

## Welfare quality applied to the Brazilian dairy cattle

*Qualidade do bem-estar aplicada a bovinos leiteiros brasileiros*

Guilherme Amorim Franchi ▪  
Paulo Rogério Garcia ▪ Iran José Oliveira da Silva

**GA Franchi** (Corresponding autor) ▪ **PR Garcia** ▪ **IJO Silva**  
Animal Environment Research Nucleus, Department of  
Biosystems Engineering, University of São Paulo, Pádua  
Dias avenue, 11, PO Box 9, 13418-900, Piracicaba, Brazil.

email: guilherme.franchi@usp.br

Received: 19 March 2014 ▪ Revised: 21 April 2014 ▪ Accepted: 21 April 2014

**Abstract** Due to the necessity of establishing animal welfare standards for the Brazilian dairy sector in harmony to the new consumer's requirements and legislation, it was drawn up the project Welfare Quality (WQ) - Brazil, based on the proposed project Welfare Quality® European Union for dairy cattle. The assessments of animal welfare were performed in seven dairy farms at São Paulo/Brazil. They were selected in order to represent the main types of dairy farms found in Brazil. To carry out the project, it was used the evaluation protocol of welfare in Dairy Cattle Welfare Quality® Assessment Protocol for Cattle, which is based on the principles of Good Feeding, Proper Installation, Good Health and Appropriate Behavior. The protocol defines four possible categories for the assessed dairy farms: Not classified, Acceptable, Enhanced or Excellent. Only one farm received category "Acceptable", while the others received category "Enhanced". A highlight is the unsatisfactory score for the principle "Appropriate Behavior" received by four farms. Possible reasons are inappropriate animals handling, assessor subjectivity and/or protocol's subjectivity. To this final point, some emotion standards are vague and do not describe how animals should behave for each type of situation during evaluation. Finally, it can be concluded that the European protocol for the Evaluation of Welfare in Dairy Cattle Welfare Quality® may be used in Brazilian dairy farms provided there is previous assessor training and adaptation of some points to be feasible to Brazilian dairy sector.

**Keywords** Brazil, dairy, evaluation, welfare

### Introduction

For a long time researchers sought to solve the challenges of dairy farming, concentrating attention on maximum genetic potential animal exploitation, both productive and reproductive. However, currently, a new front

**Resumo** Baseando-se na necessidade do estabelecimento de padrões para o sistema brasileiro de produção animal, elaborou-se uma proposta contextualizada do Projeto Welfare Quality (WQ) – Brasil, baseada na proposta do Projeto Welfare Quality® União Europeia para bovinos de leite. As avaliações de bem-estar animal foram realizadas em 7 unidades, de diferentes níveis tecnológicos, no Estado de São Paulo/Brasil. Para tal, foi utilizado o protocolo de Avaliação de Bem-Estar em Bovinos de Leite Welfare Quality® (Assessment protocol for cattle, 2009). Os principais aspectos relacionados ao bem-estar em um sistema de exploração animal foram transformados em diversas medidas mensuráveis com base nos princípios da boa alimentação, boa instalação, boa saúde e comportamento apropriado. Feita a avaliação, é atribuída à unidade de produção uma categoria de bem-estar: excelente; bom; aceitável ou não classificada. Apenas uma propriedade obteve a categoria de BEA "Aceitável", enquanto que as demais obtiveram a categoria de BEA "Bom". Conclui-se que o protocolo europeu de Avaliação de Bem-Estar em Bovinos de Leite Welfare Quality® pode ser utilizado para a pecuária leiteira nacional desde que seja feito treinamento prévio. Entretanto, necessita-se a formação de novos protocolos mais específicos para os diferentes sistemas produtivos encontrados no país.

**Palavras-chave** Brasil, bovinocultura leiteira, avaliação, bem-estar

of research comes forward and standing out in this scenario, the animal welfare, associated or not to the productive aspects (Broom, 1986).

Advance in studies on animal welfare has been sharpening the critical sense of the population about the

suffering of animals. Added to the requirements listed in the consumer market, such as food security and food quality, the concern with environmental preservation and good practices in livestock production, gradually assume a prominent position in this list. From the moment the consumer considers the animal suffering as a factor of relevance, it provides animal welfare a given economic value, becoming an integral part of the economic calculations of animal products (Molento, 2005).

