Proceedings Conference

Delivering Animal Welfare and Quality: Transparancy in the Food Production Chain

Including the final results of the Welfare Quality® project

8 – 9 October 2009, Uppsala, Sweden

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PROGRAMME

Delivering Animal Welfare and Quality: Transparency in the Food Production Chain

8-9 October 2009, Ultuna, Uppsala, Sweden

Thursday, 8 October 2009

8.00	Buses leave from Uppsala – Venue (further details will be provided)
8.30–9.00	Registration and coffee/tea
9.00–9.50	**WELCOME AND INTRODUCTION** *Chair: Anders Lönnblad, Deputy Director-General, Ministry of Agriculture, Sweden*
	Welcome speech *Eskil Erlandsson, Minister for Agriculture, Sweden*
	Perspective from the Commission *Androulla Vassiliou, Commissioner for DG Health & Consumers*
	The vision of the Welfare Quality Project *Harry Blokhuis, Coordinator of the Welfare Quality Project;* *Professor of Ethology at the Swedish University of Agricultural Sciences*
9.50–10.45	**ASSESSING ANIMAL WELFARE** *Chair: Andy Butterworth, University of Bristol Veterinary School*
	How did we design the welfare measures? *Linda Keeling, Professor of Animal Welfare at the Swedish University of Agricultural Sciences*
	Creating a welfare scoring system *Isabelle Veissier, Research Director at INRA, the French National Institute for Agricultural Research*
	Assessment and certification 'costs and benefits' *Ian Burton, Head of Information Services, PAI Certification*
10.45–11.45	**Poster session and presentation of Welfare Quality products** **Topics: See annex of the programme** **Coffee/tea**
11.45–12.45	**COMMUNICATING WELFARE INFORMATION** *Chair: Linda Keeling, Professor of Animal Welfare at the Swedish University of Agricultural Sciences*
	Feeding support information back to management *Andy Butterworth, University of Bristol Veterinary School*

Welfare® Quality
Science and society improving animal welfare

Swedish Presidency of the European Union
La Présidence suédoise de l'Union européenne
Sveriges ordförandeskap i Europeiska unionen

Thursday, 8 October 2009

	Improvement strategies from Welfare Quality *Xavier Manteca, Associate Professor at the Department of Animal Science, School of Veterinary Science in Barcelona*
	What can we tell consumers and retailers? *Henry Buller, Chair of Rural Geography, Exeter University*
	Retailer communication *Aldin Hilbrands, Senior Manager Product Integrity, Royal Ahold*
12.45–14.00	**Lunch** **Poster session and presentation of Welfare Quality products** **Topics: See annex of the programme**
14.00–17.30 ***Including 30 min break with poster session and presentation of Welfare Quality products***	**A global perspective on animal welfare with particular reference to international trade considerations** **Talks and panel discussion** **Moderator: David Bayvel, Director Animal Welfare, Ministry of Agriculture and Forestry, New Zealand** 1) Animal welfare and its role in developing countries **Daniela Battaglia,** *Livestock Production Officer, Agriculture and Consumer Protection Department, The Food and Agriculture Organisation of the United Nations (FAO)* 2) Improving animal welfare during transport improves the production of beef cattle in Uruguay **Stella Maris Huertas,** *DMTV, MSc, Veterinary Faculty, University of Uruguay* 3) Animal welfare and trade – The OIE-perspective **Sarah Kahn,** *Head of International Trade Department, World Organisation for Animal Health (OIE)* 4) Animal welfare in a sustainable supply chain **Keith Kenny***, Senior Director, Mc Donald's Supply Chain in Europe* 5) International meat trade and animal welfare **Philip Seng,** *President and CEO of the United States Meat Export Federation (USMEF*); *Chairman of the International Meat Secretariat (IMS) Animal Welfare Committee; Immediate Past President of the IMS* 6) Meat trade – view from an exporting country **Paul J. Strydom,** *General Manager, Meat Board of Namibia* 7) Animal Welfare and the WTO agreement **Gretchen Stanton,** *Senior Counsellor, Agriculture and Commodities Division, World Trade Organisation Secretariat (WTO*); *Secretary of the SPS - committee*

Thursday, 8 October 2009

17.30 (approx)	**End and transport from venue to Uppsala**
19.10 (pick-up) **19.30 (dinner)**	**Conference Banquet** *Place: Uppsala Castle* *Dress code: Smart Casual* *Transport: The Castle is within walking distance from all recommended hotels but there will also be buses to take you to and from the Castle. Pick-up time approx 19.10*

Friday, 9 October 2009

8.00 **8.00–8.30**	Buses leave from Uppsala – Venue. Do not forget your luggage! **Coffee/tea**
8.30–9.15	**SOCIETAL VIEWS, COSTS AND BENEFITS** *Chair: Henry Buller, Chair of Rural Geography, University of Exeter*
	Citizen and farmer perspectives *Bettina Bock, Associate Professor in Rural Sociology at Wageningen University* *Mara Miele, Senior Fellow at the School of City and Regional Planning at Cardiff University*
	Socio-economic studies *Kees de Roest, Head of the Department of Economic Research of Centro Ricerche Produzioni Animali of Reggio Emilia*
9.15-10.15	**Thematic activity: IMPLEMENTATION AND STRATEGY** Four parallel seminar sessions will explore how the WQ results might be implemented and what strategic options and requirements there are.
9.15–10.15	**Session 1 – Is monitoring animal welfare helpful for farmers?** *Chair: Leif Erland Nielsen, European Economic and Social Committee*
9.15–10.15	**Session 2 – Animal welfare in the market** *Chair: Keith Kenny, Senior Director for Mc Donald's Supply Chain in Europe*
9.15–10.15	**Session 3 – Animal-based measures in the regulatory framework?** What can be regulated with regards to animal welfare? *Chair: Martin Appelt, Canadian Food Inspection Agency*
9.15–10-15	**Session 4 – Consumer or citizen?** Which are we at the supermarket? *Chair: Henry Buller, Chair of Rural Geography, University of Exeter*
10.15–11.15	**Poster session and presentation of Welfare Quality products** **Topics: See annex of the programme** **Coffee/tea**

11.15–12.45	**Moving forward: Short talk sessions and discussion panel** *Chair: Isabelle Veissier, Research Director at the French National Institute for Agricultural Research (Inra)*
	Feedback from the parallel sessions Presentation of short statements from each parallel session
	An NGO view *Sonja van Tichelen, Eurogroup for animals*
	The Welfare Quality Advisory Committee – Looking ahead *Peter Sandoe, Professor in Bioethics at the Faculty of Life Sciences, University of Copenhagen*
	An outcome based approach to animal welfare during transport *Martin Appelt, Canadian Food Inspection Agency*
	Views from a farmer *Henri de Thoré, Representing Pig Farmers in the Welfare Quality® Advisory Council*
	Filling gaps, exploiting new technologies, maintaining an assessment system and keeping up the momentum *Harry Blokhuis, Coordinator of the Welfare Quality Project;* *Professor of Ethology at the Swedish University of Agricultural Sciences*
	Panel discussions Discussion and questions from the audience
12.45–13.30	**Closing statements** *Chair: Harry Blokhuis, Coordinator of the Welfare Quality Project;* *Professor of Ethology at the Swedish University of Agricultural Sciences* *Timothy Hall, Head of Unit, DG Research* *David Bayvel, Director, Ministry of Agriculture and Forestry, New Zealand* *Anders Lönnblad, Deputy Director-General, Ministry of Agriculture, Sweden*
13.30	**Lunch**
Approx 15.00	**Buses leave from venue to Arlanda Airport (time to be confirmed)**

Annex Conference Programme

Poster Session and Product Presentation

A poster session and presentation of Welfare Quality® products is organised on Thursday 8th of October 2009 and Friday 9th of October 2009.

Poster Session Topics

- Assessment outcomes for management support.
- Farmers- and citizen's opinions on the assessment system.
- Socio economic implications of improved welfare (socio economic implications ???).
- Retailer experiences in welfare communication.
- Scenario's for implementing the assessment system.
- Improving piglet survival.
- Decreasing aggression in pigs through selective breeding.
- Project Econ Welfare: socio economic impacts of farm animal welfare.
- European Animal Welfare Platform.
- Swedish Centre for Animal Welfare.
- Farmland.

Topics of the Product Presentations

- **Welfare Quality® Assessment Systems for Poultry, Pigs and Cattle.**
  The Welfare Quality project developed standardized ways of assessing animal welfare and a standardized way of integrating this information into a welfare score. The procedures and requirements for the assessment of welfare in cattle (fattening cattle, dairy cattle and veal calves), pigs (sows, piglets, growing pigs and finishing pigs) and poultry (broiler chicken and laying hens) are presented. This includes collection of data on farm and where applicable at the slaughterhouse. The Welfare Quality® protocols reflect the present scientific status of the project.
  Linda Keeling, Christoph Winckler (cattle), Antoni Dalmau (pigs), Andy Butterworth (poultry)

- **Support Tool for the Overall Animal Welfare Assessment**
  Welfare Quality® developed ways of assessing animal welfare. 30-50 welfare measures are used to check compliance of farms and slaughterhouses with the 12 welfare criteria. This generates a substantial amount of data that is to be integrated. Welfare scores are calculated and farms and slaughter houses are finally classified into four welfare categories: excellent / enhanced / acceptable, else not classified. A software programme is proposed to collect the data, store them, calculate scores, and produce the final overall assessment. The software will be shown and you will be able to simulate results from data.
  Anne Lamadon and Isabelle Veissier

- **Web-based Lameness Control Programme for Dairy Cattle**
  Lameness in dairy cattle can have a range of different causes, and the main contributing factors vary from farm to farm. Approaching a herd lameness problem in a methodical way will improve the chances of discovering the root causes and finding solutions.
  A newly launched website, www.cattle-lameness.eu, developed by the University of Bristol as part of the Welfare Quality® project, can help farmers and their advisors to do this.
  Katharine Leach

