

Abstracts for WQ Network Workshop Lille 2013

Implementation of the Welfare Quality® broiler welfare monitor in The Netherlands

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In 2011 we studied whether it is possible to simplify the WQ broiler welfare monitor to make it less time consuming and thus more feasible in practice, without compromising the quality. The conclusions of that study were that there were possibilities for simplification but that the simplification strategies should be re-tested in a sample of farms that showed larger differences in final scores (De Jong et al., 2011). In addition, stakeholders indicated that although the monitor in its present form is too time consuming, the underlying measures may be valuable to the farmer to guide his management decisions and thus to improve broiler welfare on-farm. Therefore, a new project started with the following aims: (1) to test the proposed simplification strategies to promote adoption of the broiler welfare monitor in practice; (2) to study if and how the monitor may function as guidance for the management of the farmer. Fifty farms (one house per farm) are involved in the project and veterinarians are asked to discuss the results with the farmer. Each farm will be monitored four times in order to study if management changes are effective. In the first year (2013) the full WQ protocol will be used. If analysis after the first two visits shows that simplification is possible, the simplified protocol will be used during two visits in 2014. We will present the methodology used in the project to feed back the information to farmers and veterinarians, and present results of the first year (outcomes of farms of different categories and correlation between measures).

On-farm comparison of the Welfare Quality® resource-based versus an animal-based measure of thirst in broiler chickens

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In the Welfare Quality® broiler welfare assessment protocol the absence of thirst is measured by the percentage compliance with a recommended number of birds per drinker. The reliability and validity of this resource-based measure has not been tested, however, and there is growing consensus that animal-based measures are preferred as they allow a more direct assessment of animal welfare. We compared the Welfare Quality® measure of thirst with a novel animal-based test on 10 Belgian and 10 Brazilian broiler farms. Per flock 4 groups of 5 chickens from 4 locations (2 near walls, 2 central) were enclosed and the amount of water consumed from an unfamiliar open drinker during 90 min was measured. The mixed model indicated that water consumption in the test was higher in Brazil than Belgium ($P < 0.001$), but was not

affected by location. The Welfare Quality® scores for the criterion ‘absence of thirst’ were not correlated with the amount of water Belgian ($r=-0.10$, $P=0.55$) or Brazilian ($r=0.20$, $P=0.23$) birds consumed during the animal-based test. Furthermore, the drinker ratio was not identified as a risk factor for the water consumption test outcome ($P>0.05$). These results cast doubts on the validity of the thirst-measure used in Welfare Quality®. An animal-based measure based on voluntary water consumption from an open drinker could be a superior alternative provided further testing of sensitivity and confounding factors.

Assessing possibilities to improve the efficiency of the Welfare Quality® broiler protocol

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The time-consuming character of the existing Welfare Quality® protocols is currently a major hindrance in their routine implementation. In December 2013 a new project initiated by the Belgian federal government will start, aimed at assessing the possibility to monitor the welfare of broiler chickens in a more efficient way. In this project, we will investigate whether the Welfare Quality® protocol can be replaced partially by information that is currently routinely collected for other purposes (e.g., by government inspectors, certification bodies, sales representatives, poultry farmers, transporters, slaughterhouses and hatcheries). We will evaluate if any parts of the protocol can be replaced based on correlations between the Welfare Quality® scores and the routinely collected data, and we will calculate how much time this would save compared to a full Welfare Quality® assessment. In addition we will study correlations amongst the Welfare Quality® parameters. Also, we will evaluate if the routinely collected data can serve to identify farms with an increased risk of welfare problems, in order to allow more targeted Welfare Quality®-based audits of at-risk farms. The strength of the associations between the Welfare Quality indicators and certain management procedures will also be studied.

Use of sequential feeding to improve welfare in poultry during and after the Welfare Quality® program

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Sequential feeding (SF) is an innovative system we used during the Welfare Quality® program to improve welfare in meat-type chicken. Lameness is a widespread painful disease in fast-growing chicken and we used this nutritional strategy to get reduced early growth and increased exercise in the chickens since both are known to improve the muscle-skeleton system and reduce lameness.

