Assessment of farm animal welfare at herd level

many goals, many methods

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Assessment of farm animal welfare at herd level: many goals, many methods[1]

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Abstract

This paper describes and compares nine methods of assessing the welfare of farm animals at herd level. A distinction is made between two types of welfare parameter: the environmental and the animal-based. The relative weight of these parameters, together with variation in their measurability, explains many of the differences between the methods with which the paper is concerned. To discuss the merits of a given method it is necessary to look at the goal it is intended to serve. Some methods compare production systems well. Others are better used in assisting the individual farmer to improve the welfare of animals within his production system.

Keywords: certification, evaluation, farm animals, housing systems, indicators, well-being.

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Introduction

Background

During the last few decades increasingly sophisticated interest in the welfare of farm animals has developed. At the same time there has been a move towards more welfare-friendly housing systems. Examples of this are loose housing systems and stables with deep litter for dairy cows, group housing for pregnant sows, and large floor systems with access to outdoor facilities for laying hens. These so-called welfare-friendly housing systems provide generous space and other conditions which encourage animals to express their natural behaviour. Potentially the animals can experience a high level of welfare as a result. In some countries, government subsidies for farmers are linked to guarantees of high welfare standards on the farm. Typically, meat and other animal products coming out of welfare-friendly housing systems are labelled and sold at a higher price than alternatives which have been 'conventionally' produced. But if consumer and government trust is to be secured, some control of the level of welfare is necessary. Consequently, there is a need to develop methods which can be used to assess the level of welfare in farm animals.

Aim and main hypothesis of this paper

This paper summarises nine methods of assessing the welfare of farm animals at herd level. (Some of these methods are described in more detail elsewhere in this volume.) The methods were developed in Europe. They all claim to assess animal welfare, of course, but they are very different and this difference may be due, in part, to the fact that they have different goals. We suggest that descriptions, comparisons and indeed validations of methods of welfare assessment are inevitably *relative* to the features the methods are designed to measure, and that variations in methods for welfare assessment may to a great extent be explained in the light of this hypothesis.

Methodology

The study draws on available literature on the nine welfare assessment methods. However, since some of the methods are still under development, interview transcripts are also used. For each assessment method (with one exception: see below) a key person working with that method was interviewed. All of the interviews were conducted by the same interviewer and carried out according to a standard guide. The interviews were recorded on tape, and subsequently a written transcript was prepared for each recording. It should be noted that none of the key people working with the French project 'On-farm assessment of dairy cows' welfare' were interviewed, and that the description of the method is based entirely on a presentation of the method at the workshop 'Assessment of Animal Welfare at Farm or Group Level' (August 27-28, 1999) in Copenhagen.

Types of welfare parameter

Methods for assessing animal welfare at herd level are in general based on a range of welfare parameters. In principle these parameters can be divided into two categories. One category, the environmental parameters, describes *features of the environment and management*, such as length of stalls, feeding and drinking facilities, space allowance, quality of litter, and access to pasture. Assessment is fairly uncomplicated because environmental parameters are relatively easy and quick to record, and because the recordings can usually be repeated without difficulty. It is also true that records of welfare problems based on environmental parameters often serve as an excellent basis for problem solving. Measurements in the second category, of animal-based parameters, record *animals' reactions* to specific environments. Thus, animal-based parameters fall within the categories of behaviour, health, and physiology. Level of stress hormones, aggression, fear and abnormal behaviour, symptoms of acute disease, and mortality are examples of such parameters. Animal-based

parameters are in one sense more direct measures of welfare than their environmental counterparts, since they each register a state of the animal itself. This may be thought to favour them. However, the recording of some of the animal-based parameters is difficult and demands considerable resources, and even when they are recorded the results may be difficult to interpret and therefore less suitable for welfare assessment. These last drawbacks certainly attach to physiological and behavioural parameters. Behavioural parameters can take a great deal of time to record. Special tests developed for assessment of the rising behaviour (Sørensen et al., 1998) and human-animal relationship in dairy cattle (Waiblinger, 1996) are time consuming in this way. However, this situation may change, since more and more devices are now available to automatically record behaviour of an animal as well as of groups of animals. By contrast, methods of measuring animal health parameters are in general more practicable. Here the relevant data are often available from databases of health records based on registrations made by, for example, the local veterinarian.