- **Training Programme for Animal Handling**
  The training programme Quality Handling is developed by Welfare Quality, for professional stock people, as well as for students in farm-related professions. The training makes trainees aware of the importance of attitudes and behaviours towards handling and the quality of human-animal interactions (minimising handling stress, increasing positive contact). Quality Handling is a multimedia programme. Specific training packages were developed, for handling of cattle (in French, German and English), pigs and laying hens (in Dutch and English).
  Xavier Boivin and Marko Ruis

- **Preventing Lameness in Broiler Chicken through Feeding Strategies**
  Farmers often underestimate the amount of lameness in their broiler flocks and in doing so they risk reducing the birds' welfare as well as product quality and profitability. Broiler flocks may suffer from painful leg disorders caused by bone and joint infections as well as skeletal abnormalities, both of which are a result of a fast growth rate during the first few weeks of life. Welfare Quality® researchers have discovered how a different diet and feeding regime can significantly reduce lameness and thereby improve animal welfare.
  Christine Letterier

- **Educational Materials on Animal Welfare**
  There is some coverage of animal welfare in the UK national curriculum, but the overall coverage of farm animal welfare issues is quite poor. Animal welfare NGOs have been actively producing materials for use in primary and secondary education to fill this gap, and the present NGO coverage is fairly wide ranging. However, Welfare Quality® researchers found that there are still gaps in provision relating to animal welfare and food safety/quality, the roles of certain stakeholders, including retailers and farmers, and the environmental impacts of animal farming.
  John Lever and Adrian Evans

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Abstracts of Communications Thursday 8 October 2009


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Statement from Anders Lönnblad

Animal issues are something that interests many people in Sweden. Animals are of great importance for the production of food and for nature's eco-cycle. Many people also have pets or animals as their leisure time interest.

The basic idea of Swedish animal policy is that all animals should feel good, be healthy and be able to behave naturally. This also requires that the environment in which animals live be as animal-friendly as possible. The goal is to maintain good animal welfare among farm animals, pets, experimental animals and wild animals in captivity.

Swedish regulations on how animals should be kept and managed are found in the Animal Welfare Act and the Animal Welfare Ordinance. Regulations are also produced by the central agencies responsible for animal welfare issues, primarily the Swedish Board of Agriculture. Sweden works continuously on reviewing the regulatory framework to ensure that the regulations are up to date.

Statement from the Swedish Presidency, Sound animal husbandry and healthy animals

Sound animal husbandry is key to the well-being of animals, to consumer confidence in food production, to public health and to the producers' financial situation.
Good animal welfare is essential for sound animal husbandry.
The aim of the Swedish Presidency is to advance work on animal welfare issues and to keep the debate alive on the importance of good animal welfare in the EU.

Perspective from the Commission - Androulla Vassiliou

Animal disease outbreaks can have devastating consequences for the economy, the food supply and society as a whole. Some animal diseases pose grave threats to human health. Therefore, I regard the prevention and control of animal diseases as a top priority for the EU. Legislation on serious diseases such as avian influenza and foot-and-mouth disease has been updated in the past couple of years, and the Commission has worked closely with Member States to improve preparation for, and response to, disease outbreaks.

The Commission's Communication outlining the Community **Animal Health Policy** published in September 2007 is an important milestone to strengthen and rationalise the important body of EU legislation in this domain. It is setting an ambitious agenda for the near future.

I also place huge importance on securing the highest possible level of **Animal Welfare** throughout the EU, in line with consumer demand. The Animal Welfare Action Plan adopted in October 2006 is now well underway, and there have been a number of good initiatives, including a proposal to ban cat and dog fur, and measures to improve the welfare of broiler chickens. Future activities will include updating the rules on animal welfare at slaughter and further improving the conditions for animals in transport.

Welfare Quality®'s drivers and vision

Harry Blokhuis
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Introduction

It is an amazing seven years ago that we started to formulate our first aims and goals of what became the largest piece of integrated research work yet carried out on animal welfare in Europe. The actual Welfare Quality® project started more than five years ago and it has been an exciting and very productive time. During the project's lifetime our original ideas (c.f. Blokhuis *et al*., 2003) evolved and the priorities were slightly modified accordingly. However, the main drivers underlying our vision, the general aims and our research approach have remained the same.

Drivers of the Welfare Quality project

Of course there are many and very diverse groups, factors, circumstances and developments that have been influential in driving and guiding the Welfare Quality® project. Here I will focus specifically on four factors that I feel have been particularly crucial: citizens, production chains, European Union and scientists.

*European **citizens** consider farm animal welfare of increasing significance and they demand guarantees and transparent information*

During the last decades of the 20th century major changes took place in animal production (cf Blokhuis *et al.,* 1998). Production intensified enormously and farms became highly specialised (Porcher, 2001). This development led to a huge increase in the number of animals per farm and to striking increases in actual production. Furthermore, housing conditions and management practices changed profoundly with increased mechanisation and other technological developments. Animal production became increasingly industrialised, with quantity often taking precedence over quality.
Over the years, cultural, attitudinal and commercial barriers hampered constructive communication between farmers and the people who ultimately eat what is produced. The activities of consumer groups and animal protectionists and, more recently, the effects of crises such as swine fever, BSE, foot-and-mouth disease and avian influenza have led to people becoming increasingly aware that animal production is more than just an industry. Issues such as animal welfare, food quality, food safety and the environment have assumed much greater importance for the public ('consumer concerns'). Farm animal welfare is now clearly an important issue for ordinary people across Europe and there is clear demand for higher animal welfare standards (see Eurobarometer, 2005; 2007; Kjaernes *et al*., 2008).

The general interest in animal welfare is also reflected in a widespread demand for information across Europe.

However, this demand varies significantly across different countries and largely reflects differences in primary production, processing and distribution as well as governance structures and public discourse. Moreover, information demand often seems to reflect a general interest, rather than one that is apparent through purchase choice (Kjaernes *et al*., 2008).

*The **production chain** focuses more and more on delivering good animal welfare as an important attribute of total food quality*

In general farmers consider animal welfare as an important aspect of farming (c.f. Bock, these proceedings) and they are very motivated to take good care of their animals. Farmers also realise they have to deal with a market where people are concerned about the welfare of production animals and they acknowledge that these concerns have to be taken into account. There is broad recognition that conditions that harm animal welfare can negatively affect production and also damage specific quality aspects thereby jeopardising profitability.

Farmers are in favour of an objective standardised system of assessing animal welfare that could be used all over Europe and preferably world wide (c.f. Bock, these proceedings). But, they are also worried about the costs of welfare assessments, welfare improvements and more stringent regulations. They are also anxious about who will bear such costs.

Producers, retailers and other food chain actors increasingly recognise that consumer concerns for good animal welfare represent a business opportunity that could be profitably incorporated in their commercial strategies (Roe and Buller, 2008). Animal welfare is increasingly used, particularly by retailers, as a component of product and supply chain differentiation (c.f. Eurogroup for Animals, 2007). Such differentiation (and creation of markets) may be based on an 'overall' high welfare level or be related to specific welfare aspects; it might or might not be 'bundled' with other product characteristics such as those referring to 'environment', 'global warming' or 'sustainability'.

In general, animal welfare is increasingly used as an important attribute of an overall conception of 'food quality' (Blokhuis et al 1998; Buller et al., 2007).

*The **European Union's** endorsement of the European Research Area*

At the Lisbon European Council in March 2000, the European Research Area (ERA**)** was endorsed as a central component of the process of developing a knowledge-based economy and society in the EU. It was recognised that the issues at stake and the challenges associated with the technologies of the future, require European research efforts and capacities that are integrated to a far greater extent than at present. As such the ERA has become the reference framework for research policy issues in Europe. The European Union promotes the ERA objectives and strengthens the scientific and technological basis of the Community through the Framework Programmes (FP) for research, technological development and demonstration activities.

These FPs stimulate the creation of large collaborative projects and networks of excellence. Such integrated efforts aim to mobilise a critical mass of European research and development resources and skills and to better integrate research capacities across Europe.

*The commitment of **scientists***

Animal welfare science is relatively young and can be traced back to the 1960's with behavioural and physiological sciences being the most dominant areas of research (c.f. Blokhuis et al., 2008). The science area is developing and expanding through the efforts of a growing number of committed researchers.

Nowadays, the approach to the issue is clearly multi disciplinary and involves many different specialisations such as biology, psychology, ethology, biotechnology, veterinary and animal sciences, and social sciences.
Animal welfare is a subject of fierce debate in society and researchers in this area are often asked to contribute to the debate. Policy makers also often draw upon these experts to provide the science base for animal welfare regulations (e.g. through scientists' contributions to opinions of the European Food Safety Authority, EFSA).
Current developments in animal welfare research also clearly indicate that researchers respond to the ongoing public discourse and policy making needs and that they shift their priority topics accordingly. Some examples of such topics are: positive welfare indicators, detailed animal-based descriptions of farming practices, socio-economic information and technical decision support (Keeling, presentation at EFSA Scientific Forum November 2007).

Vision, aims and approach
Welfare Quality®'s vision is to accommodate the above drivers and to respond to their diverse requirements. Transparency of the product quality chain in relation to animal welfare is considered a major requirement. The latter involves visibility of production processes to all stakeholders (public, NGO's, industry, government etc) and a quantification of how these processes affect animal welfare (Blokhuis et al., 1998).
Welfare Quality® therefore set out to deliver reliable, science-based, on-farm welfare assessment systems for poultry, pigs and cattle as well as a standardised system to convey welfare measures into easy to understand product information. It was also recognised that a large European effort in the area of animal welfare should also include research designed to identify practical ways of solving some of the main welfare problems in current animal production. Welfare Quality® initiated appropriate studies in important areas like handling stress, injurious behaviours, lameness, temperament etc.
In our view an integrated European approach provides a firm basis for the harmonisation of assessment and information systems. It is also considered extremely relevant for the provision of transparent consumer information and for marketing and trade.

Thus, although our original goals have evolved as results have emerged and opportunities arisen, the main aims still stand:
- to develop a standardised system for the assessment of animal welfare;
- to develop a standardised way to convey measures into animal welfare information;
- to develop practical strategies/measures to improve animal welfare;
- to integrate and interrelate the most appropriate specialist expertise in the multidisciplinary field of animal welfare in Europe.