Numerous negative features can be identified as critical points regarding the welfare of cattle production. Some are inherent to the systems in question and the genetic load for high production. However, on the other hand, there are problems related to the low level of welfare, such as malnutrition, which is able to permeate any system and which could be perfectly avoidable (Broom and Molento, 2004).

To suit the conditions of animal welfare, there are criteria that must be observed. The animals need to have their feed provision consistent with their needs, easy access to drinking bowls and troughs, and total freedom of movement (Butler and Smith, 1989). In addition, the environment should provide thermal comfort conditions for animals (Paranhos da Costa, 2000), sufficient size in the rest area (Lawrence and Appleby, 1996), maintain standards of hygiene and cleanliness in order to avoid the proliferation of pathogenic microorganisms (Fonseca and Santos, 2000; Barkema et al., 1998; Philipot et al., 1994). Those responsible for the handling of the animals must be trained to perform the activities of the property, from handling of equipment and animals to the adoption of surgical procedures (Lensink et al., 2000). Finally, animals should be free of frustrations, fears, anxieties, and positive feelings should be promoted, such as safety or any other positive emotions (Singer, 2002; Nóbrega Neto 2008).

The feeling of suffering is not a physical variable, so it is not palpable. However, on the other hand, being negative and unpleasant, this feeling should be avoided whenever is possible. Often, researchers make use of variable responses relating to diseases, injury, physiological and behavioral attempts to measure an animal adaptation to an environment. Then, what is known about the animals' 'feelings' is not enough. This information can be obtained through the study of preference. However, such knowledge should be supplemented with other information about the welfare (Bond, 2010).

However, in order for the welfare being able to be discussed accurately, to be mentioned legally and to be thematically part of public discussion, it is necessary a clear and well-defined concept around this subject. And to be capable of comparison in different situations and evaluated specifically, it is necessary an objective evaluation. Thus, the Welfare Quality® project has "developed a system to enable

global assessment of animal welfare and a standardized conversion of animal welfare measures within simple descriptions and information".

The basic principles of animal welfare are defined by both the physical health as mental, and include aspects such as absence of prolonged hunger and thirst, thermal comfort, the absence of injuries, inappropriate management-induced pain, diseases, social behavior and expression, human-animal relationship, etc. Thus, the Welfare Quality® protocol based its assessment of animal welfare predominantly in animal-based measures (e. g. , behavior, and health). When this measure is not sensitive or applicable to check a criterion, measures based on the resources (e. g. , installations) or in the management (for example, management procedures) are used.

The Welfare Quality ® project aims to associate welfare with the quality of the final product. In addition, protocols of evaluation are tools of great value to emphasize points which require the attention of the producers, and to inform consumers about the health status and welfare level of animals raised to originate animal origin products.

Because it is an European project, protocols for dairy cattle were developed for the intensive system, of two types: Loose House and Tie Stalls. However, 90% of the milk produced in Brazil originates from herds kept on pastures (Aguiar, 2008). Thus, it is necessary to adapt the Welfare Quality ® project for the Brazilian dairy system reality. Then, the assessment protocol will be able to be applied correctly and precise evaluations can be obtained.

Brazil occupies a leading position in world production of animal protein. To maintain this position is inexorable that the productive sector pays attention to the implementation of animal welfare methods to ensure your product reliability, quality and commercial appeal. The present work is justified to check the applicability of the Welfare Quality ® protocol, originally developed for the European intensive production system, in semi-intensive dairy farming based on pasture systems, in the State of São Paulo.

## Materials and Methods

Animal welfare assessments were conducted in 7 milk-producing units in the State of São Paulo, Brazil. One dairy farm was in the city of Piracicaba (unit 1), another farm was located in the municipality of Nova Odessa (unit 2), another three in Avaré (units 3, 4 and 5), the sixth in the city of Tatuí (Unit 6) and finally, Unit 7, located in the region of São Carlos.

Below, the following table features the dairy units and their respective technological levels (board 1).