It is generally accepted that both sets of parameters – environmental and animal-based – are important indices of animal welfare, and that the most valid assessment of animal welfare is obtained when parameters of both kinds are used in combination.

Methods of assessing animal welfare at herd level

The majority of the methods reviewed below have been developed to investigate or certify the impact of the housing system on animal welfare. Six methods aim to assess animal welfare in a particular farm animal species, and three are intended to assess welfare in more than one species. An overview of the methods – which cover welfare assessment in horses, pigs, cattle, and poultry – is provided in Table 1.

Table 1. Methods of assessment of farm animal welfare at herd level

Title of method:project	Group of animals	Characteristics of the method	Aim of assessment	Result of assessment	Status of project	Country
1. TGI 35L (Tiergerechtheitsindex 35L)	Cattle, pigs, laying hens	Index system for on farm welfare assessment	Certification of housing in respect to welfare in organic farming	Welfare score	Implemented in legislation	Austria
2. TGI 200 (Tiergerechtheitsindex 200)	Cattle, pigs, laying hens	Index system for on farm welfare assessment	Certification of welfare in organic farming Advisory tool	Welfare score	Used by organic organisations	Germany
3. Welfare assessment in ''Ethical Accounting''	Cattle, pigs	Multidisciplinary expert based assessment	To provide an advisory tool for the farmer	Welfare report	Completed research project	Denmark
4. The impact of housing systems on welfare in dairy cattle	Cattle	Monitoring system Epidemiologic approach	Investigate the impact of housing systems on animal welfare	Welfare status report	Ongoing research project	Switzerland
5. On-farm assessment of dairy cows' welfare	Cattle	Multidimensional approach to welfare	Evaluation and certification of welfare on individual farms	Multiple welfare scores	Ongoing research project	France
6. Decision support system to assess the welfare status in farm animals	Pigs	Computer model combined with scientific knowledge base	Certification of welfare Evaluation of housing systems	Welfare score	Ongoing research project	The Netherlands
7. Evaluation and certification of housing systems for horses	Horses	Test concept based on test tradition from psychology and social science	Certification of welfare on individual farms Evaluations of housing systems	Multiple welfare scores	Completed research project	Switzerland (Germany)
8. Dispensation programme for battery cages	Laying hens	Dispensation programme for phasing out battery cages	To evaluate individual farms	Welfare score	Completed programme	Sweden
9. Testing alternative housing systems for laying hens	Laying hens	Testing programme for new housing systems	Evaluation of housing systems	Final report includes welfare	Completed programme	Sweden

Index systems of welfare assessment

The 'Animal Needs Index', 'Tiergerechtheitsindex' (TGI), was developed in Austria during the 1980s into TGI 35L, an Austrian version of the index system (Bartussek, 1999). It was later reworked in Germany, which produced a German version, TGI 200 (Sundrum et al., 1994). Both systems assess the impact of the housing system on animal welfare. Index systems have been developed for assessing welfare in cattle, pigs, and laying hens, especially with regard to organic production. They assign scores to selected aspects of the animal's environment and farm management, and these scores are summarised in an overall welfare score. The higher the score, the better the welfare. Environmental and management parameters constitute the main part of the index system, and only a few animal-based parameters are included in the assessment. Index systems are flexible in the sense that, as long as pre-defined minimum standards are kept, the system makes it possible to compensate a low score within one area with a high score within another area. A prescribed minimum level of welfare can thus be reached in different ways. The parameters are recorded on the farm in about an hour by specially trained inspectors. Farms are visited once, and the overall welfare score is calculated on the basis of data gathered during this single visit. In general, index systems are highly practicable and highly repeatable (Schatz et al., 1996; Hörning, 1998a; Amon et al., 2000). TGI 35L and TGI 200 have much in common, but they are not identical. Detailed comparison of the two index systems is now available (e.g. Hörning, 1998b; Van den Weghe, 1998). In the following two sub-sections sketches of TGI 35L and TGI 200 are offered.

