

Validation of broiler chicken gait scoring training in Thailand, Brazil and New Zealand

A Butterworth^{*†}, TG Knowles[†], P Whittington[†], L Matthews[‡], A Rogers[‡] and CS Bagshaw[‡]

[†] Clinical Veterinary Science, University of Bristol, Langford, N Somerset, BS40 5DU, UK

[‡] Animal Behaviour and Welfare Research Centre (ABWRC) Ruakura Research Centre East Street Private Bag 3123, Hamilton, New Zealand

* Contact for correspondence and requests for reprints: andy.butterworth@bris.c.uk

Abstract

Broiler chickens are the most numerous terrestrial farmed animals on earth. These birds can suffer a range of pathologies which result in lameness, and one technique for assessing the impact of lameness on the individual bird, and on the flock has been gait scoring. This paper describes a study where the results of the same training programme for validated gait scoring are compared for groups of assessors in Thailand, Brazil and New Zealand. A uniform course of training carried out in the classroom, through video assessment and through on-farm training was carried out in the countries named; a total of 95 persons being trained overall. A measure of agreement with the reference scale for the assessors' numerical responses was carried out using a Cohen's Kappa test, and the results indicated significant differences in the 'origin position' ie the view taken by the assessors of the impact of lameness on the bird before training had taken place, but a high degree of consistency in the response to training. The study demonstrated that gait scoring can be learned by assessors from different geographical and social backgrounds, and that the 'rate of learning' – the improvement in performance in relation to a standard, was similar between the countries studied. The 'origin' and 'final' position of the assessors pre- and post-training, from the different countries in relation to the reference standard is discussed.

Keywords: animal welfare, broiler chicken, gait scoring, international, validation, welfare assessment

Introduction

Broiler chickens are normally slaughtered at about six weeks of age when they weigh approximately 2.2 kg. This rapid growth has been achieved by careful genetic selection and nutritional programmes. Lameness can be prevalent in these rapidly growing birds (Sorensen 1992) and has been highlighted as a major welfare concern (FAWC 1992).

The principal causes of broiler lameness can be divided into those of infectious origin (Butterworth 1999) which cause small numbers of birds to become profoundly lame, and those which are caused by skeletal abnormalities (Pattison 1992) which cause larger numbers of birds to become moderately disabled. A strong genetic influence on the incidence of lameness in broilers has been demonstrated in recent studies (Rauw *et al* 1998; Kestin *et al* 1999).

The Bristol Gait Scoring System (BGSS) was first described by Kestin *et al* (1992). Six scores are defined, from Gait Score 0, 'the bird walked normally' to Gait Score 5, 'the bird is incapable of sustained walking'. Gait scoring is usually carried out in groups of birds randomly selected from within a production house, and by two people, one motivating the individual bird to walk, and the other recording the gait score. American workers have used a modified gait scoring system (MGSS) (Garner *et al* 2002) and Dawkins and co-workers used a three-point lameness

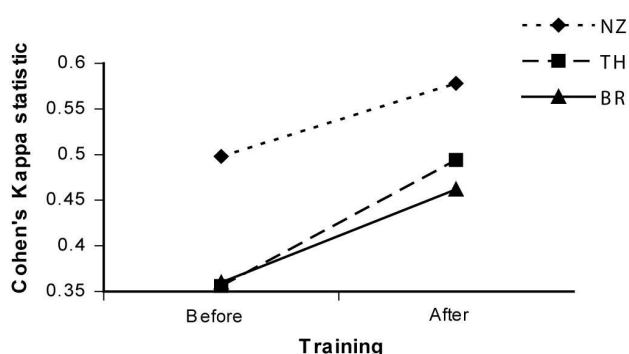
scale in recent work on the effects of stocking density on broiler welfare (Dawkins *et al* 2004). Lameness has been shown to alter the behavioural repertoire of birds, affecting frequency of visits to feeders, and time spent standing and eating (Pattison 1992; Weeks & Kestin 1997; Weeks *et al* 2000); ground pecking (Weeks & Kestin 1997); preening (Weeks *et al* 2000) and, standing and scratching (Reiter & Kutritz 2001). Increasing lameness score has been shown to result in an increase in the number of birds showing abnormal lying posture (Weeks & Kestin 1997), reduced running and walking (Weeks & Kestin 1997; Weeks *et al* 2000; Reiter & Kutritz 2001) and reduced levels of dust bathing (Vestergaard *et al* 1997; Vestergaard & Sanotra 1999).

An analysis of the test/re-test reliability, using Pearson correlation, a measure of the repeatability of the BGSS scoring by the same assessor, has been found to be 0.700 by Kestin *et al* (1992) and 0.906 by Garner *et al* (2002) who also found that inter-rater reliability was 0.892 for the BGSS. These Pearson correlation values cannot be compared directly with the Cohen's Kappa values described in this paper.

In a pragmatic on-farm assessment context, the BGSS has been found to provide a feasible technique for the assessment of walking ability as it is non-invasive and has

Table 1 Agreement measures for categorical data (From Landis & Koch 1977).