In a truly integrated effort Welfare Quality® combined analyses of consumer/citizen perceptions and attitudes with existing knowledge from animal welfare science and thereby identified 12 areas of concern that needed to be adequately covered in the assessment systems.
To address these areas of concern, it was decided to concentrate on so-called performance measures that are based on measuring the actual welfare state of the animals in terms of, for instance, their behaviour, fearfulness, health or physical condition. Such animal-based measures reflect the effects of variations in the way the farming system is managed (role of the farmer) as well as specific system-animal interactions (see diagram below). Relevant resource- and management-based measures are also included.

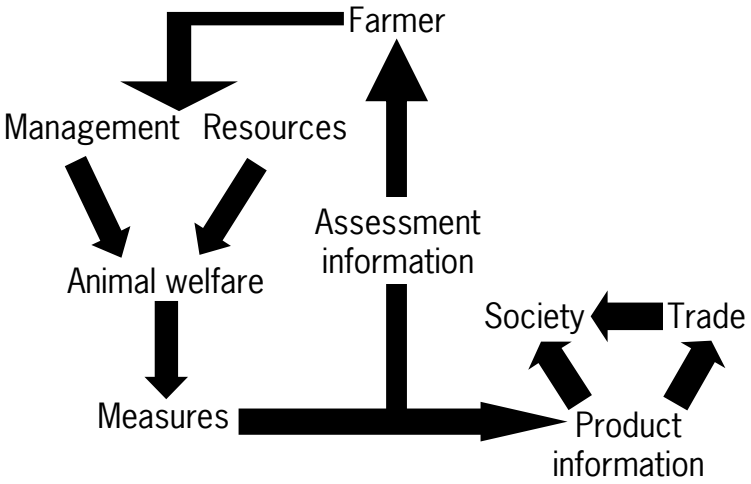

Figure *Diagrammatic representation of the measuring and information systems (adapted from Blokhuis et al. 2003).*

Clearly, such an integrated, standardized, assessment procedure could also provide an invaluable tool for testing and evaluating new housing and husbandry systems as well as new genotypes before they are allowed onto the market. By identifying potential risks, such monitoring would play a critical preventative role.
In Welfare Quality®'s vision, the feedback of the detailed outcomes (assessment information) of the measures to the farmer is a very important basis for the on farm welfare management. Together with expert advice such information can support the farmer's efforts to further improve the welfare of the animals. To support this process Welfare Quality® also developed an 'information resource' which gives farmers and advisers access to background information, causal factors and possible improvement strategies for identified welfare problems.

Welfare Quality® also conducted detailed studies of producers, distribution systems and consumers in six European countries (France, Great Britain, Italy, the Netherlands, Norway, and Sweden), and more modest studies of a seventh (Hungary). Significant national differences were found in for instance how farm animal welfare is considered and regulated. On the basis of these analyses different strategies for the implementation of the Welfare Quality® results were considered. These scenarios were characterised by the market situation, regulatory arrangements, the focus on welfare among experts and in public discourse, issues of trust, division of responsibility for farmed animal welfare, market forces, and so on (Buller, these proceedings; Miele and Bock, these proceedings).

I firmly believe that Welfare Quality® has made great progress towards fulfilling its vision and thereby not only accommodating the above drivers but also improving the welfare of our farm animals.

Acknowledgements
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How did we design the welfare measures?

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Although there are many aspects to take into consideration when designing a welfare assessment system, a main one is the design of the measures themselves. This presentation deals with three key issues related to the measures used in the Welfare Quality® project. Even if much is no longer new, it is easy to forget that there was little agreement about how welfare assessment protocols should be developed five years ago, when the project first started. While acknowledging other research and developments in this area, it is probably safe to say that the Welfare Quality® project has achieved broad scientific consensus on core points related to welfare assessment under commercial conditions. It has also made a significant contribution to the development of a standardized methodology that can continue to be used in the future as new measures are identified.

Different types of measures

The distinction between animal-based measures, resource-based measures and management-based measures has become clear in recent years, as has the importance of using the right type of measure for the task.

Welfare Quality® has developed protocols to assess the level of welfare of animals on farm and at slaughter. Since there are many ways to achieve good welfare the emphasis in the project has been on animal-based measures i.e. behavioural or clinical observations that are taken directly from the animal. When, on the other hand, the task is to assess the risk of poor welfare in the future or to help identify causes of poor welfare, then resource-based measures (e.g. how much space an animal should be given, what type of flooring or bedding material etc.) and management-based measures (e.g. breeding strategies, specifications about how animals are handled and treated etc.) are more appropriate.

Legislation is based on scientific evidence or long experience and when it is known that some aspect of the environment or management is problematic from an animal welfare point of view then it may be better to ban it, rather than repeatedly recording the consequences on animal-based measures. But too much prescription of how things should be in resource-based terms can restrict innovation and does little to promote welfare above the minimum required by legislation. Animals, because of their genetic background, or how they were reared, may experience the same housing situation or handling procedure differently. Even within the same group of animals there may be differences according to the rank or temperament of the individuals. Thus animal-based measures taken on a representative sample of animals reflect the actual state of the animals in that group or at that animal unit. Furthermore, once the measures have been taken, they can be used in several ways.
Results of the different animal-based measures provide useful feedback for the manager for benchmarking and monitoring changes in measures over time. If appropriate, they can also be used as a basis for decisions relating to improvement strategies.

For example, a high incidence of lameness identified using animal-based measures may be attributable to inappropriate flooring (a resource-based measure) or an inappropriate hoof care programme (a management-based measure). The separate welfare measures can also be integrated in a welfare scoring system.
Thus the different types of measures are complementary and can be used in different ways to promote animal welfare.

Validity, reliability and feasibility of measures
It seems obvious that measures in an animal welfare assessment system should be valid, i.e. that they should really say something about the welfare of the animals being assessed. Indeed, as stated previously, this is the basis for the decision to focus as much as possible on animal-based measures. In the future, perhaps welfare measures made from a drop of milk or from tissue sample might be validated, but with few exceptions Welfare Quality® has not been able to focus resources into developing completely new animal-based measures. Instead, it has focussed on assessing the reliability of already validated measures and on making them more feasible. The emphasis has been on identifying potential welfare measures and establishing procedures for deciding amongst them. This has been carried out separately for each of the seven categories of animals considered in the Welfare Quality® project; dairy cattle, beef cattle, veal calves, sows with piglets, fattening pigs, laying hens and broilers and for measures on farm and at slaughter. Although the details of the measures tend to be species specific, the three key issues related to the design of the measures presented in this paper are the same across species.

Valid animal-based measures developed by researchers for use under experimental conditions are often unsuitable for use under commercial conditions because they are too time consuming or require equipment to be taken on to the animal unit, and also specialist veterinary or behavioural expertise is sometimes required to take the measures. An important consideration in the design of welfare measures for on farm welfare assessment is that the measures are simple to take. Although they still require training, in many cases they consist of the assessor counting frequencies or classifying animal-based measures according to a small number of categories illustrated by photos. Some of the scoring systems evaluated in this project were developed by the Welfare Quality® scientists, others were taken from the scientific literature. When several different scoring systems were available a 'devil's advocate approach' was taken, whereby the original scientists were asked to agree among themselves upon a final scoring system.

To address concerns about subjectivity, or that assessment would vary from one day to another depending on the mood of the assessor, measures were systematically tested for inter (between different observers) and intra (within the same observer) reliability. The testing procedures were standardised as much as possible to allow comparisons between measures and when several different options were available the measure that had highest reliability and feasibility was selected.
It is noteworthy that many welfare measures currently used in quality assurance schemes have not been tested for reliability. The reliability of the animal-based measures was generally high and the methodology has been further improved by instructions on how the animals to be investigated are to be selected. If reliability was poor the measure was rejected.

Welfare measures have been collected on approximately 700 farms/slaughterhouses around Europe and on 150 farms/slaughterhouses in Latin America. The monitoring systems used initially contained many more measures than suggested for the final assessment protocol. This was so that measures could be evaluated under a wide range of conditions and further refinements made. This has provided a unique database of animal-, resource- and management-based measures that is still being analysed.

For example, analysis of correlations and associations between different animal-based measures and the calibration of simplified versions of the monitoring system against the full system will help in decisions of whether measures can be removed from the assessment protocol without loss of sensitivity. A risk factor analysis is also being carried out. While every attempt has been made to reduce the time taken for individual measures, and in some cases measures can be recorded simultaneously, a reliable assessment of a farm or slaughterhouse will inevitably take time. The decision of whether to record only animal-based measures for welfare assessment or whether information about resources and management is gathered as part of an advisory tool will also affect the duration of the visit.

Covering the different dimensions of welfare

Good animal welfare can mean different things to different people, thus it became clear early in the Welfare Quality® project that the choice of measures had to reflect these differing scientific and societal views. For some, that the animal is able to show natural behaviour is a prerequisite for good animal welfare. For other people, animal welfare is mainly defined in terms of physical health, while yet others emphasize the importance of the mental or emotional state of the animal. Welfare Quality® decided upon 12 criteria that covered all the key dimensions of animal welfare and each of these three different views of welfare is reflected in one or more of these. The 12 criteria are; absence of prolonged hunger, absence of prolonged thirst, comfort around resting, thermal comfort, ease of movement, absence of injuries, absence of disease, absence of pain induced by management procedures, expression of social behaviour, expression of other (non-social) behaviour, a good human-animal relationship and a positive emotional state. Ideally there should be at least one animal-based measure in each area, which at the present time is not the case for all animal species. Thus besides identifying welfare measures, this project has also identified where welfare measures are lacking so that future research can be directed to these areas.