1. TGI 35L

TGI 35 L was developed as a means of certifying the level of animal welfare on farms. Today it is used in controlling organic husbandry in Austria and in the implementation of animal welfare

legislation in two federal provinces of Austria. In TGI 35L points are assigned to five areas of the housing system and management: 1) possibility of movement, 2) social contact, 3) quality of floor, 4) climate, and 5) stockman care. Parameters relevant to feeding are not included in TGI 35L, because it is assumed that there is no economic incentive in not feeding animals properly. Very restrictive housing systems, such as battery cages for laying hens, cannot be assessed by TGI 35L, because the scoring system requires certain minimum standards to be fulfilled (e.g. minimum spatial requirements). The parameters are almost exclusively environmental, and each is awarded points between -0.5 and 3. These are combined to reach an overall welfare score and at this level, there is a maximum score of 45.5 points. (An earlier version of TGI 35L had a maximum of 35 points, and the name was not abandoned when the maximum score was changed to 45.5 points; instead the L, which stands for 'long version', was added to the name.) TGI 35L operates with six categories of welfare. A score of less than 11 points defines a level of welfare as 'not suitable', and scores rise from here through the following categories: 11-15 (scarcely suitable), 16-20 (somewhat suitable), 21-24 (fairly suitable), 25-28 (suitable), and 28-plus (very suitable). In Austria existing organic farms must obtain a minimum of 21 points and new housing systems need more than 24 points (Bartussek, 1999).

2. TGI 200

TGI 200 was developed as a method for on-farm welfare assessment which would allow farms to be compared. However, TGI 200 goes beyond certification. It also aims to provide advice and support for farmers on how to improve animal welfare at herd level (Sundrum, 1997). In TGI 200 scores are assigned to seven different aspects of the housing system and management: 1) locomotion, 2) feeding, 3) social behaviour, 4) resting, 5) comfort, 6) hygiene and 7) stockman care. In pigs, the assessment is supplemented with parameters relating to defecation and urination, and in laying hens,

parameters relating to nesting behaviour are included. All parameters are measured and assigned points between 1 and 7 (Sundrum et al., 1994). The maximum score achievable is pre-defined by the housing system – the more restrictive it is, the lower is the maximum that can be obtained in the assessment. A maximum of 200 points can be obtained in loose housing systems with access to pasture. In the nature of the test, it is only housing systems permitting a certain degree of welfare that can be assessed by TGI 200. Assessments of welfare in very restrictive housing systems, such as crates for sows and battery cages for laying hens, cannot be carried out.

3. Welfare assessment in ethical accounting

In the project 'Development of Ethical Account for Animal Husbandry' a prototype of welfare assessment was developed for dairy and pig farms (Sørensen et al., 1998). The original project concluded in 1997, but a descendant of it is still running. The prototype method aimed to provide the farmer with detailed information about welfare status on the farm. This information might then be used to guide the farmer in improving such welfare. Assessments of welfare were based on information from four sources: 1) the housing system, 2) the management, 3) records of animal behaviour, and 4) records of health, i.e. records of clinical symptoms and centrally registered health data. The environmental, management and behavioural parameters were recorded every second week by trained technicians, and each recording session lasted between one hour and one hour and 30 minutes, depending on herd size. Four times a year special tests measuring fearfulness of humans were conducted on a sample of animals in each herd. A veterinarian carried out clinical examinations of all animals in the herd every fourth month. These examinations took between one hour and one hour and 30 minutes. Additionally, records of routinely recorded veterinary treatments were collected. The results of the welfare assessment were presented to the farmer in an annual welfare

report consisting of individual measurements and an aggregated text-based description of welfare status on the farm as a whole. As well as receiving this report, the farmer was informed about changes in animal welfare status since the previous year. He was also advised on how the overall welfare on the farm could be improved. The method of assessment did not allow welfare-levels on different farms to be compared, nor did it certify a welfare standard.

