ON-FARM ANIMAL WELFARE AUDITS

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ABSTRACT

On-farm welfare audits may be carried out to assess compliance with legislative requirements, to monitor aspects of pig health and management affecting performance, or to provide market differentiation of product. Welfare is a multidimensional concept which may have different interpretations for different stakeholders, and the nature of the audit must reflect the purpose for which it is being carried out. Formalised audits to objectively assess aspects of pig production relevant to welfare under practical farm conditions have been most fully developed as part of Quality Assurance Schemes. Constraints on time and cost have resulted in such audits being largely based on evaluation of resource provision. However, interest in the possible application of animal-based auditing criteria has increased and such approaches are currently undergoing evaluation as part of a large scale EU research initiative.

THE NEED FOR ON-FARM ANIMAL WELFARE AUDITS

There are a number of reasons why animal welfare is an important subject for consideration by pig producers. Animal welfare is essentially a moral issue, and the importance attached to it therefore varies between individuals depending on their economic circumstances and the accepted ethical norms of their culture. However, in many European countries public opinion has pressured politicians into making adherence to animal welfare considerations a legal requirement. In 1991, the European Council published the first Directive setting out specific minimum standards for the welfare of pigs (Directive 91/630/EEC), which are legally binding on all member states. Several individual European countries have enacted even more demanding unilateral legislation on certain contentious issues (for example, the ban on sow stalls in the UK in 1991 legislation), and many of these initiatives are becoming more widely implemented as further Directive amendments (Directives 2001/88/EC and 2001/93/EC) increase community-wide legislation.

In most cases, the requirement to improve pig welfare is not counter to the interests of the producer, since it has been repeatedly demonstrated that poor welfare will result in reduced biological and economic output (Edwards et al., 2006). This is because of the many negative influences of the stress hormones elevated in conditions of poor welfare on the processes regulating health, growth, reproduction and meat quality. The particular aspect of welfare which has received greatest industry attention in this context is animal health, because of its clear and dramatic effects on profitability. Auditing schemes to identify and benchmark the prevalence of health problems on individual farms are consequently becoming more common

in the UK (for example, the British Pig Health Scheme, www.bpex.org/bphs; the National Animal Disease Information Service, www.nadis.org.uk).

However, a more powerful economic force affecting welfare auditing in the pig industry has been the growing trend for animal welfare to become a marketing issue in a number of European countries. Animal welfare is seen as a matter of great importance by EU citizens. A recent comprehensive EU survey (Eurobarometer, 2007) demonstrated that citizens ranked the importance of protecting welfare of farmed animals very highly (7.8 on a 1-10 scale). Although 79% of respondents felt that welfare needed to be improved, most of them (85%) felt that they knew little or nothing about farming practice. An important marketing message was that 72% believed that farmers should be financially compensated for higher costs linked to farming animals under more welfare friendly conditions, and 89% believed that similar standards should be applied to products imported from outside Europe. However, 54% felt it was not easy to find information on the welfare provenance when shopping, and this gives rise to the need for identifiable labeling of products according to objective and transparent criteria which relatively uninformed consumers can both relate to and trust. As pigmeat processing and retailing is carried out by fewer and larger organisations (dominated by the multinational retail chains), they have seen a need to demonstrate to consumers the ethical acceptability of the processes involved in production of the meat they sell. It was these considerations, which brought about the establishment of rigorous Quality Assurance (QA) Schemes, based on independent on-farm audits, which have now become a market requirement for the great majority of UK producers.

The measurement of animal welfare on-farm can therefore serve different purposes for different stakeholders. For government, it serves to verify adherence to legislative requirements defined by societal demands. For producers, it serves to monitor the conditions for animals that might be influential in production efficiency. For the marketing chain, it serves to inform and reassure consumers about the provenance of the food they purchase, and can thus be used as a component of marketing strategy to differentiate products.