Sequential feeding consists in using different diets that are given sequentially to the birds within a day or within several-day cycles. During Welfare Quality® program we showed that 2-day cycles were more suitable to reduce growth when using diets differing in energy/protein ratio (Leterrier et al. 2005). The high energy/low protein diet (107% of energy compared to control diet and 85% of crude protein compared to the control) increased exploratory behavior while the low energy diet given next day (93% energy and 115% protein compared to the control diet) increased time spent standing. SF was not effective in improving gait score when it started at 14 days of age only (Bouvarel et al. 2008) but it significantly reduced lameness without reduction in body weight at slaughter when SF started as soon as 10 days of age (Leterrier et al. 2008).

We also use SF in laying hens in order to know if this feeding schedule would better fit to the animal nutritional requirement linked to egg formation. Because of this daily egg formation we used a one-day cycle with provision of high energy diet during the middle part of the day and of high protein and calcium diet during the end of the day (eggshell formation). Whole wheat, ground wheat or energetic pellets were used in the middle part of the day. SF induced large changes in behavior (time spent eating, oviposition time). Four hours after distribution of wheat diets, the occurrence of feather pecking was the highest in whole wheat group and the lowest in the ground wheat group. The poorest feather condition was recorded in the whole wheat treatment which indicated that SF program still needed improvement in laying hens (Jordan et al. 2010). New experiments are being carried out to improve this SF program in laying hens. The new aim is to substitute whole wheat in the morning by an alternative energy supply: ground wheat and ground corn, with or without a proportion of whole wheat or insoluble fiber. The goal was to obtain the advantages observed in previous experiments with whole wheat (bigger gizzard, best feed conversion ratio (Faruk et al. 2011). Wheat- and corn-based diets showed intermediate results between whole wheat SF and continuous feeding with an average feed conversion ratio improvement of 3.2% compared with the continuous control. The hens fed with SF had a very low food intake between the two distributions and in the previous hour of distribution, ingestion was close to zero. Birds seem to wait for the food distribution coming (Traineau et al. 2013). Thus, it is possible in SF diets to substitute, at least partially, whole wheat by ground wheat or ground corn with added insoluble fiber or some whole wheat, allowing more flexibility and economic optimization but consequences on feather pecking still need investigation.

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The influence of aviary housing characteristics, management and genetics on health, welfare and production in laying hens

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The potential of non-cage systems to be more animal-friendly than cage systems for laying hens is often not optimally achieved. Laying hens housed in non-cage systems have a higher risks of certain health and welfare problems due to housing conditions. In an on-going cross-sectional study on commercial aviaries in Belgium (n=50) animal based parameters (keel bone injuries, feather damage, wounds and foot health) are measured at flock-level in 60-weeks old laying hens. Overall welfare is measured with the Welfare Quality protocol. To identify possible risk factors details on housing characteristics, management and genetics are obtained through questionnaires and from farm documentation. We will investigate the relation between the animal based parameters and egg-production parameters, mortality, and the possible risk factors. Initial data from 35 flocks show a large variation in all measured parameters and indicates an extremely high (>90%) average prevalence of keel bone injuries. Further, preliminary comparison between portal-type aviaries (N=10) and row-type aviaries (N=15) show more keel wounds in the portal-system (31%±SE=5 vs. 14%±SE=2; $p=0.001$), less foot-pad lesions (15% ± SE=3 vs. 31% ± SE = 3; $p=0.009$) and a lower laying performance (84%±SE=2 vs. 88%±SE=1; $p=0.018$). Identification of risk factors and associations between the different aspects will be investigated further in the near future once data have been collected from all flocks (N=50). This larger

dataset will allow testing the association between housing characteristics, the management and the genetics on the one hand, and the prevalence of keel bone injuries and production performance on the other hand.

Iceberg indicators: fact or fiction?