4. The impact of housing systems on welfare in dairy cattle

In Switzerland dairy farmers receive financial support from the government if their housing systems, or management procedures, are considered welfare-friendly (e.g. involve a loose housing system, regular grazing or outdoor exercise). The effect such programmes have on animal welfare at farm level is investigated in a research project at the Swiss Federal Veterinary Office which aims to guide and support future improvements. The welfare assessment method here is based on: 1) a description of the housing system, 2) an interview with the farmer, 3) behavioural observations, and 4) clinical examination of the cows. The clinical examination focuses on injuries, hoof or claw health, and general body condition. During behavioural observations, the behaviour of the cows while lying down and standing up, and their reaction to handling, is recorded. In total, half of the recorded parameters are animal-based. Scientists gather data during four visits to the farm over a two-year period. Each visit lasts two hours. The influence of the different housing systems and management procedures on animal welfare is analysed in a multivariate statistical analysis, and the results of the analysis provide information on which aspects of the housing system affect animal welfare significantly at herd level. The results of the project are mainly used to influence political decisions, but farmers who participate in the project also receive information on the health status of their herds.

5. On-farm assessment of dairy cows' welfare

This method of assessment was developed in a research project in France. It uses a multi-dimensional diagnostic tool which can be exploited to evaluate animal welfare on farms (Capdeville & Veissier, 2000). Dimensions of welfare are defined in terms of the so-called 'five freedoms': 1) freedom from hunger and thirst, 2) freedom from discomfort, 3) freedom from pain and injury, 4) freedom from fear, and 5) freedom to express normal behaviour. On the basis of the five freedoms, 42 animal-based parameters are derived, such as movement, injuries, and interaction between animals. The 42 parameters are further subdivided into 104 patterns or modalities. For example, a lying-down movement can appear in three modalities: 1) normal, 2) intentional and 3) interrupted. In accordance with pre-defined levels, the occurrences of these modalities at herd level are rated on a scale from A (excellent), to B (correct), to C (insufficient), and D (unacceptable). Ratings of modalities belonging to the same parameter are amalgamated into a single result. Scores for parameters belonging to the same freedom are then themselves amalgamated. The overall welfare assessment is presented in terms of the five freedoms. For example, welfare in a given herd may be interpreted as satisfactory with respect to expression of normal behaviour and insufficient with respect to level of injuries.

6. Decision support system to assess welfare status in farm animals

A prototype method based on scientific research which is designed to assess, and guide decisions which promote animal welfare is being developed in the Netherlands (Bracke et al., 1997, 1999). The method focuses on welfare assessment in housing systems and uses a model developed for pregnant sows in crates. It can, however, be applied to all farm animal species and any housing system. It is not clear whether the method can also be used to assess animal welfare at farm level. Together with a description of the housing system, the model aims to calculate an overall welfare score. This score is based on a combination of scientifically based data on how individual environmental factors

influence behaviour, physiology, health, and production in animals, on the one hand, and propositions concerning animal needs, on the other. Many different combinations of environmental factors may result in identical welfare scores. The scientific data can be traced back to published papers. Similarly, the propositions about animal needs are founded in welfare literature. In the original model 12 needs appear (including food, health, resting, rooting, and social contact). The scientific database can easily be supplemented and updated with relevant new findings. Likewise, the impact of a different list of needs, or a different organisation of the needs, can easily be investigated.