THE DEFINITION OF ANIMAL WELFARE

The way in which animal welfare is measured for audit purposes is influenced by the perception of welfare of the stakeholders who must give credence to the outcome (Edwards, 2007). Three clearly different perspectives on welfare have been identified, focusing on natural living, biological function, and affective state (Fraser, 2003). The concept of natural living implies that animals should be raised in conditions akin to those inhabited by their wild ancestors or relatives. Whilst animal scientists often view such a perspective as subjective and poorly informed opinion, it is the major influence on consumer perception of welfare (Harper and Henson, 2001). As such, it has given rise to one type of welfare audit based solely on the nature of the production system and, more specifically, the use of extensive production systems with provision of outdoor access. For example, legally binding organic farming standards within the EU incorporate such criteria on welfare grounds (EC Regulation 1804/99). The definition of welfare in terms of biological functioning is much closer to the perspective of producers and veterinarians. It encompasses audits based on animal health and

other factors affecting level of production, and has become the basis of industry-derived welfare auditing schemes. The definition of welfare in terms of affective state (or feelings of the animal) makes it more difficult to evaluate in a practical way, and few audits currently address this aspect effectively. However, proponents of both natural living and biological functioning perspectives frequently believe that it will automatically be maximized by application of their criteria.

There have been many attempts to provide a scientific definition of animal welfare which will assist with objective discussion of its many complex issues and evaluation in different circumstances. The most widely used current definition within Europe is that based upon the 'Five Freedoms for Animal Welfare'. This approach was first formulated by the UK Farm Animal Welfare Council (www.fawc.org.uk), a body set up to advise the government on issues relating to farm animal welfare and to develop new standards for agricultural practice. The Five Freedoms are defined as:

- Freedom from hunger and thirst
- Freedom from thermal and physical discomfort
- Freedom from pain, injury and disease
- Freedom from fear and stress
- Freedom to express normal behaviour

The first three Freedoms relate to disciplines which have been extensively studied by animal scientists and veterinarians, where the needs of the animal are generally well understood and their fulfilment is necessary for both good welfare and good biological performance. This makes it relatively simple to derive auditable measures for on-farm assessment. The fourth Freedom, whilst more difficult to assess under farm conditions, likewise links both ethical and economic aims. However, greater difficulty is experienced in finding agreement on the interpretation of the fifth Freedom. Although for many in society it implies a 'return to nature', for scientists, it implies only a requirement to meet the 'behavioural needs' of the species within whatever farmed environment they are placed.

The actual measurement of animal welfare is fraught with difficulties, even under controlled scientific conditions. Whilst it is relatively straightforward to assess some aspects of physical welfare, since poor welfare results in characteristic changes in physiology and pathology of the body's regulatory systems, the ability to assess mental welfare is still at an early stage of scientific development. At a practical level, measurements of health, productivity, stress physiology, immunology, normal and abnormal behaviour have all been utilised in welfare assessment. However, many of these measures are not amenable to instant, on-farm evaluation because they are invasive or time consuming to make. Furthermore, the interpretation of these measures can sometimes be difficult, because they may show large differences between individual animals and yield conflicting evidence about a given set of circumstances. Farm audit schemes have therefore had to adopt many indirect approaches in carrying out practical welfare assessments on pig units.

PRACTICAL APPROACHES TO WELFARE MEASUREMENT

Two distinct approaches to on-farm welfare assessment can be identified. One uses direct measurements made on animals at the time of the inspection to give a "snapshot" of their level of welfare which is believed to be representative of that farm. These can be supplemented by information from farm records of health and performance over longer periods of time. The other approach adopts indirect measures of the extent to which the system under which the animals are kept should be adequate to provide for their needs, and therefore ensure that their welfare will be good. In practice, many auditing schemes use a combination of these "animal-based" and "resource-based" approaches, as shown in the following examples.

Freedom from Hunger and Thirst

Although knowledge exists on the precise nutrient needs of pigs of all classes, it is not practical to measure the feed intake of individual pigs or the composition of all diets in a routine audit. At a theoretical level the adequacy of feeds supplied can be evaluated by checking, through questionnaires or farm records, the conformity of diet specifications to nationally agreed nutritional standards, but this does not ensure correct practical implementation. However, the adverse effects of inappropriate nutrition are easily seen in the health and body condition of the animals – both the average level and the variability. Some audit schemes therefore define adequacy of feeding in terms of the end result: for example, sows must have a body condition score of at least 3 at farrowing and at least 2 at weaning (0-5 standard UK scale). Others set a minimum growth rate for finishing pigs, which can be checked in herd performance records. Whilst pregnant sows are restrict fed, and under-nutrition which compromises welfare may sometimes reduce feed cost without apparent performance deficit, growing pigs are generally fed ad libitum for maximum growth rate and deliberate underfeeding is unlikely. Inspecting every pig amongst hundreds (even thousands on larger units) is impractical and most audit schemes therefore focus on likely reasons for accidental feed or water deprivation of some individuals. Easily audited parameters are the number of feeding and drinking places provided to each group, and the flow rate of drinkers. These can be readily measured or counted in a random sample of pens and checked against criteria defined by the scheme as being adequate to ensure welfare.