More than 70 animal scientists with different species specialities and background expertise have contributed to the design of the welfare measures. To this group we can add the social scientists and stakeholder representatives who were consulted. Not everybody agreed with everything that was decided, but the ongoing process of trying to reach consensus is a definite strength. It has resulted in a widely accepted, standardized way of assessing animal welfare that it is now being applied in other projects. Furthermore, the experience gained designing the welfare measures for the Welfare Quality® project will hopefully help facilitate the refinement and further development of valid, reliable and feasible animal-based welfare measures to be included in future welfare assessment and monitoring systems.

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Creating a welfare scoring system: ethics in practice

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One major objective of Welfare Quality® is to propose harmonized methods for the overall assessment of animal welfare on farm and at slaughter that are science based and meet societal concerns. The need for such a unified scoring system became clear from the evidence that:

1. Animal welfare remains an important concern for EU citizens (Welfare Quality® results on citizens' expectations) and an information system;
2. It may contribute to the raising of welfare standards;
3. Eurobarometer findings (2007) suggested that EU consumers do not feel sufficiently well informed about animal welfare of animals and are thus unable to adequately take it into account when purchasing food;
4. Across Europe, welfare claims are often used on animal products and several schemes have been put in place to guarantee animal welfare for consumers. These schemes differ in the measures used to check animal welfare, in the thresholds set to differentiate high vs. poor welfare, or in the way the information is integrated to form an overall judgement. A unified scoring system seems necessary to ensure both the understanding and credibility of welfare claims;
5. The EU Commission, in a white paper to the parliament in 2002, launched the idea of a unified labelling system that could be used for bilateral negotiations between countries. Again this requires a unified scoring system.

Welfare Quality® identified 4 principles (good feeding, good housing, good health, appropriate behaviour) and12 criteria (Welfare Quality® Fact sheet *Principles and criteria of farm animal welfare*) that must be satisfied to ensure good animal welfare. Researchers then developed an innovative system that incorporates 30-50 welfare measures per species (pigs, cattle, poultry) that can be used to check compliance of animal units (farms or slaughter plants) with the 12 criteria (see Keeling paper at this conference). This generates a substantial amount of data that needs to be integrated into an overall evaluation of the animal unit. This exercise is by nature bound to raise ethical questions such as:

- should we consider the average state of animals vs. the worst ones?
- should we consider that the various welfare criteria can compensate for each other?
- should we take into account societal aspirations for high welfare levels or the realistic likelihood of achieving such levels in practice?

Welfare Quality® designed the hierarchical evaluation model shown below (Figure 1). This progresses from the 30-50 measures, through an integration procedure, into scores for each criterion which are then grouped in the appropriate principles (good feeding, good housing, good health, or appropriate behaviour). In the final step the scores for each of the 4 principles are integrated into an overall assessment. Because science alone cannot solve ethical issues the model for the overall assessment of animal welfare was tuned according to expert opinion.

The experts were animal scientists (for their knowledge of the measures), social scientists (for their knowledge on expectations of societal groups), and stakeholders (as potential users of the overall assessment). The various steps are described below.

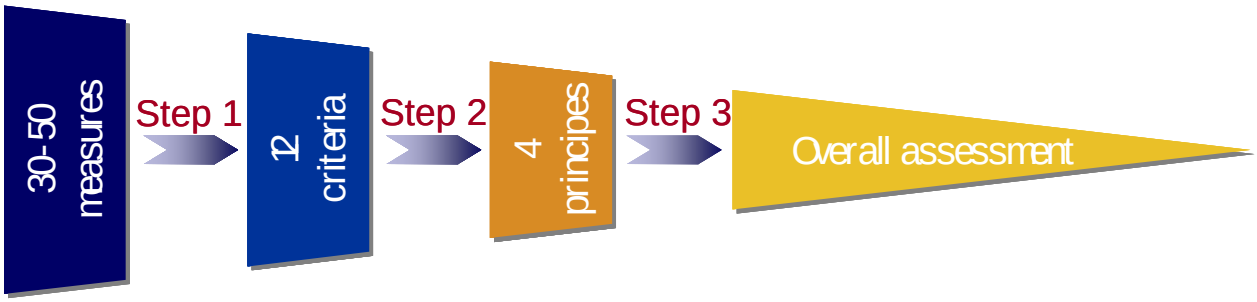

Figure 1: Hierarchical evaluation model

In **Step 1**, the results from the 30-50 measures were transformed into scores on a value scale to reflect the compliance of a given farm or slaughter plant with the welfare criteria (0 = worst; 100 = best). At that stage, it was important to know if we should give priority to the worst animals or just consider the average welfare of animals in a group. In-depth consultation with animal scientists enabled us to design the appropriate transformation of data into scores. An example is shown in Figure 2, where the proportion of lame cows is given values in terms of the absence of injuries. In this example, it is clear that the worst off animals (i.e. severely lame cows) count more than the animals in good condition: 9% severely lame cows and 91% not lame cows result in a score of 50. Nevertheless, the average welfare of the group (taking into account animals in an intermediate condition) also matters: a farm with 5% severely lame cows and 50% moderately lame cows receives a lower score than one with 10% severely lame cows and no moderately lame ones. Therefore, the scoring model reflects a balance between affording priority to animals in the poorest conditions and the overall welfare of the whole herd.

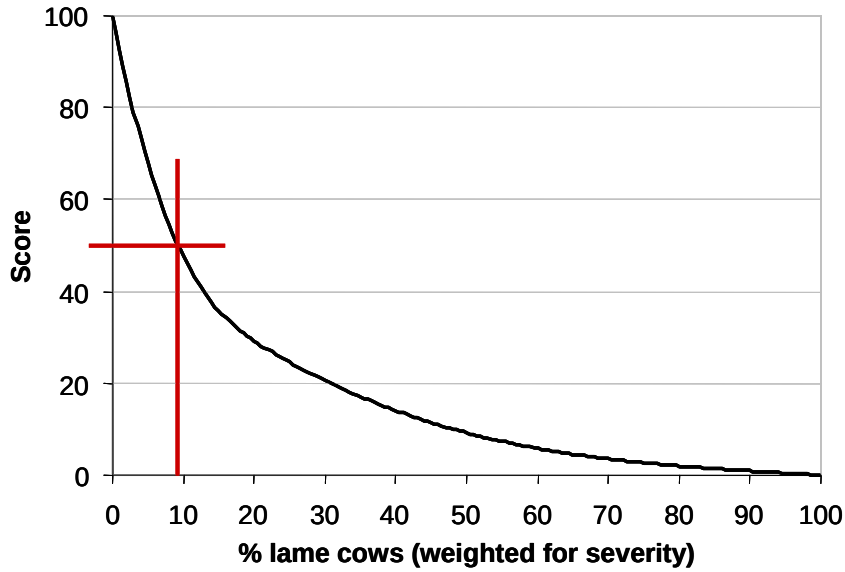

Figure 2: proportion of lame cows as a value judgment of 'absence of injuries'.

In **Step 2**, criterion-scores are combined to form principle-scores, e.g. the scores for absence of hunger and absence of thirst are combined to reflect compliance with the 'good feeding' principle. It was then important to decide if compensation between scores should be allowed.
Consultation with animal and social scientists revealed that some criteria were considered more important than others (e.g. absence of thirst is more crucial than absence of hunger) but that only limited compensation between scores should be accepted (e.g. absence of thirst does not fully compensate for hunger and vice versa). A specific technique is used to take this reasoning into account and, as shown in Table 1, the fact that scores obtained at principle-level fall below the average of scores obtained at criterion-level demonstrates that there is only limited compensation.

Table: Examples of principle scores according to combinations of criterion scores

Criteria		Principle
Absence of hunger	Absence of thirst	Good Feeding
25	75	**39**
40	60	**45**
50	50	**50**
60	40	**42**
75	25	**31**

Step 3 was designed to guarantee that farms or slaughter plants realise a certain level of welfare for their animals. Four categories are thus distinguished to meet stakeholders' requirements;

a. excellent welfare,
b. enhanced welfare,
c. acceptable welfare,
d. units that are not classified.

Researchers set the excellence threshold at 80, the one for enhanced at 55 and that for acceptability at 20. Here, it is important to consider both societal aspirations for high welfare levels and the realistic likelihood of achieving such levels in practice. Thus while setting minimum requirements for each of the above thresholds (80, 55, 20) it was also decided to allow some flexibility around these so that they could be truly aspirational.

Therefore, a farm is considered 'excellent' if it scores more than 55 on all principles and more than 80 on two of them.

A farm is considered 'enhanced' if it scores more than 20 on all principles and more than 55 on two of them.

Farms with 'acceptable' levels of animal welfare score must more than 10 on all principles and more than 20 on three of them.

Farms that do not reach these minimum standards are not classified (Figure 3).

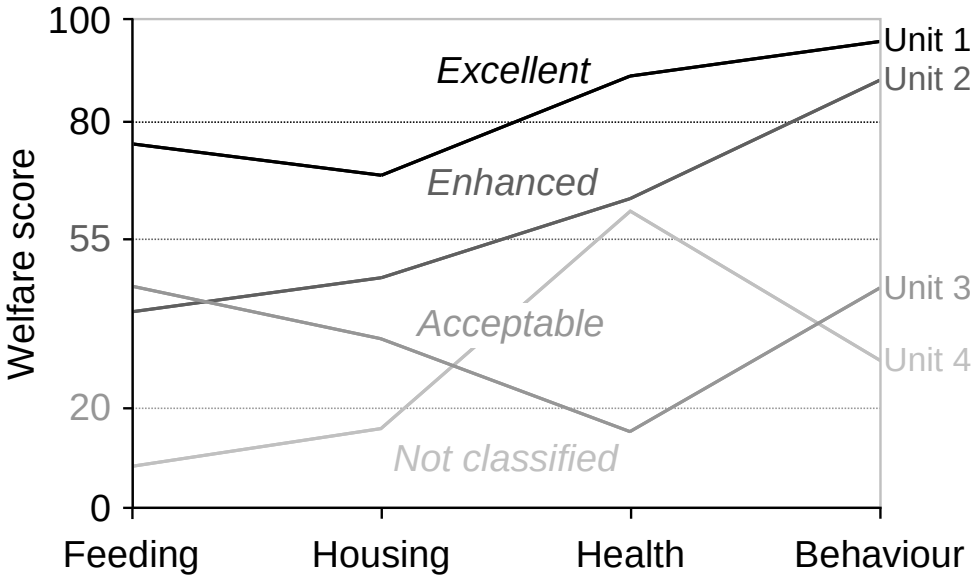

Figure 3: Example of animal units falling in the four welfare categories.