7. Evaluation and certification of housing systems for horses

In this method of assessment the aim is to evaluate different housing systems for horses (Beyer, 1998). The method cannot be used to make direct comparisons between different housing systems. Instead, all results are compared to a standard mean value which is itself based on an investigation of levels of welfare in a representative group of horse stables. The majority of parameters in the assessment are environmental features. The bodily condition of the horse is the only animal-based parameter included. All parameters are awarded 0-4 points, where 4 represents the welfare-optimal situation. Values relating to parameters belonging to the same field (such as the housing system) are agglomerated in a single result. For each housing system, welfare estimates are calculated in three fields: 1) the housing system itself, 2) the management of the housing system, and 3) management of the exercise yard. These estimates are interpreted individually. They are then presented in relation to an overall mean value as a cross on a scale. Thus, the assessment indicates each farm's situation relative to what, in welfare terms, is the average situation in housing systems for horses. One establishment may thus be found to have a better housing system than average, while at the same time

suffering from worse than average management of the exercise yard. The assessment scheme involves 45 questions in total and can be carried out within one hour.

8. Dispensation programme for battery cages

The conventional battery cage for laying hens was banned in Sweden on 1 January 1999. The ban will come into effect gradually: a dispensation programme has been introduced permitting farmers to use battery hens for up to three further years – until January 2002 – as long as certain conditions are met. These conditions, which are stringent, are designed to ensure that the birds enjoy the best possible welfare under the circumstances. The dispensation programme was developed by a working group consisting of representatives from science, the poultry industry, and the Swedish Board of Agriculture. The programme includes a legislative part and an evaluative part. In the former, all the basic conditions governing continued battery farming are inspected and confirmed. In the latter the following areas are evaluated and assigned points: 1) the condition and health status of the birds, 2) the quality of the caging, 3) the climate and air quality, 4) the buildings, and 5) management of the system. The inspection is carried out once by specially trained inspectors and takes approximately four hours. In total, 12 requirements arising from the legislation must be satisfied and 24 evaluation features are awarded points which are themselves weighted according to their importance. Approximately 75% of the points relate to features of the housing system. The findings of the evaluation are expressed as a percentage of a maximum of 860 points (Keeling and Svedberg, 1999).

9. Testing alternative housing systems for laying hens

In Sweden all new housing systems and equipment must be tested and approved on animal health and welfare grounds before being made available for use. It was originally intended that the assessment method here would be used to evaluate new housing systems for laying hens, but the principles are now being applied, more widely, in the testing of all new housing systems and equipment in Sweden. The method consists of experimental investigations and on-farm inspections (Algers et al., 1995; Ekstrand et al., 1997). It draws mostly, but not exclusively, on records of animal-based parameters, such as production, health, mortality, and behaviour. In the method's original application, bird health was studied at clinical inspections according to a methodology developed for this purpose (Gunnarsson et al., 1995). Researchers, who visit the farms several times during the production cycle, carry out the assessment. Clinical examinations are carried out three times and each examination lasts between two to three hours. Minimal criteria set by the Swedish board of Agriculture must be satisfied if approval of the new production system is to be obtained. Whether or not a new production system is approved depends on the interpretation of all relevant data by the Swedish Board of Agriculture.

Discussion

Goals for welfare assessment at herd level

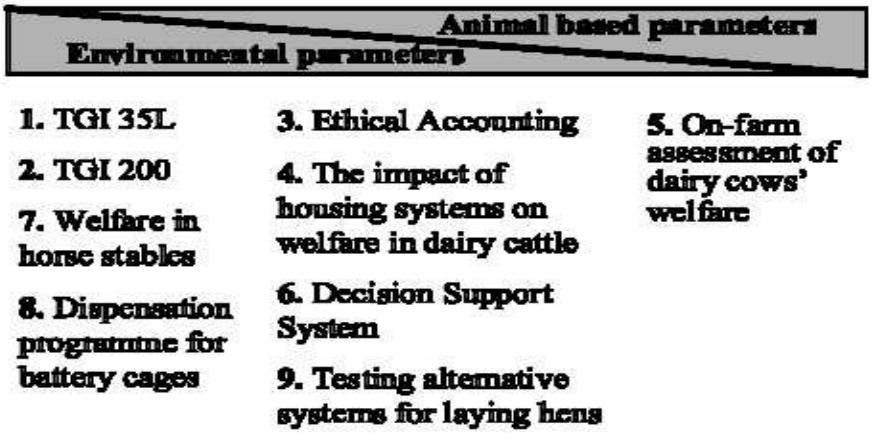
As suggested earlier there appear to be several goals for welfare assessment at herd level. The goals underlying the nine described methods of assessment cover: 1) the certification of welfare on individual farms, 2) the certification of welfare for a group of farmers, 3) the evaluation of housing systems, 4) the diagnosis of welfare problems on individual farms, and 5) the provision of advice to the farmer. Of course, a complete list of possible goals in welfare assessment might well be longer.