Freedom from Thermal and Physical Discomfort

Extreme heat or cold stress is readily apparent from the lying behaviour of pigs, but in a short audit inspection when pigs are disturbed by entry of people into the building, this may not always be easily seen. Indirect assessment is therefore again most often favoured. Since good computer models exist to calculate the upper and lower critical temperatures of pigs at any stage of production, and in any housing system, the measurement of air temperature at pig level in a sample of pens can be checked against tabulated criteria for the acceptable temperature zone for those circumstances.

Physical discomfort is more difficult to assess, since it implies a knowledge of the feelings of the animal. However, some criteria which will have an influence on this have already been

legally defined; in particular the minimum space allowance to allow normal lying and locomotory behaviour. This can be checked by measurement of pen dimensions, both for total area and defined lying area, counting pigs and checking calculated space against tabulated audit criteria for the liveweight class and housing system. Extremes of physical discomfort can be measured indirectly through tissue damage caused by inappropriate flooring (for example, foot and leg lesions, bursitis, shoulder sores). However, since it is impossible to check all pigs, an indirect approach is again frequently adopted. Flooring parameters known to influence such damage can be measured (for example, slat and void dimensions) and checked against criteria defined by the scheme as being adequate for pigs of that weight class.

Freedom from Injury and Disease

The presence of serious disease is readily apparent on inspection, and most UK audit schemes now require quarterly veterinary inspection and reporting. Subclinical disease can be assessed by inspection of farm records of pharmaceutical usage, and the compliance with housing and management practices designed to minimise health problems can be checked. Thus, the presence of adequate isolation and hospital facilities, cleaning and disinfection procedures and skin cleanliness of stock can be verified. The incidence of injury arising from inappropriate pen design or construction material or, as discussed above, the components of pens likely to give rise to injury, can be scored in a sample of pens. However, many injuries result not from inadequate pen design but from problems of management resulting in fighting or vice (tail, ear and flank biting). Whilst the extent of such problems can be quantified through measuring skin lesion scores of a sample of pigs, it is more difficult to measure related indirect indices other than the resource provision for nutritional, thermal and physical comfort needs discussed above. Whilst facilitating good welfare, this approach does not guarantee freedom from such socially-derived welfare problems, since simple, easily-measurable parameters which reliably determine whether or not these multifactorial problems occur do not exist.

Freedom from Fear and Stress

Even greater auditing problems arise in the case of assessing welfare in terms of the fourth Freedom. Objective physiological measures (for example, measurement of heart rate characteristics or dynamic profiles of stress hormones such as plasma cortisol) are currently impractical in an on-farm audit situation. Whilst some of the parameters known to influence fear and stress (stockmanship and handling, social stability, environmental predictability) have been extensively studied, their correct implementation is difficult to assess in a short inspection visit. Indirect measurement of such parameters as skin lesions, space allowance, and adequacy of feeding and drinking facilities is relevant, but not comprehensive. Test measurement of approach response to humans, while scientifically validated as a sensitive measure of quality of stockmanship, is time consuming and difficult to implement, and has consequently not yet been adopted by current auditing schemes.

Freedom to Express Normal Behaviour

This is the most contentious area in terms of welfare assessment. Some consumers would wish to see certain production systems specified (for example, outdoor or straw bedded) and

others banned (for example, tethers/stalls, farrowing crates, fully slatted pens) according to their perceived compatibility with 'natural behaviour'. For scientists, however, this Freedom focuses on the identification and satisfaction of 'behavioural needs'. These are behaviours which an animal is strongly motivated to perform in a given set of circumstances, as a result of stimulating factors from its external environment and/or internal physiology. If such behaviours are prevented when these circumstances arise, the welfare of the animal is compromised and detrimental effects on physiology and/or behaviour can be seen. Under practical conditions, these can be measured as the incidence of vice (tail, ear and flank biting) or stereotyped behaviours (repetitive, invariant behaviours with no apparent function) such as bar biting or sham chewing. Growing understanding of the reasons underlying expression of such abnormal behaviours is starting to indicate appropriate preventive strategies, which can then be audited. For example, bar biting in the pregnant sow arises from the combination of hunger and absence of foraging substrate towards which to direct the appropriate behaviour triggered by this condition. In consequence, either nutritional changes aimed at reducing hunger or provision of foraging substrate such as straw can be an effective remedy. The importance of environmental enrichment to meet behavioural needs is widely recognised, and current EU legislation specifies that all pigs must have '.. access to straw or other material or object suitable to satisfy those [behavioural] needs'. In both enforcement of legislation and in most QA schemes, however, the current interpretation of this is still somewhat vague, although whatever criteria are chosen can be readily audited.