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The theoretical concept of 'iceberg indicators' suggests that by measuring only a subset of animal-based measures it may be possible to predict the overall welfare state of an animal. To test the concept of iceberg indicators, a Welfare Quality assessment was carried out on 92 UK dairy farms which were found to have an overall Welfare Quality classification of either 'Enhanced' or 'Acceptable'. Inspection of the correlations between the animal-based measures showed no evidence in support of iceberg indicators. Next, logistic regression models were fitted using subsets of the measures, and cross-validation was used to examine how well such models predicted the overall classification. The proportion of times that the method correctly predicted the overall Welfare Quality classification increased when the aggregated score for 'Absence of prolonged thirst' was included in the model. As a single variable, 'Absence of prolonged thirst' correctly predicted the overall classification 88% of the time. A single, resource-based measure driving the classification system is, however, at odds with the conceptual underpinnings of the protocol which, instead, espouses a multidimensional, animal-based account of welfare. It is therefore suggested that the prominence of 'Absence of prolonged thirst' in this role may be better understood as an unintended consequence of the published measure aggregation system rather than as reflecting a realistic iceberg indicator.

Development of a new welfare assessment protocol for dogs housed in shelters

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Some dogs may spend part, or most, of their life housed in shelters exposed to environment and social challenges that may impair their welfare. Currently, no standard tool is available to evaluate the welfare state of dogs housed in shelter facilities. Welfare Quality® principles and criteria were used to suggest a welfare assessment protocol for long-term resident dogs in shelters. Animal-based measures (ABMs) to assess the welfare state of the animals in terms of their behaviour, health or physical condition were used together with resource and management measures. All the assessors received training sessions before applying the protocol to ensure standardization. The raters' accuracy compared to 'golden standards' previously defined and their overall agreement were assessed. Fleiss' kappa index of agreement and Cohen's weighted kappa were computed for all comparisons. Analysis performed after the training sessions showed a high to perfect agreement ($K > 0.6$ to 1) among observers and a moderate to perfect ($k > 0.4$ to 1) level of accuracy. The protocol was tested in 29 shelters (n° dogs=1667) of six different European countries. Intra- and

Inter-observer agreement for field assessments were checked. Some ABMs (e.g. dyspnoea, nasal discharge) were discarded from further analysis due to the very low prevalence (<1%) recorded on each shelter. Intra-observer agreement ranged from high to perfect ($K > 0.6$ to 1). Inter-observer agreement was low for one measure (wounds on the body, $k = 0.33$) and moderate to perfect ($k > 0.4$ to 1) for all other ones. Feasibility, areas of applicability and improvement of the protocol will be discussed.

Welfare Quality assessment protocol in practice for dairy farms: Proposal for adaptations in order to improve discriminative capacity.

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The practical applicability of the Welfare Quality assessment protocol (WQ) has been tested on 60 dairy farms in the Netherlands. Farms were selected in the area of 4 veterinary practices (VP), divided over the country to avoid regional influences. By each VP 15 farms were selected that had no previous experience with welfare assessment. For each VP there were 5 bad, 5 average and 5 good farms selected based on the impression of the veterinarians (without measuring). Criteria used were: Feed and water, housing, health and behaviour of the cows. Of each VP one veterinarian went to a course to become a WQ observer and performed the observations. The results were: 3 farms with score Not Classified, 52 with score Acceptable and 5 Enhanced, no farms were scored Excellent. This implies that WQ does not have a proper discriminative capacity. In relation to the endscore, the Proportion of Variance (and Pearson correlation) was calculated to be for Feeding 0.54 ($r = 0.46$); Housing 0.25 ($r = 0.15$); Health 0.05 ($r = -0.07$) and Behavior 0.16 ($r = 0.47$). It appeared that mainly the principles Feeding and Behavior were determining the score. Therefore, the original WQ was adapted in 3 ways:

- 1) **Drinkers:** If one of the drinkers is dirty, all drinkers are considered to be dirty. This is not logical because a farm with 10 drinkers will have a lower score than a comparable farm with 5 clean ones just because one of the drinkers is dirty. However, 9 clean drinkers are available for the cows. In the adapted protocol, therefore, a weighted score for cleanliness was introduced. A clean drinker scored 1, partially dirty 2 and dirty 3 points. After giving the score for the rest of the parameters measured, the total is divided by the average score for the cleanliness.
- 2) **Integument alterations:** If a cow has one hairless patch (HP) or lesion/swelling, she is taken in the calculations as a cow with a HP or a lesion/swelling, not taking into account how many HP or lesions/swellings she has. In the adapted protocol, therefore, the average number of HP, lesions and swellings per cow is used in the calculations.
- 3) **QBA:** The QBA is seriously disputed (Bokkers et al., 2012) and in the experience of the present study very difficult to explain to the farmers. Since the aim of WQ is improvement of animal welfare, one has to motivate the farmer to improve the situation on his farm. With the use of the QBA, farmers do not consider WQ a proper way of determining the welfare of their animals, and are not convinced that the result is something to be taken seriously. Therefore, the QBA was omitted.

After these adaptations a new score was calculated for the 60 farms and resulted in 22 farms with score Not Classified, 31 with score Acceptable and 7 Enhanced, no farms

were scored Excellent. Now all 4 principles were influencing the endresult. The Pearson correlations of the 4 principles were: Feeding: 0.85; Housing: 0.45; Health: 0.99 and Behaviour: 0.99. It is therefore proposed to change the WQ according to the 3 adaptations described above.

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Application of the WQ protocol[®] for assessing dairy cattle welfare on Flemish farms: identification of risk factors and predictors for welfare outcomes

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Purposes of on-farm animal welfare monitoring could be to give feed-back to farmers about (improving) the welfare status of their herd and to use the information in marketing strategies. Both purposes could be fulfilled more efficiently when using adequate knowledge of risk factors associated with specific and overall welfare outcomes. In this on-going project, the Welfare Quality[®] protocol is used to monitor dairy cattle welfare on Flemish farms. For each farm, we also collect data about husbandry and management conditions, farmer attitude towards his/her cattle herd, economic performance and routinely collected data. By examining associations between these datasets we aim to identify risk factors for specific welfare problems and predictors of overall welfare status. Risk factors would be particularly useful in advising farmers about potential actions to remedy possibly identified welfare problems. Predictors of overall welfare status could be used to prioritise monitoring resources to farms with an elevated risk for a low or high animal welfare status.

Up to present, we have conducted welfare assessments and collected additional data from 43 dairy farms in Flanders. Based on the Welfare Quality[®] integration method, the overall cattle welfare status was categorised as 'acceptable' for the majority of the farms (35/43). The remaining farms were classified as 'enhanced'. Preliminary analyses revealed that the provisioning of deep litter is associated with an increased likelihood for enhanced instead of acceptable welfare status, due to a higher score for the principle 'housing'. Further analysis on a larger sample size will be conducted in the near future.

Can welfare assessment and risk factor analysis contribute to welfare improvement in veal calves?

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On-farm welfare assessment tools are now available for veal calves (Welfare Quality® 2009). Animal-based measures for the assessment of human-animal relationship, abnormal oral behaviour and respiratory disorders in veal calves were developed and validated on a large sample of 174 veal farms across Europe. This study permitted to identify issues that should be considered carefully during welfare assessments. For instance, season had an effect on the outcome of the welfare assessment that should be taken into account for farm evaluation and comparison. Also, the measurement of some of the welfare criteria (i.e. respiratory disorders) could be improved. A risk factor analysis was performed on the sample of farms. Factors implying a potential risk and factors potentially beneficial for welfare were identified. These factors were related to several characteristics of the farm such as production and housing system, batch of calves, management of calves and farmer's experience, feed and feed distribution system. Knowing these factors and understanding their effect on the outcome of welfare assessment can help in advising farmers in their effort to improve welfare of veal calves. Risk factors for the welfare of calves could be further investigated. Once larger data sets become available from future welfare assessments in practice, risk factor analyses could be repeated. More research in specific experimental set ups could be performed, to determine causality between risk factors and welfare measures. Collectively, this will promote the provision of scientifically-sound advice to veal farmers and the improvement of veal calf welfare. The next step in the development of the welfare monitoring tool is the practical organisation of the monitoring of farms (timing and frequency of visits, training of observers, feedback to farmers...). On-going projects are currently focusing on the development of training material for the observers and of comprehensive feedback material for farmers.