Thus, welfare assessment at herd level does not have a single, clearly defined goal: the goals vary with the methods of welfare assessment, and moreover, some methods serve more than one goal. The welfare parameters that are selected with particular goals in mind also display considerable heterogeneity. It is important that this diversity is borne in mind when methods of welfare assessment at herd level are being compared.

Possible validation of welfare parameters

It is clear, then, that the methods of welfare assessment reviewed here use quite different environmental and animal-based parameters – and in various combinations. Some methods are primarily based on environmental parameters, whereas others combine records of the environment with records of the animal itself (see Figure 1). In general, at least 50% of the parameters are environmental and managerial. In only one case is the assessment method based primarily on animal-parameters. The housing system is without question a very important determinant of animal welfare on farms. Likewise, at farm level, management has a significant effect on welfare, since it determines how the housing system is actually used. Therefore, it is hardly surprising that records of environmental and management parameters play a significant role in all nine of the assessment methods described here. It should be remembered, however, that a farm's environment and management routines do not necessarily determine animal welfare, and that huge variation in animal welfare may be found among farms with similar production systems (Sandøe et al., 1997). This variation can only be monitored if the way animals react to living in the specific environment is examined and recorded, i.e. if animal-based parameters are brought into play.

Figure 1: Combination of welfare parameters in methods for assessing farm animal welfare at herd level.



It may be questioned whether methods of welfare assessment that are primarily based on environmental parameters are valid. The answer depends on what the methods are intended to measure. As has already been mentioned, questions about validity cannot be answered without reference to the goal of the method. If the goal is to evaluate the production system across farms, or to certify that the conditions of the housing system are as they are claimed to be, then it may be sufficient to examine environmental parameters. However, if the goal is to reveal welfare problems at herd level and to provide advice of how to improve welfare on the farm, then records of environmental parameters must be combined with records of animal-based welfare parameters. As is shown in Figure 1, this last approach is taken in several methods of welfare assessment.

In the nine methods reviewed here, the selection of welfare parameters is generally based on scientific findings which link the parameters to welfare problems. The scientific findings derive either from scientific literature or from interviews with scientists working in the field of animal welfare – so-called 'welfare experts'. In some cases, interviews with welfare experts also serve as part of the validation of the welfare parameters. For example, a welfare parameter is included in an assessment of welfare only when the experts agree that the parameter is of importance for animal welfare (i.e. when there is *content validity*). In addition the parameters must be *reliable* – that is, valid when successively repeated with different observers over time. However, matters other than genuine validity, such as scientific background, tradition, availability of resources, and the possibility of quantifying the parameter in a limited time, often determine the selection of parameters. The possibility of quantifying a parameter in a limited time is obviously an important factor so far as the practicability of a method is concerned, and when welfare assessment is viewed as a tool which must be used within a certain time limit, practicability becomes a major concern. Consequently practicability has a huge impact on the selection of welfare parameters, and often this favours the selection of environmental parameters.

To validate a method for assessing animal welfare at herd level it is important to specify the goal and the required degree of practicability. It does not make sense to ask simply whether a method is valid. A method which is based on a limited number of measurements may, for example, serve to give a good estimate of the average welfare level in one kind of production system, but it may be quite unsuitable when a farmer needs to find ways of improving the welfare of the animals on his particular farm.

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