For execution of this research, it was used the European protocol for the evaluation of welfare in dairy Cattle Welfare Quality ® (Assessment protocol for cattle,

2009). The evaluations were carried out by two previous trained assessors. The protocol includes means of 24 measures, within 04 fundamental principles of Animal

Welfare: Good Feeding, Proper Installation, Good Health and Appropriate Behavior (board 2).

**Board 1** Characterization of the milk-producing units.

Features	Units						
	1	2	3	4	5	6	7
Breed	Holstein/ Jersey	Holstein	Zebu breed/ Jersey	Zebu breed/ Holstein	Holstein/ Jersey	Holstein/ Jersey	Holstein/ Simmental
N° Lactating cows	55	50	26	46	72	18	66
Milking/day (timetable)	2 7:30/15:30	2 7:00/15:00	2 4:00/16:00	2 5:30/15:30	2 4:00/16:00	2 6:00/15:30	2 6:00/16:00
Weaning weeks	8	8	9	8	12	16	9
Concentrate available (kg/animal)	5,5	5	5	6	8	8	6
Pasture area (ha)	10	12	4	6	7	1	15
Average picket size (m <sup>2</sup> )	500 - 2200	5000	380	210	23000	10000	18000
Annual milk yield (10 <sup>3</sup> kg)	240	340	150	280	540	130	400

**Board 2** The principles and measures for evaluation of welfare of dairy cows. Adapted from Welfare Quality ® Assessment Protocol for Cattle, 2009.

Welfare Principles	Welfare Criteria
Good Feeding	Absence of prolonged hunger Absence of prolonged thirst
Proper Installation	Comfort around resting Ease of movement
Good Health	Integument Alterations Nasal Discharge, Ocular Discharge, Hampered Respiration Diarrhea Dystocia Milk Somatic Cell Count Mortality Rate Dehorning/ Tail Docking Downer Cows
Appropriate Behavior	Agonistic behavior Access to loafing area or pasture Avoidance Distance Qualitative Behavior Assessment

The most important aspects of well-being in a dairy farming system were transformed into several measurable measures. The researchers used animal based measures, management and resources aspects to acquire an overall assessment of animal welfare.

Various measures were evaluated, most of which are scored according to a binary scale (yes/no). Other measures were scored according to a scale of up to 03 points, which goes from 0 to 2. The rating scales were selected so that a score 0 is assigned when the welfare is good, the 1 score is assigned when there was some compromise, and the score 2

was assigned when the welfare was poor or unacceptable. Several items have been drawn up and checked within each principle quoted above.

The measures evaluated on the basis of the animals were: integument modifications; ocular discharge; nasal discharge; vulvar discharge; hampered breathing; diarrhea; body condition score; cleanliness of udder, flank/upper legs and lower legs; lameness; agonistic behaviors, avoidance distance and qualitative behavior assessment.

Measures on the basis of the resources were: water provision; cleanliness of water points; water flow and functioning of water points.

Finally, it was conducted a questionnaire to the owner or to the manager of the milk production unit, covering the following aspects: average annual number of animals kept in animal unit; access to pasture (days per year and hours per day), average number of parturitions and dystocia frequency; number of dairy cows and heifers (if they are kept with dairy cows) diagnosed with downer cow syndrome; number of dairy cows or heifers (if they are kept with the dairy cows) that died on the farm or have undergone euthanasia in the past 12 months; if the animals were disbudded and if the procedure was performed in the farm and which method was used, and if the animals had their tails cut off.

Once all the measures on an animal unit, a bottom-up approach is followed to produce an overall assessment of animal welfare on that particular unit: first the data collected are combined to calculate criterion scores; then the criterion scores are combined to calculate principle scores; and finally

the animal unit is assigned to one welfare category according to the principle scores it attained.

For the calculation of criterion scores, there are 03 different methodologies, depending on the criterion which is needed to obtain. The methodologies are: Decision Tree; Weighted sum and I-spline Functions; and use of Alarm Thresholds. The Decision Tree is produced when all measures used to check a criterion are taken at farm level and are expressed in a limited number of categories. When a criterion is checked by only one measure taken at individual level, this scale generally represents the severity of a problem and the proportion of animals observed can be calculated, then, a weighted sum is calculated. Finally, when the measures used to check a criterion lead to data expressed on different scales, such as percentage animals lying outside the lying area, data are compared to an alarm threshold that represents the limit between what is considered abnormal and that should be considered to be normal. Thereby, the 25 variable responses resulted in 12 criteria values.