To our knowledge, the Welfare Quality® scoring system of animal welfare is the first to propose a harmonised system across animal species. It not only rests on sound scientific knowledge but it also makes clear the ethical assumptions that underpin the scoring of an animal unit. The four categories (not classified, acceptable, enhanced, excellent) allow a range of possible results from very poor to excellent welfare. The scoring system can provide farmers or slaughter plants' managers with a broad picture of the welfare status of their animals while identifying specific aspects requiring their attention. It can help stakeholders to certify farms, e.g. to keep only enhanced farms for a general quality label, or to select excellent ones for a niche market, while also enabling consumers to make an informed purchasing choice.

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Costs and Implementation of Welfare Quality® Protocols

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One of the challenges to any protocols developed by the Welfare Quality® project is gaining recognition and perhaps more importantly acceptability within the agricultural industry. The industry as a whole feels it is already over regulated and facing ever growing demands for more assessment. Many feel that the currently applied assessment procedures used in existing farm assurance schemes are often duplicated and provide little or no incentives both in terms of product prices or management information. Any new protocols need to show that they can deliver measurable benefits to producers and the production chain.

Integration in Existing Schemes

The Welfare Quality® protocols are unlikely to be used as a "stand alone" tool if they are to be delivered in a cost effective way. Integration into either existing "national" or "international" schemes or retailers own assessment systems would be the most cost effective way of delivering the protocols. The cost of delivering current assessments is not just the time taken for the assessment visit itself but also the cost of actually getting a qualified assessor on site both in terms of training, transport and administration.

Once on site, the additional cost of time taken to deliver the assessment is relatively low in comparison with a 'stand alone' visit. Management time required by the producer himself should also be taken into consideration. By being delivered as "bolt on'" within existing schemes there is already a pool of trained assessors in place who would have the skills to acquire new inspection methods and tools. The one danger of this method is the risk of the protocols being taken out of context so it will be important that it is clear how the protocols can be grouped so the scoring methodology still holds validity.

Barriers to Implementation

Assessor training and how this is delivered will also need a prominent focus in any debates following the completion of the project. It will be essential that training on the interpretation and scoring of the protocols is available to ensure consistency across assessments. Costs of training and keeping assessors updated will need to be factored into any assessment costs.

Industry bodies representing producers are often wary of creating "tiered" schemes with farms appearing to be of different standards e.g. Gold, Silver, Bronze. They want schemes to be inclusive not exclusive, but it is also clear that some consumers value the possibility to make choices based on quality level ("Finest" product ranges for example). Implementing into existing "National " or "International" schemes can sometimes be a lengthy process with a number of technical committees and stakeholder consultations, retailers own schemes are generally much quicker to react with often shorter or dedicated supply chains to involve.

Implementing Protocols

Schemes could initially include the requirements as recommendations rather than as mandatory requirements. This has the benefit of allowing producers to gain understanding of the protocols without any impact on their certification. Over a period these can be assessed for impact and usability and can be easily adopted at an appropriate time.

Feedback to producers of the results will be key to getting industry buy in. Current schemes concentrate on non conformances and will need to adapt to feedback of results of the protocol scoring.

Conclusion

Welfare outcomes are widely recognised as being the next step in animal welfare monitoring. Implementation of the protocols developed by the project will need to be embraced by the industry as a whole.

Costs and time involved in recording the outcomes can be kept to a minimum by delivering within existing animal welfare assessments.

It will be essential that feedback and benchmarking of results is available to producers.

This can only be seen as the starting point for the use of welfare outcomes. Further research and development of other protocols covering different species and environments will be essential following on from the achievements of the current project.

Feeding support information back to management

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Existing farm assurance standards are beginning to ask 'animal centered' questions, and it is apparent that repetitive resource based assessment can fail to fully answer questions about animal welfare (Fraser, 2004). Two farms may have exactly the same physical dimensions, the same feeding systems and the same feed (many new farms – particularly poultry and pig farms are build on standard designs and use standardized equipment). A resource based assessment of these farms may 'pass' them both, and in fact may give both farms a high 'score' for provision – but it is possible that the animals on one farm experience a better 'quality of life' than the animals on the other farm which, despite identical resource provision are more often sick, lame, fatigued or 'stressed' (Webster, 1997, Dawkins, 1990, Hemsworth & Coleman, 1998). A number of current agricultural standards in use in Europe use basic 'welfare assessment tools' in that they incorporate the inspectors view and interpretation of the severity of issues observed. *Integrale Keten Beheersing* in the Netherlands, Swedish *Broiler Control*, *Filières Qualité Carrefour* in France, *McDonald's* in Europe, *Wholefoods* in the USA and Europe and *RSPCA / Freedom Food* in the UK have created assessment and certification schemes which have a more 'specific focus' on animal welfare criteria.
For example, some 'animal based' clauses from existing commercial farm standards;

- Are growing pigs kept in stable social groups?
- Where tail, flank, ear biting or fighting, which goes beyond normal behaviour becomes apparent, is an effective plan agreed
- Is the number of birds found dead on arrival at the slaughterhouse after transportation above 0.25% ?

Moves toward use of ABMs in existing schemes
For all farm producers, a secure market is an important driving factor. Some farmers do not participate in specific food schemes because they have no faith in the financial benefits promised and see only an increase in bureaucracy and work load and fear a loss of their independence (Kjaernes & Larvik, 2007). At present across Europe, the use of assurance schemes in promoting higher levels of farm animal welfare is highly variable. 'Private' standard owners and assurance bodies can be flexible in both driving standards upwards and in responding to local conditions. Private assurance schemes (not government driven), whether linked to NGOs (RSPCA Freedom Food for example) specifically seeking to promote higher standards of farm animal welfare, or participants in retailer driven standards appear to offer the most apparent current mechanism for improving farm animal welfare at the present time.

In some countries, scheme membership has now shifted from being voluntary, to the current position where many producers now view membership to be an entry requirement (effectively non voluntary) to retailer shelves (Roe & Buller, 2008).
In the overall assessment picture, animal welfare is perceived as a component of broader ranging assessments, which also contain environmental, COSHH, animal medicine use, work environment safety, food safety and retailer specific requirements (Butterworth *et al*, 2008).

There are moves to use animal based measures (ABMs) in addition to the existing resource based measures (RBMs) in some countries, although, as yet, this is in a preliminary and 'tentative' stage in most cases (Main *et al*, 2003). In general, schemes rely heavily on assessment of welfare by examination of the provision of housing or resources (RBMs), rather than looking at the animals themselves. But what benefits might the use of ABMs have to the producer (the benefits to the consumer and to 'society in general' are addressed in other papers at this conference c.f. Bock, Blokhuis, Veissier).
Is it possible that the use of ABMs as a part of a farm assessment may actually provide tools of real (not just imagined) value to a producer through management support?

Management support – an example
Let us consider an example. A dairy farmer has a problem with lameness in his dairy cows. An assessment can tell him how many lame cows he actually has (when referenced to some standard definitions). Once he has a tool to gauge whether the level of lameness is increasing (or decreasing) then this can be a barometer against which to judge practical steps he may make to reduce the problem (Veissier *et al*, 2008, Spoolder *et al,* 2003). ABMs may help him to identify practical ways of trying to reduce lameness. For example, information on the type of floor and the farmer's hoof care strategy could be used to help advise on remedial solutions to improve the problem, which can be both an economic cost (lameness in dairy cows costs the farmer in terms of lost productivity) and also a cost to the animals in terms of disability or discomfort.

Alongside this advisory information, the producers veterinarian may be able to use this information as a part of his 'advisory support' and, armed with this type of ABM information, the advisor may also be able to tell the farmer how his animals are doing with regards to other areas of interest such as calf mortality, respiratory disease, udder lesions and with respect to the feeding of his adult cattle. When this information is linked to economic information that the farmer is likely to share with his vet or with an agricultural advisory network (as exists in some countries), then the vet or advisor may have a powerful tool to help and support his farming clients and to promote best management in animal health and welfare. This productive relationship between the vet, the advisor and the farmer relies on several things – trust, information and economic sense. Trust comes from the professional interaction between vet, advisor and client, and information is part of the armory of skills that makes this interaction potentially a valuable part of the farming system. This knowledge can build a picture of what is common and uncommon, and how economic, disease and welfare performance relates to other similar farms.

Farm advisory services are not alone in potentially benefiting from benchmarked indices on which to base management decisions - the use of Key Performance Indicators (or indices) (KPIs) is a cornerstone of good business management in many commercial practices.

One potential problem is that the people who carry out assessments at present in existing certification inspections cannot, in general, offer advice. This provides an appropriate distance between inspection and 'advice / support' and the inspectors relationship to the farmer usually remains at the level of professional detachment, in which advice may not be directly given (schemes which operate under a harmonized certification standard EN45011 may not offer advice associated directly with the assessment). However, some schemes, most notably the soil association in the UK have set up a distinct advisory arm (separate from the assessment process) which can support farmers overall to achieve the standards required for certification. If the advisory process can be separated from the assessment, then the feedback of information to the farmer, often with veterinary involvement, and his/her uptake of recommendations and remedial measures represent a potential direct advantages of this approach. Targeted improvement information may be able to help both the farmer and the animal, but to be viable, remedial strategies must satisfy both welfare and economic requirements (c.f. paper Henri de Thoré, this conference, European Parliament, 2001), and they must be practical.