DEVELOPMENT OF INDUSTRY-BASED WELFARE AUDIT SCHEMES

Prior to the 1990s, on-farm welfare audits for pig production were very uncommon. Compliance with legislation was monitored by government veterinarians only to the extent of identifying serious cruelty issues for prosecution, since Welfare Codes in force in the UK at that time had no obligatory legal status. Whilst comprising very detailed booklets of good practice, the Codes were, and still are, only recommendations. The few formalised schemes in existence at that time, such as "Organic" or "Conservation grade" production, which had defined production criteria for some welfare related aspects such as later weaning, increased space allowance, provision of bedding and outdoor access, encompassed only a very small part of pig production. Furthermore, the first QA Schemes set up by innovative retailers were relatively unsophisticated, defining welfare only according to generalised production methods (notably pigmeat produced in outdoor systems). These schemes achieved a price premium for a differentiated product and individual farms contracted into the scheme, agreed to produce pigs within the specified production system, and in return received a price premium for their animals.

Following this lead, the growth of industry-based QA Schemes began during the 1990s and was pioneered by the Scottish pig industry. By the mid 1980s this industry was in crisis as a result of major reductions in number of producers, national herd size and number of abattoirs. As a small industry in a region with low pigmeat consumption and far from the major UK centres of population, with a relatively high feed cost and poor production efficiency, the long term future looked grim. In assessing the options, it was apparent that this industry could never compete effectively on production cost alone. From this circumstance, was born the

concept of creating a differentiated product by establishing a national, producer-lead Quality Assurance scheme to create a product which would be in demand by retailers and consumers, providing both market security and a price premium. Thus the Scottish Pig Industry Initiative (SPII) developed what was claimed to be the world's first 'farm to shop' Quality Assurance scheme for pigmeat, encompassing farmers, abattoirs and retailers.

Within this scheme, animal welfare was only one of three key target components, designed to address the concerns expressed at that time by consumers, specifically relating to:

- Animal welfare – humane production methods
- Food safety – freedom from microbial contamination and antibiotic residues
- Product quality – consistently good eating quality

The starting point for the SPII scheme, and all subsequent QA schemes for livestock production, was a clearly specified code of production practice, with independent inspection of every farm to ensure that these codes were adhered to. Whilst the original SPII scheme required independent inspection at 6 monthly intervals, the cost of this was such that inspection frequency was subsequently reduced in this and most other schemes to one inspection per year, with interim quarterly reports being required from the farms own veterinarian.

In the original SPII scheme, the written production codes included a requirement for:

- adherence to all welfare legislation and government codes of practice
- documentation of veterinary input and health management programmes
- appropriate feed specifications and ingredients
- safe use and accurate recording of medicine use

Great emphasis was placed on the day-to-day housing, management and husbandry of the pigs. Thus the categories in the codes included:

- origin of stock
- management, stockmanship and welfare
- veterinary medicines and health supervision
- stock accommodation and handling facilities
- feeding and water provision
- farm cleanliness

The success of the Scottish scheme led to a proliferation of other schemes, both in the pigmeat and other livestock sectors, which sought to attract the same market advantages. Growth of the QA schemes was further promoted by the realisation of retailers that these could meet their legal requirement to demonstrate 'due diligence' in the marketing of safe food, as required by UK legislation under the 1990 Food Safety Act. At this point, QA scheme membership started to become a basic market requirement rather than a niche marketing opportunity. At the present time, three major schemes dominate the UK industry and have largely standardised their audit practices and requirements relating to animal welfare (Assured British Pigs, 2007; Genesis QA, 2007; SFQC, 2007).

SPECIALISED ANIMAL WELFARE QA SCHEMES

As the early industry-based schemes grew to encompass the majority of all UK pig production, and scheme membership became a market requirement but ceased to attract a significant price premium, they had to become increasingly pragmatic about the level of welfare requirements. Standards had to suit all systems, and auditing ensured no more than compliance with all existing legislation and application of high quality stockmanship and management in areas relating to production efficiency and product safety. In response, other specialist schemes based wholly around animal welfare were developed to meet a perceived ethical and market need. The most significant of these was the Freedom Food Scheme, established by the Royal Society for the Prevention of Cruelty to Animals (RSPCA), the largest and long established UK animal welfare charity. In promoting such a scheme, the RSPCA stated that, "The RSPCA has no other interests except those of the animals. The public (and the food industry) can trust in Freedom Food to be totally independent and to implement strict but practical welfare conditions consistently across the industry".