The next step is to transform the criteria previously obtained into four scores, through the Choquet Integral. This specific mathematical operator is used to take into account two lines of reasoning. According to some animal and social scientists, some criteria may be more important than others (e.g. In most animal types, “absence of disease” is considered more important than “absence of injuries” which in turn is more important than “absence of pain induced by management procedures”). However, synthesis does not allow compensation between scores (e.g. Absence of disease does not compensate for injuries and vice versa). Each one of that values corresponds to each of the principles of animal welfare: good feeding, proper installation, good health and appropriate behavior.

The scores obtained by an animal unit on all of the animal welfare principles are used to assign that farm to a welfare category. The four categories of animal welfare were distinguished to meet the needs of stakeholders (producers and scientists) as follows in table 1.

The score scale is from 0 to 100 points, for each principle score. Thereby, a dairy farm is considered “Excellent” when your principle scores are higher than 55 points for all four principles and, at least two principle scores are above 80 points. A property is evaluated as “Enhanced”

animal unit when its scores are higher than 20 points for all principles and, at two or more principles get more than 55 points. “Acceptable” dairy farms present scores higher than 10 points for all principles of animal welfare and, at least 3 of them present more than 20 points. Dairy properties which do not reach these standards are considered as “Not Classified”.

**Table 1** Categories about the welfare level of the property. Adapted from Welfare Quality® Assessment Protocol for Cattle, 2009.

Excellent	The welfare of the animals is of the highest level.
Enhanced	The welfare of animals is good.
Acceptable	The welfare of animals is above or meets the minimal requirements.
Not classified	The welfare of animals is low and considered unacceptable.

### Results and Discussion

The scores for each principle of welfare and the respective animal welfare category obtained by each animal unit follows on board 3.

Only the property “number 3” obtained the animal welfare category "Acceptable" because it received at least 10 points in all criteria and 20 points in 3 or more criteria. This result is mainly due to the principle of Good Feeding, which gained 9 score value. This value reflected the severe disabilities of the farmer to provide his animals easily access to drinking places, in sufficient quantity and quality. In the case of this property, lactating cows and heifers kept with the first had to walk a long distance between the pasture where they were and the source of water. Thus, there may be energy losses to the detriment of displacement, leading to decrease in milk production, in addition to greater risks of injury in the limbs and incidence of laminitis in the herd. According to Fraser and Broom (2002), inadequate water fountains within a dairy property may reflect the efficiency of production and the welfare of animals. In addition, another reason for this unwelcome result was the relevant percentage of cows with body condition score 1, i. e. underweight considered ideal, which was 7.5%, according to Welfare Quality® protocol.

**Board 3** Principle scores and animal welfare categories for each animal unit.

Score	Properties						
	1	2	3	4	5	6	7
Good Feeding	33	15	9	50	62	60	75
Proper Installation	70	74	64	64	63	65	64
Good Health	38	54	39	19	27	21	51
Appropriate Behavior	59	64	58	33	62	58	67
Animal Welfare Category	Enhanced	Enhanced	Acceptable	Enhanced	Enhanced	Enhanced	Enhanced

The remaining livestock units fit in the category of "Enhanced", according to Welfare Quality® protocol. Because, according to protocol, the properties reached at least 20 points in all criteria and 55 points in two or more criteria.

In the assessed farms 1 and 2, the values obtained for the principles of good Feeding and good health were minors, thus harming the final evaluation. In the case of animal unit n° 1, the final score 33 to Good Feeding is a consequence of the insufficient amount of water points available for animals or incorrect length for water points. Incorrect dimensioning of drinking trough can result in increased agonistic interactions and may limit the access of some animals (Albright, 1993). While the value obtained for good health, 38 points, was due to the incidence of mastitis in the herd, result of high milk somatic cell count (SSC), as well as for the relevant percentage alterations in the integument. While in the property n° 2, the principle of Good Feeding was much hampered by the absence of water points working properly. There was only one drinking point, which was not clean and sufficient to satisfy all the cows.