Kappa statistic	Strength of agreement
< 0.00	Poor
0.00 – 0.20	Slight
0.21 – 0.40	Fair
0.41 – 0.60	Moderate
0.61 – 0.80	Substantial
0.81 – 1.00	Almost perfect

Figure 1

The mean Cohen's Kappa values for responses of personnel from New Zealand (NZ), Thailand (TH) and Brazil (BR) scoring standardised reference video examples of bird gait, using the Bristol gait score system (BGSS) before, and after an established gait scoring training course. The closer the Cohen's Kappa statistic approaches a value of 1 (maximum value 1) the better the agreement between the assessed and reference values.

minimal impact on 'normal' walking behaviour. A large number of birds can be scored in a comparatively short time, providing a significant statistical sample size; increasing the confidence in analysed results.

The BGSS has been used experimentally to identify risk factors associated with increased lameness (Sorensen & Kestin 1999; Su *et al* 1999; Butterworth *et al* 2002) and is starting to be used by producers and assessors in a commercial context, company representatives having been trained in the BGSS to produce information on leg health for farm accreditation audits in the UK, Brazil and Thailand.

Materials and methods

At the request of commercial poultry companies in Thailand (TH), Brazil (BR) and New Zealand (NZ), assessors from the poultry industry in TH and BR, and from the poultry industry and the Ruakura research institute in NZ were trained in gait scoring. The objective was to provide these assessors with a tool to assess the prevalence of lameness and to assess whether there are geographical differences in the ability to learn the technique of gait scoring. Ninety five assessors were trained; 52 in Thailand, 26 in Brazil and 17 in New Zealand. The trainees took part in lectures and practical sessions providing information on the causes of

broiler lameness and offering guidance on risk factors for lameness, and practical management steps which could be taken to reduce the incidence of lameness and to improve company performance and to reduce the potentially significant impact of lameness on the welfare of the birds. The training for each course was as follows.

Day 1: To assess the pre-training gait scoring 'origin' for the assessors, 36 reference video clips of birds of varying walking ability, used as reference gait score examples, were shown to the assessors prior to any formal training and the assessors were asked to score them. This was followed by classes in which the pathological, skeletal and infectious components and welfare impacts were presented. Large numbers of reference video clips of birds of varied walking ability were shown during this training.

Day 2: Training on-farm. Two farms were visited by each group, and the assessors taught how to make random selection of areas within the house, how to catch groups of birds in a pen without overt disturbance (Figure 1), how to move the birds using a cane, and avoidance of direct contact with the birds. The score results for the birds sampled within the poultry house were combined to produce histograms in order that training groups could assess 1) how their individual scoring performance compared to the combined group scores and 2) what the overall flock gait score distribution was.

Day 3: Classroom training in which risk factors and control measures to reduce the incidence of lameness were taught, and workshops carried out to create plans for the individual companies to tackle broiler lameness in their own operation. At the end of this session, the reference set of 36 reference clips were again reviewed by the assessors, and their post-training scores recorded.

To assess the level of agreement between the reference values and assessors' scores, a Cohen's Kappa test was performed using StatXact3 (Cytel 2003). Cohen's Kappa was chosen as a statistical test because the classification of each category (gait score) was on a nominal scale, and the degree of agreement between the observed and the reference values can provide a single, reportable measure of assessor performance (Agresti 1990). The highest possible result for the Cohen's Kappa analysis is a value of 1, indicating perfect agreement between the reference set of gait score examples used in this validation exercise and assessor performance, other levels of agreement for Kappa statistics are outlined in Table 1.

Results

The mean Cohen's Kappa values are presented in Figure 1, the numerical values being as follows. Before training: TH 0.356, BR 0.360, NZ 0.498 and after training: TH 0.494, BR 0.462, NZ 0.578.

The mean improvement in performance, assessed using the Cohen's Kappa test for agreement between actual and reference values for the three countries were: TH 0.138, BR 0.102, NZ 0.080.

The difference between the Cohen's Kappa values for individual countries, and the average value for all countries (0.405) were TH -0.049, BR -0.450, NZ +0.093, indicating significant differences in the 'origin position' ie the position taken by the assessors of the impact of lameness on the bird before training had taken place.

Discussion and conclusions

As the majority of assessors who were trained were stockmen or managers from the commercial poultry companies, the flock gait score distribution interested them as a 'marker' for leg health within their own company. Using the BGSS, the assessors were able to provide information for auditors from retail purchasers who wished to be assured that leg health concerns were being assessed, and addressed, by the producer companies.

The study demonstrated that gait scoring can be learned by assessors from different geographical and social backgrounds, and that the 'rate of learning' - the improvement in performance in relation to a standard, was very similar between the countries studied. The 'origin' and 'final' position of the assessors pre- and post training from the different countries in relation to the reference standard however differ, the assessors from Thailand and Brazil showing both a lower 'origin' and 'final' position when compared to assessors from New Zealand. This drift between origin (before training) and final position (after training) could (in theory) be adjusted by increased training effort, both for individuals and for assessors from different countries as an understanding of individual assessor variation from the reference is of value in assessing the quality of their training. However, 'geographical adjustment' of scoring is not proposed or advocated. The geographical and societal reasons for these observed differences between groups of assessors from different countries merit further investigation as methods for assessing and auditing welfare are becoming elements of retailers' decisions as to where to source their animal products.

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