The production standards for the Freedom Food scheme were drawn up by RSPCA technical specialists, in consultation with other animal welfare experts. They were based on the "Five Freedoms", and specified a number of areas in which production practice was required to go beyond the basic requirements of welfare legislation. The standards for pigs and laying hens were first published in 1994, with standards for most other farm livestock species being developed subsequently and now in place. The auditing process is essentially the same as for the industry-based schemes. Adherence to standards is checked by trained assessors but, in addition, random and unannounced checks can be carried out at any time by officers of the RSPCA. Special requirements of the scheme (over and above existing industry schemes) include loose housing of all sows including lactating sows (initially implemented at a time before UK legislation made this a national requirement for dry sows), the provision of straw or other bedding to all pigs, higher space allowances, and a ban on all mutilations (castration, tail docking, teeth clipping, nose ringing) except under special circumstances of veterinary need (RSPCA, 2005). The standards are regularly updated as new welfare knowledge indicates it to be necessary.

THE EU WELFARE QUALITY PROJECT

Whilst welfare assessment has now become well established in Quality Assurance schemes, concerns are frequently expressed about the heavy dependence on resource-based measures, rather than the more direct evaluation of actual welfare outcomes through animal-based measures (FAWC, 2005). In a move to both try and reduce consumer confusion by creating a standard EU assessment scheme, and to make this scheme animal- rather than resource-based, a large EU research project was initiated in 2004 and is currently in progress. The Welfare Quality project is seeking to develop an overall welfare assessment system which is scientifically valid and widely accepted by stakeholders (Blokhuis et al., 2003). The project involves both social science research into the perspectives of different stakeholders (farmers, retailers and consumers) and animal science research into the development of valid animal-based measures. Recognising the multidimensional nature of welfare, a set of criteria around

which welfare assessment should be structured was designed (Botreau et al., 2007). It was considered important that measurements were exhaustive (containing every important viewpoint), minimal (containing only necessary and relevant criteria), that criteria were independent of each other, and agreed by stakeholders. Finally 12 sub-criteria, grouped into four main criteria, were agreed (Table 1).

Table 1. The criteria and subcriteria defined by the Welfare Quality project to develop an overall welfare assessment

Criteria	Subcriteria
Good feeding	1. Absence of prolonged hunger
	2. Absence of prolonged thirst
Good housing	3. Comfort around resting
	4. Thermal comfort
	5. Ease of movement
Good health	6. Absence of injuries
	7. Absence of disease
	8. Absence of pain induced by management procedures
Appropriate behaviour	9. Expression of social behaviours
	10. Expression of other behaviours
	11. Good human-animal relationship
	12. Absence of general fear

Measurements to assess each of these criteria were developed from a combination of literature review and experimentation. Each measure was required to meet strict criteria for:

- Validity – ability to measure the underlying welfare criterion
- Sensitivity and specificity – ability to detect true cases of welfare deficit and avoid false positives
- Reliability – ability to show good agreement over time and between observers
- Feasibility – ability to be carried out in the range of farm conditions within acceptable time and cost constraints

Following this research phase, a preliminary set of welfare measures for breeding pigs and growing pigs were agreed (Velarde et al., 2007 a, b). These are now being evaluated in pilot studies across a range of different production systems, whilst the best way to integrate the results from the different measures into an overall welfare categorization is also being formulated.

CONCLUSIONS

On-farm auditing of animal welfare has an important role to play in reassuring both the citizen and the consumer that livestock production operates in an ethically acceptable way. Increasing consumer awareness and concern about food production methods, and the market power of the major international food retailers, will ensure that welfare auditing continues to be a core requirement for pig farming in the UK, and will promote the spread of such approaches within Europe and worldwide. It also has a currently under-utilised role in good production practice, as a means of optimising performance through removal of constraints preventing animals from achieving their genetic potential. However, experience to date suggests that relatively few producers are likely to obtain a significant price premium through niche marketing of pigmeat from 'welfare friendly' production systems. Harmonisation of welfare standards and animal-based farm assessment protocols are a policy objective of EU politicians.

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