The steps required to use ABM based assessment

Step 1: Train assessors

In all existing certification and inspection schemes, a critical 'component' is the assessors. Without competent and credible assessors, no certification scheme can function in a way which will satisfy both the producer and the consumer. Existing schemes know this, and place a significant value on training, monitoring and retaining their assessors. Assessors using ABMs will require to be assessed during a robust training course until they develop a uniform scoring, and subsequently, when they are active in the field, assessors need to be 're-assessed' to ensure that they retain objectivity, impartiality and repeatability in scoring. These attributes are common to existing (RBM) based assessors in existing commercial assessment, and so the concept of training and periodic audit of performance is already deeply embedded in the 'quality systems' in place in many commercial inspection and certification bodies.

Step 2: Make the measures on farm and at the slaughterhouse

Visit the farms at a appropriate interval (usually annually or 18 months in farm schemes at present) and carry out the measures – either alongside an existing certification visit as part of a combined scheme, or as a 'stand alone' welfare assessment which adds to existing certification information to provide a 'whole farm' picture (Botreau *et al*, 2007).

Step 3: Analyse risk factors
The company (or the assurance or advisory service) can (in this specific example) analyse the ABM and RBM information and;
- Find out the prevalence and severity of the welfare conditions seen – for example tail biting in pigs, lameness in cattle, skin conditions in poultry.
- Analyse the farm data to help identify management, house environment, feeding, medication, stockmanship and genotype factors which can be used to support management decisions and to provide truly 'tailored' advise.

Step 4: Support management decisions to create improvements in welfare
The farmer can be informed about the extend the welfare measures on his farm, and, with time, and after analysis, a pattern of risk factors may emerge which allow him to make specific management decisions which can reduce these.

Step 5: Inform consumers or retailers of the welfare status of the producers from whom they purchase products
Use the information gathered during the inspection, or resulting from a 'rolling accumulation' of data on the farm, and provide this to retail purchasers and to consumers. The potential for differentiated product pricing or selection of 'upper level' producers by the purchasing teams working for retailers may offer the potential for increased income for farmers who work to a higher level. Ultimately, this route – product differentiation - may offer a route to both increased profitability and improved welfare against a background of an intensely competitive global farm economy.

Fear of the future
The tools being developed in ABM's now under development evolve the trend toward inclusion of assessment techniques which reflect what can be measured 'on the animal'. Whilst accepting that many areas of animal assessment are complex, and some are very subtle, it seems likely that ABMs will find their way into farm assessment schemes, and, to a certain degree, into the farm animal legislature. This raises some fears, amongst producers, scientists, NGO's, legislators and others that, if ABMs are of use, how far will people want to go with them? Should (or even could) they replace some of the prescriptive resource based measures found in existing legislation? Some stakeholders are concerned that the good work already carried out in animal protection which is now enshrined in existing legislation could be 'swept away' on the a wave of enthusiasm for ABMs. However, there are some obvious (and some less obvious) questions and potential difficulties in applying ABMs within existing assurance schemes (Buller & Roe, 2009), for example;
- Who will carry the cost of assessing ABMs ?
- How will assessment of ABMs work in terms of seasonal changes and the cycles of production seen in many farm systems?
- Will the seasonal changes seen in production systems make interpretation of the findings difficult?
- ABMs conventionally assess negative, findings (lameness, skin lesions, hunger), can they also be used to convey 'positive' information to consumers?
- Do ABMs integrate best into existing standard farm assessments' or is it best 'to keep them separate'?
- Can slaughterhouse derived ABMs be successfully combined with farm ABMs when creating overall welfare assessment reports?

The potential for inclusion of ABMs appears as a ripple of evolution (not a wave of revolution) and the stability of the legislative and assessment community will help to ensure that if ABMs begin to make their way into farm assessment methods and the legislation, then this is likely to take place in a stepwise fashion - and without removal of the existing frameworks which protect farmed animals.

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Improvement strategies from Welfare Quality®

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Within the Welfare Quality® (WQ) project an important aim was to develop and test practical ways of improving the welfare of pigs, chickens and cattle. These strategies can be divided into three main categories: improving the quality of stockmanship, improved housing and husbandry, and genetic selection. Several examples of the work carried out in WQ are given below.

Improving the quality of stockmanship

Fear of human beings is a major welfare problem in farm animals that can also seriously damage production, product quality and profitability. Fear of humans is largely determined by the stockpersons' behaviour, which normally reflects their beliefs, attitudes and skills. Therefore, training programmes aimed at improving stockmanship can markedly decrease fear of humans and thereby improve the animals' welfare. To be fully effective, these programmes must be tailored to the species and production system and the characteristics of the producers in each country.

WQ researchers sent a questionnaire on animal handling problems to 300 beef cattle farmers / breeders in France; this covered the perceived ease of handling, husbandry conditions, the farmers' attitudes towards cattle and their behaviour during husbandry and handling procedures. Some of the farms which were breeders were visited and interviewed about husbandry and handling practices. Their young calves' behaviour was also observed in a test in the presence of a human.

Farmers emphasised the importance of good human contact (quality and frequency) and the quality of the facilities in increasing the ease of handling. Surprisingly, 28% of them did not recognise genetic background as important in determining the ease of handling even though the temperament of heifers or cows was the first trait they considered in decisions on culling. Some farmers showed negative behaviours (hitting, shouting) in certain situations but their attitudes towards such behaviours were independent of those expressed specifically when questions regarding their animals. Collectively, the results confirmed that; a) calves were much calmer (when tested in the confined space test) if the farmers enjoyed contact with their animals than if they had little interest in them, and b) that a regime of regular gentle handling reduced the animals' fear (as tested in the confinement test) of humans.

A "Quality Handling" package (software, trainer´s manuals – which are aimed at people who offer training to farmers, newsletters etc) for training stockpersons has been developed and tested in cattle, pigs and poultry. These describe:
How animals' fear responses to humans vary between farms.
How fear of humans can adversely affect productivity and ease of handling.
How animals perceive their environment.
How to build a positive human-animal relationship.
How to improve the stockpersons' attitudes and behaviour towards the animals.

How to maintain this improvement when the stockpersons return to the farm after training.
This "Quality Handling" training package will soon be commercially available in various languages (e.g. English, French, German and Dutch) for each species.

Improved housing and husbandry is the most frequently used strategy for enhancing farm animal welfare. The range of strategies can vary substantially from those which may require significant changes in the production systems, e.g., replacing stalls for pregnant sows by group housing systems, to those which involve only moderate alterations, such as increasing feeding space for beef cattle or changing the feeding regime for broiler chickens.

Feeding space for beef cattle. To improve our understanding of the influence of social stress in intensively housed fattening cattle, WQ researchers established the effects of varying numbers of heifers per concentrate feeding place on performance, behaviour, welfare indicators, and ruminal fermentation in feedlot heifers. Seventy-two Friesian heifers were used in a factorial arrangement with 3 treatments and 3 blocks of similar body weight (BW). The treatments were 2 (T2), 4 (T4), and 8 (T8) heifers per feeding place in the concentrate feeder (8 heifers/pen). Observations began after 4 wk adaptation to these treatments. Concentrate and straw were offered separately at 08:30 and animals were fed *ad libitum.* During 6 periods of 28 d each, dry matter intake and average daily gain were measured, and blood and rumen samples taken. Behaviour was also recorded.

Variability in final body weight rose and concentrate intake decreased linearly as competition increased. The proportions of abscessed livers increased quadratically with increased competition (8%, 4% and 20% in T2, T4 and T8 animals, respectively) and serum haptoglobin increased linearly, particularly in the most subordinate heifers. Increased competition reduced ruminal pH in some experimental periods and increased ruminal lactate, suggesting an increased risk of acidosis.

The altered feeding behavior, reduced resting time, increased aggression and rumen acidosis strongly suggest that increased competition at the food trough can harm the animals' health and welfare. The fact that fewer abscessed livers were found when the competition for food was reduced, thereby indicating that improved welfare can result in better product quality. In summary, the results suggest that exceeding a threshold of 4 heifers per feeder has a negative effect on performance, health, product quality and animal welfare.

Feeding regime for broiler chickens. This study determined if lameness in broiler chickens could be alleviated by sequential feeding of two diets. Sequential feeding was carried out during ten 48-H sequential-feeding cycles from 8 to 28 days of age. Three treatments were compared: complete diet (C) and 2 alternations of diets varying in protein and energy contents (S1: E+P- followed by E-P+; S2: E-P+ followed by E+P-). Chickens received the normal feed during the starter and finisher periods (0-7 and 29-38 d of age). Body weight, feed intake, general activity, gait score, bone quality and carcass conformation were measured.

Gait score was improved in birds fed with the sequential regime (mean GS = 2.41 vs. 2.61 in controls) without significant changes in body weight at slaughter.

This gait score enhancement was only significant in birds fed the poor-energy/high-protein diet during the first day of each cycle, and might reflect the increased motor activity observed during the sequential feeding phase linked to more time spent feeding and exploring. Neither feed conversion nor carcass conformation were impaired by sequential feeding, and an increase in abdominal fat was small enough to be avoided by improving diet composition.
In short, this novel regime not only reduced lameness but also brought the broilers up to standard slaughter weight without any need for additional feeding days. Analysis of price differences between broiler standard diet and the sequential ones is ongoing. This sequential feeding method could improve the birds' welfare by reducing lameness while safeguarding the farmers' profits at the same time.

Genetic selection
Genetic selection is an increasingly important tool for improving farm animal welfare. It generally has two different aims: to prevent the negative welfare consequences of selection for certain production traits, (e.g., increased prevalence of lameness in broilers due to selection for rapid growth), and to select animals that are better able to cope with existing production systems and perhaps future developments.