The farm number 4, located in Avaré/Sao Paulo, achieved regular result in respect to Good Feeding and good results for Proper Installation. However, the value obtained on the principle of Good Health was , due to the way how is practiced the dehorning of young animals. In this case, there was no use of any analgesic or anesthetic for the adoption of this practice. Soon, animals whose horns were removed, may suffer from pain and their welfare is compromised. In addition, it was observed a considerable portion of animals with severe integument alterations, especially, swollen limbs.

Another point to attempt was the low value obtained by animal unit n° 4 in Appropriate Behavior principle. Among all dairy farms evaluated, it received the worst score for this animal welfare principle. One explanation for such a result would be an inappropriate treatment received by these animals throughout the day by employees who have been and are in direct contact with them. Possible aggressions, exalted tone of voice and violence on conduction along the property, among other reasons, can result in fear, stress, restlessness and irritation on the part of animals. Resulting thus in a negative evaluation of the animals and, consequently, of property.

However, there is another possible reason for such unsatisfactory score: the subjectivity of evaluators as well as the protocol. The terms employed by the Welfare Quality® protocol on the definition of Positive Emotional State as "active", "calm", "frustrated", "restless", "irritable", "sociable" or even "happy", among others, are substantially vague as they are not described as the animals were due to meet for each type of situation at the time of evaluation. In addition, the evaluator, is given a scale of 0 to 120, with which will be assigned a note for each term. Again, Welfare

Quality® protocol fails to demonstrate, explain and evaluate the Appropriate Behavior principle. Thereby, once there is not a clear description of how animals should behave for each emotion, assessors should have attention to not humanize the animals.

Regarding dairy units 5 and 6, the scores were very similar, including, on the downside. To the principles of Good Feeding, Proper Installation and Appropriate Behavior, the results obtained were satisfactory,

However, the value for the principle of Good Health was unsatisfactory. Again, the lack of use of artifices that inhibit or reduce the pain suffered by animals during dehorning, high level of SCC and the presence of lesions in some animals are the main factors that explain this poor performance.

Finally, among all dairy properties evaluated, the best result obtained was unit n° 7. This property has received satisfactory scores for all four principles assessed. Again, just as occurred in other units, which compromised adversely the overall assessment was the adopted procedure for the withdrawal of the horns of young animals, which compromises the their welfare. In this case, there is the adoption of anesthetic after the dehorning by thermal procedures. However, it does not translate into total relief of pain and suffering on the part of the animal.

Some of the properties obtained score below the desired for Good Feeding principle, as were the cases of the properties 1, 2 and 3. The main reason for such facts can be explained by absence, inaccessibility or lack of drinking troughs for animals consume water. On one hand, it was recorded an insufficient number of water points for all animals. Nonetheless, on the other hand, it must be remembered that the Welfare Quality® protocol is intended for evaluation of properties whose production systems are Loose-house or Tie-stall. In other words, animals are confined in individual pens or suits most of the time, throughout the day, and hold their food and water near them. Therefore, they don't find difficulties to get them or do not need to walk long distances to meet their nutritional needs, such as in Brazil, in which dairy farming is conducted mostly in grasslands.

Another point to be discussed in relation to the welfare of farm animals, particularly in Brazil, a country of tropical climate, and that is not handled in the protocol, is the effect of heat stress on animals. Once the Welfare Quality® protocol has been developed in a region where the animals, in particular dairy cattle, are raised indoors and climatically controlled, it was not given special attention to this theme. However, it is clear that the thermal comfort, besides being one of the requirements for maintaining a good productivity, it is essential also to ensure animal welfare. Becoming, thus, in an increasingly important tool when it comes to lifting production levels in a livestock system, in particular in the

dairy sector. Therefore, it is necessary to create a system of evaluation of the influence of climate on livestock, because, besides it is cited on animal welfare assessment protocol, is a factor of paramount importance when it comes to the welfare of farm animals raised on pasture, in tropical regions.

## Conclusions

After the whole process of the study protocol, application in properties and analysis of results, it can be concluded that the European protocol for the evaluation of welfare in dairy cattle Welfare Quality® [16] can be used for Brazilian dairy farming, as long as it is done previous training. In addition, some changes must be applied so as to comply with the requirements of the Brazilian production systems, which are based on animals reared under grazing.