Animal based measures for a 'Welfare-plus' certification scheme for long distance transport

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Animal welfare during transportation is currently regulated through environment based parameters such as space per animal. However, to properly assess welfare, animal based measures (ABM's) are more appropriate. This study is part of a European project 'Quality Control Posts', aiming to create a scientific basis for certification of long distance transportation of cattle, sheep, pigs and horses. Identification of measures was based on the available literature, following the Welfare Quality® approach. Training courses were developed and assessors trained. They subsequently tested the feasibility of measures in 5 countries, during unloading of 50 transports per species. Finally, ABM's were scaled using a Delphi procedure involving over 60 experts from 10 countries. They were asked to provide threshold values per measure for 'welfare certification' (values < TH1) and for 'acceptability' (values < TH2). The initial selection of measures suggested some Welfare Quality® criteria cannot be applied (e.g. absence of thirst). Furthermore, the test phase identified less feasible ABM's (e.g. shivering during unloading of pigs). The final lists presented to the experts consisted of 10 ABM's for sheep, 14 for cattle, 14 for horses and 12 for pigs. Delphi results suggest that the variation in threshold values decreases in subsequent steps (e.g. sheep: '% slipping' TH1: 1st round median = 2.0, range 0-70; 2nd round: median 2.0 and range 0-10. TH2: 1st round median = 5.0, range 0-90; 2nd round: median 5.0, range 0-40). The outcomes are presented to a certification body for possible inclusion in a 'Welfare-plus' transport scheme.

Animal welfare assessments in Control Posts

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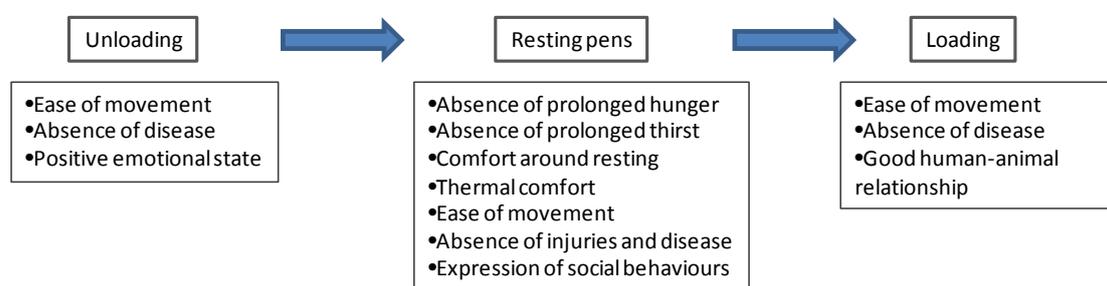
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The main objective of the project "Renovation to promote High Quality control posts in the European Union- SANCO/2010/D5/CRPA/SI2.578062" was the renovation of Control Posts (CPs) and the development of protocols to assess the effects on cattle and pig welfare at the renovated CPs. Welfare Quality® protocols for fattening cattle and pigs on farm and at slaughter have been adapted to be used to assess the effects of renovation of CPs and to explore possibilities to include animal based parameters in a certification scheme. Animals were assessed on arrival at the CP after long journey transports, during unloading, one hour after arrival, one hour before departure and

during reloading. Moreover, resource based indicators were assessed for overall welfare assessment. A total of 84 cattle and 23 pig transports were assessed in CPs in five countries (France, Germany, Italy, Poland and Spain). Assessments were performed by researchers and official veterinarians. All had been trained in the animal welfare protocols prior to performing the assessments. A training course lasted two days and included both theoretical and practical training sessions. CP renovations included ramp improvement for unloading and loading animals; placement and improvement of drinking bowls and feeding troughs in resting pens; roof insulation; improvement and installation of ventilation systems and installation of mobile gates enabling the formation of animal groups as required. The animal welfare assessments have proven to be feasible and both protocols were effective in the detection of the effects of the CP renovations on animal welfare.