WQ scientists explored the possible benefits of genetic selection for reduced post-mixing aggression in pigs. Such aggression is common in commercial pig production; it compromises welfare and profitability and cannot be significantly reduced by low-cost changes to the environment. To estimate the genetic contribution to individual aggressiveness and to validate a method of predicting involvement in aggressive encounters (based on lesion scores (LS)), aggressive behaviour was recorded continuously for 24h after mixing and LS was recorded at 24h and 3 weeks post-mixing in 1660 pigs. In order to investigate genetic correlations between aggressive behaviour and other traits, pigs' behaviour during handling and their general activity were scored in the same population of 1660 pigs. Subjects were 895 purebred Yorkshire pigs and 765 Yorkshire x Landrace of both sexes. All were housed in partially slatted pens with straw bedding

Two behavioural traits had a moderate to high heritability similar to that of growth traits; these were the duration of involvement in reciprocal fighting (0.43±0.04) and the delivery of non-reciprocated aggression (NRA) (0.31±0.04). On the other hand, receipt of NRA had a lower heritability (0.08±0.03). A genetic merit index using lesions to the anterior, central and rear regions recorded at 24h post-mixing as separate traits should allow selection against animals that participate in reciprocal fighting and in NRA. Selective breeding for reduced post-mixing LS should have a long-term ameliorative effect on aggression and related injuries even after dominance relationships are established.

Inactivity was weakly heritable (h^2=0.06±0.02) and negatively associated with bullying (r_g=-0.28±0.17), suggesting that pigs selected for reduced aggression might also be slightly less active. A higher heritability (h^2=0.29±0.02) and more variability were found for the ease with which pigs entered a weigh crate than for their behaviour in the crate (h^2=0.13±0.01) or on exit (h^2=0.11±0.01). The ease with which pigs entered and exited the crate had low positive genetic correlations with fighting and bullying, r_g between 0.08 and 0.25, although aggressive pigs were also more active during weighing (r_g -0.23 to -0.33). Because these genetic correlations are low selection for reduced aggression is likely to have only a small negative impact on the ease of handling at weighing.

In summary, fighting and bullying post-mixing were moderately heritable, and skin lesion counts 24hrs after mixing could be used as a proxy trait. A genetic merit index using lesions to the anterior, central and rear regions recorded at 24h post-mixing as separate traits should allow selection against animals that participate in reciprocal fighting and in NRA. Selective breeding for reduced post-mixing lesion scores should have a long-term ameliorative effect on aggression and its related injuries even after dominance relationships have been established.

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What can we tell consumers and retailers?

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It is generally accepted that the growth of farm animal welfare concerns in food chains is essentially a demand-led phenomenon. Increasing citizen and consumer attention to the ethics of food production has greatly raised the profile of animal welfare both as a domain of national and international regulation and as an element of food product differentiation and market segmentation. Buying, and therefore selling, identifiable products that derive from high welfare production systems is becoming far more familiar than it used to be.

For this reason, a major component of the Welfare Quality project research has focused specifically upon the 'demand-end' of food supply chain. That is to say retailers, manufacturers and consumers. We have been concerned to understand how, across different countries, this demand is constructed, regulated, expressed and enacted and we have identified and assessed the various mechanisms and procedures that facilitate or limit such actions.

The shifting place of welfare in food supply chains

Against the backdrop of a growing body of harmonised animal welfare legislation across the European Union, there exists, as one would expect, a considerable range of cultural, commercial, agricultural and regulatory traditions within Member States allowing us to discern three broad approaches to the active incorporation of farm animal welfare concerns into food supply chains.

It is clear from any review of recent gains in the welfare of farm animals across Europe that, in a number of countries (such as the UK and the Netherlands), the market has played a key role in selectively driving up standards, in many cases well beyond regulatory minima, as supply chain actors employ animal welfare criteria to create additional value on particular products. Beginning with 'quality' food products, defined by production standards and selling at a premium to a specifically concerned clientele, higher welfare production methods have, in certain sectors – such as, most notably, fresh eggs – become increasingly widespread to the extent that additional product value is no longer the only driving concern. Producers are having to meet ever-higher welfare conditions merely to gain competitive access to retailer shelves while retailers themselves increasingly see farm animal welfare as a broader component of their own social and ethical responsibility and thereby client fidelity.

Not all European countries however, see the market as the principal means of providing higher welfare standards, preferring instead (as in, for example, Norway) to rely upon robust internal welfare legislation and a sense of 'national branding' through which domestic production systems are held to be more inherently welfare-friendly than those from which food is imported.

Finally, in certain States, or indeed in certain regions, where there is a longstanding and often institutionalised practice of explicitly linking particular agronomic and gastronomic food qualities to specific territorially embedded production systems, farm animal welfare is perceived, by both consumers and food chain actors, as an intrinsic component of traditional 'quality' production techniques.
These three strategies of farm animal welfare promotion evoke different responsibilities. Market strategies place the burden of both action and accountability primarily on the part of retailers, the dominant actors in contemporary food supply chains. Regulatory strategies, which are common to all States but play different roles in actively stimulating welfare gains, are chiefly the responsibility of States and their agents. Quality strategies, by contrast, are more closely associated with the territorial actors themselves; the producers and producer groups.

All three, however, are dynamic, yet display varied abilities to respond to shifting consumer and societal demands. Moreover, any sharp division between the three is becoming increasingly blurred as different aspects of farm animal welfare become actively and differentially defined and re-defined as public goods, as the basis for price premiums, as components of mandatory standards, as qualifications, as criteria for market segmentation, as ethical baselines and so on.

Expressing demand
The research conducted under the Welfare Quality project reveals an unequivocal and cross-national public concern for the welfare of farm animals yet one that is often characterised by a general unfamiliarity with contemporary farming techniques. One consequence of that unfamiliarity is that, across Europe, 'good' animal welfare is largely, and often uncritically, associated, amongst consumers, with idealised notions of naturality, traditional farming practices, 'free-range' and small scale production.

The key issue though is to what extent this concern and these associations are translated into acquisitional or consumption practice. Welfare Quality confirms previous studies by demonstrating that, for the most part, farm animal welfare *per se* is not a major concern in individual purchasing decisions for all but a relative minority of European consumers or for a relative minority of products (eggs, again being the obvious example). However, this wide-ranging discontinuity masks two important considerations. On the one hand, the research shows that many European consumers believe that farm animal welfare is something that should be directly addressed either by responsible food chain actors through certification and assurance mechanisms or by regulation but not by individual consumer choice. On the other hand, consumers generally feel poorly informed about animal welfare issues. There is therefore a dynamic tension between the 'visibility' and the 'invisibility' of farm animal welfare in consumer choice. In short, consumers want to know more, but increasingly want to know that animal welfare has been suitably addressed by the providers of food.

Constructing demand
Despite obvious consumer and citizen concern, apart from a few very specific products or product ranges, farm animal welfare is rarely a stand-alone selling point for food. Indeed, retailers across Europe have consistently rejected the idea of developing any 'animal welfare' label on their food products, arguing that, on its own, animal welfare doesn't sell. The few specifically welfare assurance/labelling schemes that do exist are generally run and operated either by NGOs or by individual producer groups and even these are by no means always explicitly labelled as such by retailers.

Nevertheless, welfare concerns and welfare standards are increasingly prevalent within supply chains. For retailers and food chain actors, welfare is a progressively more important element in the construction, not only of a market for individual products and product ranges – and therefore of demand - but also for the broader status of the retailer concerned – and therefore customer fidelity. The paradox is that these concerns and standards are becoming less and less immediately discernable at point of sale.

Different strategies are available to retailers to incorporate farm animal welfare into supply chain management; quality bundling, choice editing, segmentation and corporate social responsibility (CSR). As farm animal welfare is not considered sufficiently powerful as a unique selling point, it is often bundled together, often explicitly through a distinct label or range, with other product or production process qualities such as free range systems, grass fed husbandry, 'traditional' techniques, environmentally sustainable production and so on. The welfare of farm animals thus becomes a component of specific product quality. Many retailers run premium ranges at higher prices, and for which higher farm animal welfare standards are often required, though in many cases, are not identified at point of sale. Here welfare is used to create market difference and sustain customer expectation. Increasingly though, retailers are absorbing welfare standards into their own brand identity as part of their corporate social responsibility. As such, welfare becomes one element amongst others in retailer rather than product or brand differentiation.

This has a number of implications. Farm animal welfare occupies an unstable, yet increasingly important position within market-driven food supply chains. On the one hand, only certain cuts and certain animal products are open to differentiation and market segmentation on the basis of welfare. A great deal of meat, produced to high welfare standards enters the non-specialist or non-premium sector yielding a poorer carcass balance. Inversely, the consumer driven growth in free range and organic eggs has had far less impact upon the powdered egg market. On the other hand, specific aspects of farm animal welfare are accorded different and competitive levels of visibility within supply chains. Hock burn in broiler chicken or lameness in dairy cattle might be perceived as significant issues by some retailers but not others, while few refer explicitly to conditions of slaughter. Moreover, retailers are increasingly establishing their own independent assurance procedures, undertaken by third-party certification bodies. These too can become elements in competitive welfare integration.

End point

While the growing concentration and power of retailers has undoubtedly increased their captaincy over supply chains, the growth in societal interest in farm animal welfare means that retailers need to be particularly attentive to consumer concerns. In a highly competitive retail environment, animal welfare, whether as a component of product or store branding and social responsibility can, nonetheless, be an area of vulnerability, either to criticism for poor and inconsistent welfare standards or to the failure of dedicated, assured supply chains or to challenges to the validity of any welfare claims which are made. Whilst welfare standards may legitimately vary (over and above required legal minima) in the pursuit of competitive advantage, welfare claims need to be made on the basis of consistent, verifiable and universal assessment procedures. Retailers and the market generally respond faster than legislation to shifts in societal concern. For this reason, they are key actors in the extension and development of farm animal welfare standards across Europe.

