handled.<sup>23</sup> Additionally, sheep that received gentle handling had a lower flight distance than those that received rough handling.<sup>19</sup>

Feeding behavior at the feed bunk can be assessed by counting the number of animals queuing behind others over a period of time. Queuing behavior can indicate insufficient space at the feed bunk or that the feed is not spread evenly along it.<sup>1</sup> Goats are gregarious and tend to perform activities at the same time as others, and their welfare may be decreased if they are prevented from doing so. Additionally, proper feed bunk design should allow for animals to stand during feeding, whereas poorly designed feeders may result in kneeling as the feed may be too low (or the pen floor too high).

Overgrowth of claws can result in impeded locomotion and irregular gait, which may cause long term unfixable damage to the bones in the foot and lower leg. Overgrown claws are usually the result of a lack of wear of the hooves or insufficient hoof trimming. Excessive claw growth (where the hoof resembles an elf shoe) may be easier to identify in the pens; however, mild and moderate claw overgrowth can be evaluated during milking, where the hoof is on a flat surface (i.e. without bedding).<sup>3</sup>

Lameness can be caused by claw overgrowth (with or without deformation) or diseases that affect the claw, skin or joints, such as interdigital dermatitis and foot rot in sheep or caprine arthritis-encephalitis in goats.<sup>21,42,54</sup> Furthermore, lameness is an important behavioral indicator of pain,<sup>25,34</sup> to the authors' knowledge there are no studies assessing pain associated with lameness in goats. Small ruminant gait scoring systems to detect prevalence and degree of lameness use either a 4-point (sheep,<sup>3,30</sup> goats<sup>21,32</sup>) or 5-point scoring system (goats,<sup>11</sup> sheep<sup>52</sup>). Most scoring systems require a definite limp to be observed to classify an animal as lame.<sup>3,21,32</sup> However, gait-scoring individual animals may be challenging due to the level of training required and differences in management and resources across farms;<sup>11</sup> therefore, quantification of animals with severe lameness may be more beneficial for evaluating welfare status.<sup>1</sup> An alternative to lameness scoring goats using a modified visual analogue scale instead of a numerical scale, may improve validity.<sup>47</sup> The location of lameness monitoring can impact lameness prevalence as estimates are often lower when evaluated in pens that have soft bedding,<sup>4</sup> compared with observations of goats exiting the parlor, where flooring is usually concrete.<sup>3,11</sup> Lameness may be worsened (or more apparent) when walking on hard surfaces.<sup>3</sup>

Disbudding is a common husbandry practice carried out on dairy goat farms, usually with a hot cautery iron. If disbudding is not performed correctly (i.e. disbudded when the horn buds are too large), then incomplete horn growth or scurs may result.<sup>42</sup> Scurs can become stuck in housing structures and break off or grow toward the head or eyes, both resulting in pain and injuries.<sup>5</sup> Horned and hornless goats should not be housed together as there may be increased aggression, which may be directed towards those without horns, and may lead to injuries.<sup>50</sup> The number of animals with scurs and horns can be counted to reflect disbudding efficacy and the level of mixing of horned and hornless goats.

### Management-based Indicators

Management-based indicators assess how animals are managed by their human handlers and can be collected in an objective manner. Management of sheep and goats includes husbandry practices (e.g., disbudding, castration, tail docking), environmental cleanliness, feed distribution, quality and amount, and regular specialist care (e.g., veterinary treatment). Poor management can reduce animal welfare and may lead to aggressive or fearful behavior, which can impact on routine management practices (e.g., handling, mustering).

It is common for farmers to use straw, corn stalks or wood chip/saw dust to bed animal pens, which may not allow for regular hoof wear, compared with harder surfaces (e.g., concrete). However, sufficient bedding is required for comfort around resting, and patches of bare floor in the lying areas should not be visible. Additionally, cleanliness of bedding can affect lying behavior and can be scored.<sup>1</sup>

Other management-based indicators that could be assessed may include cleanliness of the water troughs, feeders, access ways and the milking parlor, whether farmers have a vaccination program, level of record keeping, euthanasia practice, protocols for protection from harsh weather, and use of pain relief; these indicators could be asked in a survey.

### Resource-based Indicators

Resource-based indicators can be assessed objectively and are concerned with the resources available to the animal; these indicators include quantity and quality of the feed, water supply, space per goat in the lying areas, outdoor spaces, and any other resource of value to an animal. Assessment of stocking density and shelter from extreme climates can be reliable measures of welfare for both sheep and goats.<sup>9</sup> It has been suggested that a stocking density of < 21.5 ft<sup>2</sup> (2 m<sup>2</sup>) may increase mastitis prevalence and reduce milk yield in sheep.<sup>41</sup> Furthermore, goats spent less time feeding in pens stocked at 10.8 ft<sup>2</sup> (1 m<sup>2</sup>)/goat compared to 21.5 ft<sup>2</sup> (2 m<sup>2</sup>)/goat, which demonstrates reduced production efficiency.<sup>26</sup> Further research on stocking densities and the effect on animal welfare are required.

Water availability is vital, especially in the extensive environments that small ruminants are often farmed. Where waterers are visible, it is important to check that they are in good working order and multiple waterers are available to reduce crowding.<sup>1</sup>

### Summation of Welfare Indicators

Once a variety of indicators of welfare have been evaluated on-farm, conclusions on the welfare status should be made, highlighting any areas for concern. A discussion with the producer on key findings of the welfare assessment, often combined with a report presenting the information visually may be useful. Visual feedback can effectively highlight areas of positive welfare as well as areas that can be improved.<sup>1,2</sup>

### Conclusions

Indicators of welfare for sheep and goats should be valid, reliable, and feasible. The indicators outlined in this paper can be used without the requirement for animal restraint and be conducted in the home pen, which both can reduce stress. Based on available literature, animal-based indicators such as body condition scoring, hair/fleece condition, skin lesions, claw overgrowth, lameness, and the human-animal relationship may give a more accurate evaluation of welfare than management- and resource-based indicators. Identification of areas of welfare compromise is the first step in order to improve the welfare of sheep and goats on-farm.

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