Figure1 Welfare criteria used for assessment at the CP



Development of a Welfare Quality® based protocol for assessing the welfare of broiler chickens during transport to slaughter plants

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Transport to slaughter plants is a critical phase of the meat production process, which could affect the industry's image. In broilers, heat stress, metabolic disorders and injuries could be intensified by transport, which has economic implications. However, no protocol exists for the evaluation of welfare during transport. Valid evaluation methods are important for welfare improvements. The aim is to develop a broiler welfare assessment protocol for transport, and to condense it to a simplified version in order to facilitate uptake by the industry or authorities.

The reference protocol contains mostly animal-based measures from the Welfare Quality® (2009) protocol, EFSA (2011) report on transport and other literature, conducted before and after catching and slaughter. It is being tested on commercial transports in Belgium and the validity, reliability, and feasibility of the measures will be assessed. Broiler welfare experts will be consulted to aggregate the information

from separate measures into an overall welfare score.

The full protocol will be a reference for the condensed version, where we aim for maximal reduction in assessment time and minimal reduction of completeness, by reducing duration or sample size of observations or by removing less essential measures. Results from the application of the full protocol during commercial transports will be used to investigate correlations between measures and the effect of removing certain measures on the overall welfare score. Preference will be given to remove measures that co-vary with other, more feasible, measures or that have a small influence on the overall welfare score.

Assessment of sheep welfare on pasture: preliminary results

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On farm assessment for animal welfare has been more developed for intensively reared farm species than for extensively reared ones. The aim of our study was to test a new approach to assess welfare in sheep on pasture, estimating inter- and intra-observer reliability and variability among French farms. We proposed animal-based measures inspired from the 4 principles of WelfareQuality® method. Feeding (body condition score), housing (dirtiness, wool humidity) and health (lameness, lesions, respiratory disorders, hoof overgrowth, udder) were scored at the individual-level on 30 ewes per farm. A human approach test and Qualitative Behaviour Assessment (QBA) were also performed on two or three 30-ewes groups per farm to assess appropriate behaviour. The inter- and intra-observer reliability was assessed on ten experimental farms using intra-class correlation or kappa coefficients. Between-farms variability was estimated in summer time on 53 commercial farms by variance analysis with a mixed model. Inter-observer reliability was good for individual measures as well as for group measures (>0.66). Intra-observer reliability was generally good for individual measures (>0.65) but poor (<0.2) to moderate (<0.6) for group measures. In summer, most measures presented occurrence rates below 2% except lameness (5.6% of ewes), nasal discharge (3.6%) and hoof overgrowth (5%). The highest occurrence rate was noticed for animals' back dirtiness (26%). For these measures and for the QBA, within-farm variability was higher than between-farms. By contrast, between-farms variability represented more than 60% of the total variability for the human approach test, suggesting a promising measure for discriminating farms. A first assessment in winter pasturing conditions was performed on two farms and needs to be performed on a large scale.

Consumer attitudes to injurious pecking in free range egg production

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Free range egg producers face continuing problems from injurious pecking (IP) which has financial consequences for farmers and poor welfare implications for birds. Beak trimming has been practised for many years to limit the damage caused by IP, but with the UK Government giving notification that they intend to ban beak trimming in 2016, considerable efforts have been made to devise feasible housing, range and management strategies to reduce IP.

A recent research project investigated the efficacy of a range of IP reducing management strategies, the mean capital costs of which came to around 25 pence per bird. Here, the results of the above project's consumer survey are presented: consumers' attitudes to free range egg production are detailed showing that, whilst consumers had a very positive attitude towards free range eggs, they were especially ignorant about some aspects of free range egg production. The contingent valuation technique was used to estimate the price premium consumers would be prepared to pay to help reduce IP: this was calculated as just over 3% on top of the prevailing retail price of free range eggs. These findings reinforce other studies that have found that whilst consumers are not generally well-informed about certain specific welfare problems faced by animals under free range conditions, they are prepared to pay to improve animal welfare. Indeed, the study findings suggest that producers could obtain an additional price premium if they demonstrate the welfare provenance of their eggs, perhaps through marketing the eggs as coming from birds with intact beaks. This welfare provenance issue could usefully be assured to consumers by the introduction of a mandatory, single, accredited EU-wide welfare-standards labelling scheme.