It is needed essential changes in the forms of evaluation of installations in animal units and modifications on the study of animal behavior. Make those points clearer and more practical being quantified and evaluated is essential for the correct application and effectiveness of Welfare Quality® protocol [16] on national reality. Another point that should be added to the protocol in order to meet Brazilian needs is the evaluation of the heat stress effects on animals.

Finally, in order to promote better understanding and greater efficiency in the evaluation of animal welfare, it is necessary to develop new more specific protocols for the different production systems found both in the State of São Paulo and in the rest of the country. Because, that way, it will be possible to match the characteristics and peculiarities of each different dairy systems adopted around Brazil.

## References

Aguiar, A.P.A. Produção de leite em pastagens. In: ENCONTRO DE PRODUTORES DE GADO LEITEIRO F1: AVANÇOS TECNOLÓGICOS, Belo Horizonte. Anais... Belo Horizonte: PUC Minas, 2008. 6., 2008, [CD-ROM].

Albright, J. Feeding behaviour of dairy cattle. *Journal of Dairy Science*, Champaign, United States, 1993, v.76, n.2, p. 485-498

Barkema, H.W., Y.H. Schukken, T.J.G.M. Lam, M.L. Beiboer, G. Benedictus, A. Brand. Management practices associated with low, medium and high somatic cell count in bulk milk. *Journal of Dairy Science*, 1998, 81: 1917-1927.

Bond, G.B. Diagnóstico de bem-estar de bovinos leiteiros. MSc Thesis - Universidade Federal do Paraná, Curitiba, 2010.

Broom, D.M. Indicators of poor welfare. *British Veterinary Journal*, London, 1986, v.142, p.524-526

Broom, D.M ; Molento, C.F.M. Animal welfare: concept and related issues – Review, *Archives of Veterinary Science*, 2004, v. 9, n. 2, p. 1-11

Butler, W. R.; Smith, R. D. Interrelationships between energy balance and postpartum reproductive function in dairy cattle. *Journal of Dairy Science*, 1989, v.72, p. 767 – 772.

Capacity building to implement good animal welfare practices. Report of the FAO Expert Meeting, FAO: Italy, 2008.

Ecocert Brasil Humane Farm Animal Care – Padrões para cuidados dos animais, Certified Humane Brasil, Gado Leiteiro, 2006  
Singer, P. Animal liberation. New York: HarperCollins, 324 p., 2002

Fonseca, L. F. L.; Santos, M. V. Qualidade do leite e controle da mastite. São Paulo, Brasil, Ed. Lemos, 2000, 189 p.

Fraser, A.F.; Broom, D.M. Farm animal behaviour and welfare, Oxon: CABI, 2002, 437 p.

Lawrence, A.B.; Appleby, M.C. Welfare of extensively farmed animals: principles and practice. *Applied Animal Behaviour Science*, Amsterdam, 1996, v.49, p.1-8.

Lensink, B.J., Boissy, A., Veissier, I. The relationship between farmer's attitude and behavior towards calves, and productivity of veal units. *Annales de Zootechnie*, 2000, v. 43, 313-327.

Molento, C.F.M. Bem-estar e produção animal: aspectos econômicos – revisão, *Archives of Veterinary Science* 2005, v.10, n. 1, p. 1 – 11

Nóbrega Neto, Pedro Isidro, Dor, sensibilidade e bem-estar em animais – grandes animais, *Ciência Veterinária Trópicos*, Recife, 2008, v.11, suplemento 1, p. 26 – 30

Paranhos da Costa, M.J.R. Ambiência na produção de bovinos de corte a pasto. *Anais de Etologia*, Jaboticabal, Brasil, 2000, 18:26-42

Philipot JM, Pluvinage P, Cimarosti I, Sulpice P, Bugnard F. Risk factors of dairy cow lameness associated with housing conditions. *Veterinary Research* 1994; 25(2-3):244-248.

Welfare Quality® assessment protocol for cattle. Welfare Quality® Consortium, Lelystad Netherlands, ISBN/EAN 978-90-78240-04-4, 180 p. 2009