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Retailer communication

Aldin Hilbrands
Senior Manager Product Integrity, Royal Ahold

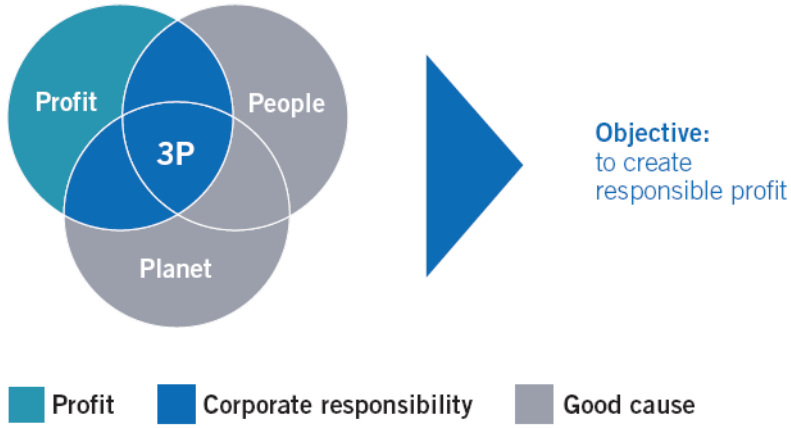
1. Corporate responsibility
An integrated part of our business

Corporate responsibility is an integrated part of Ahold's daily business. As one of the world's leading food retailers, we can help consumers understand the consequences of the choices they make when shopping in our supermarkets and the impact of those choices on their health, the environment and communities.

We believe that building a sustainable future for our company and our stakeholders is the right thing to do. Our customers, investors, suppliers, employees and the communities we serve also expect us to take environmental and social interests into account. We consider their concerns every time we make a business decision.

Balancing the interests of people, planet and profit

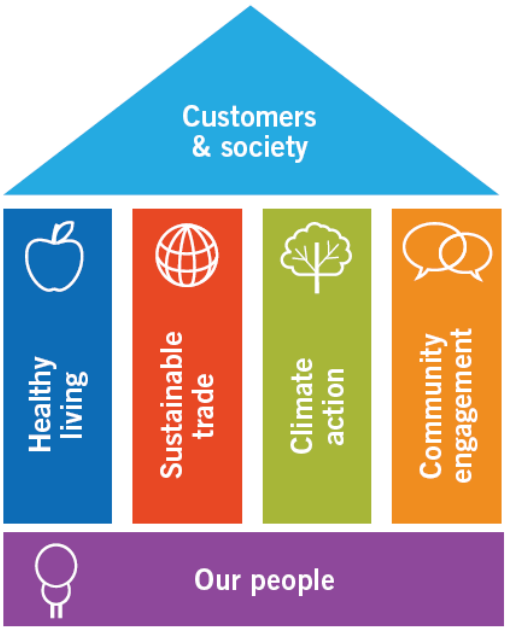
Corporate responsibility benefits all our stakeholders and supports the profitability of our business. We work according to the "Triple P" model.



This model aims to balance the interests of people, the planet and profit to create a business that is profitable and sustainable.
Our vision, policies, goals, targets and performance measures are set at a global level by Ahold and carried out locally. This allows our operating companies to meet the specific needs of stakeholders in each market.
This structure also enables us to share expertise and resources across the company.
Our operating companies have varying levels of maturity. Sharing knowledge of successful initiatives across the group makes it possible for us to provide the right solutions, at the right time, in the right place.

The main corporate responsibility themes
Our corporate responsibility activities are organized around four main themes – healthy living, sustainable trade, climate action and community engagement.

These themes are the most relevant to our business today. They are also areas where we see the greatest opportunity to make an impact.
The foundation for all of our corporate responsibility activities is our people.
Ensuring they are aligned with the main themes of our corporate responsibility strategy gives us the opportunity to have a positive impact on the lives of our customers and our other main stakeholder groups.



The main components of our corporate responsibility strategy:

- **Healthy living**
  We offer healthy choices in our assortment as well as product information and services that promote the benefits of a healthy diet and lifestyle. We also provide healthy living lifestyle programs to our employees.
- **Sustainable trade**
  We provide products that are safe and responsibly produced. We choose suppliers carefully and work with them to improve the social and environmental impact of the products we sell.
- **Climate action**
  We are making our operations as efficient as possible and are limiting our impact on the climate and the environment. Our priority is to improve our energy efficiency and reduce greenhouse gas emissions.
- **Community engagement**
  We are active, contributing members of society, supporting the communities in which we operate.

- **Our people**
  Our employees are the foundation of our business and the key to Ahold's success. We are committed to being a company that people are proud to be a part of.

Sustainable trade
We are committed to providing products that are safe and responsibly produced. We choose suppliers carefully and work with them to improve the social and environmental impact of the products we sell.

Sustainable trade is about ensuring responsible behavior at each step of the production process. We balance economic success with social and environmental responsibility. That means helping suppliers create businesses that are commercially, socially and environmentally sustainable.The aim of our sustainable trade program is to create transparency throughout the supply chain and increase our influence over the way in which our products are produced and sourced.

Sustainable trade goals
Our primary goals in sustainable trade are to:
- Source safe products. Product safety for all our customers is non-negotiable. It is the starting point for safeguarding our customers' health and well-being;
- Source responsibly. We aim to ensure that our suppliers respect the rights of their workers and provide safe working conditions and protect the environment;
- Buy close to home. We need to balance international sourcing with buying locally to help communities and small, local businesses develop.

2. Animal welfare
Background
In January 2006, the European Commission adopted a Community Action Plan outlining their planned initiatives and measures to improve the protection and welfare of animals. One of the five main areas of action was introducing standardized animal welfare indicators with a view to, over the next 5 years, upgrading existing animal welfare rules so that EU standards remain among the highest in the world. They even foresee a classification system for animal welfare practices to differentiate between minimum standards and cases where even higher standards are used. This official statement reflects an increasing interest among citizens and consumers in Europe regarding animal welfare issues and acknowledges that there is a market for schemes that identify sustainable products, products that come from animals which have had a good quality of life, along with a wide range of other perceived added value product attributes.

Retailers and producers are increasingly recognizing animal welfare as a fundamental aspect of product image and quality. Independent animal welfare audit programmes, promoted by processors, retailers and multi-national corporations are becoming increasingly commonplace both in the EU and beyond.

Ahold
We respect local regulations concerning animal welfare and often implement stricter controls. We aim to improve living conditions for animals while, at the same time, delivering safe, quality products.

Ahold is involved in the Advisory Committee of a European research initiative called Welfare Quality. Welfare Quality is a European research project focusing on the integration of animal welfare in the food quality chain. The project aims to accommodate societal concerns and market demands, to develop reliable on-farm monitoring systems, product information systems, and practical species-specific strategies to improve farm animal welfare. Forty-four institutes and universities, representing thirteen European countries and four Latin American countries, participate in this integrated research project.

We supported the establishment of a European Animal Welfare Platform to help European producers, food service providers and retailers to improve standards for animal welfare applying the science-based standards of the Welfare Quality project in the real world.
The project is an initiative by leading companies in the European food chain, who will be working together with research institutes and animal welfare organisations. Surveys show animal welfare is increasingly becoming more important to consumers, and this project will assist in better meeting this demand.

The platform provides a unique opportunity for a wide range of participants to work closely together. They will exchange knowledge and generate reliable and user-friendly information on the best ways to realise good animal welfare in practice. This can then be assessed and certified by credible and transparent independent schemes. Not only will the provision of this clear information help to increase consumer trust in how their food is being produced but it will also help governments to make informed judgements when drafting new legislation.

Good animal welfare is an integral component of quality production and therefore production practices need to be improved further to guarantee high animal welfare standards to the consumer. At the moment though, many producers struggle to define best practices and to determine how best to assess and improve welfare. Partners in the platform will pool their resources to jointly address these issues. We are very pleased that companies, research institutes and animal welfare organisations are working together in this unique project. It is a win-win situation for the companies, the public and the farm animals.

ICA
ICA is one of Sweden's most well-known brands. ICA strives to become the leading retail company in the markets where we operate, by focusing on food and meals. It is an ICA group general strategy to contribute to a positive and sustainable development of society. Thus, interest in these issues is steadily growing, both within ICA and the outside world. We are one of the Nordic regions most visible companies which subsequently puts high demands on how we take responsibility for how ICA affects the 'greater society'. We are humble towards this view and it continues to be both a motivation as well as a source of inspiration for our continued work across all our business segments.

The basis for ICA's business within ethics and social responsibility is comprised of what we call ICA's good business. ICA's good business serves as the basis for the policies which regulate our business. Every policy has a number of guidelines supporting the day to day business. We work on a wide scale with sustainability issues – environment, quality, social responsibility etc and have done so for a long period of time. Animal welfare is one of the areas which we are constantly working on to develop further.

The ICA policy for animal welfare ensures high standards of animal welfare wherever possible. By this we mean the following:

- Animals shall be treated well and protected from unnecessary suffering and disease;
- Animals shall be kept and cared or in an animal friendly environment that promotes their health an allows them to behave naturally;
- Animal shall receive adequate care and attention.

Regular checks of animal husbandry are carried out to ensure compliance with these requirements.

High demands are put on the producers of primary product for our private labels. In cooperation with the Swedish Seal of Quality (”Svenskt sigill”) we have developed standards comprising control of the environment and good animal welfare at farm level.
These standards are audited by independent third parties. In all other cases, ICA undertakes its own controls and this is carried out both in Sweden and at farms raising animals outside Sweden.

ICA works to uphold the Swedish animal protection regulations. We also push for the compliance of these regulations in trade with suppliers outside Sweden. ICA aims to keep Sweden free from Salmonella. If deemed necessary we complement governmental controls of salmonella and other pathogenic micro organisms in imported products.

With regards to transport, ICA complies with Swedish regulations. Slaughter transports shall be less than eight hours from the loading of the first animal to the off loading of the final animal. We assess that drivers are licensed to handle cattle, and this is done both in Sweden and with imports.

The meat primary product is always labeled with country of origin on our own private label according to the guidelines for voluntary origin labeling. It is important for us to make it easier for our customers to make conscious choices when shopping in an ICA store. ICA’s private labels are the products that we put our names on as well as take producer responsibility for.
Euroshopper is founded on a European purchasing cooperation that exists in several countries. Lower animal welfare demands for this brand are a market adaptation to maintain a low price for the consumer.

Aside from origin labelling our meat, we also go further to help our customers make informed choices when buying meat. ICA has adopted a concept called “product close communication” where we provide our customers with additional useful information at the time of buying. The sign explains why a certain type of meat is more expensive.

We cooperate with important organisations and NGOs within the area. One example is the very successful concept of cooperation with WWF for Swedish free range cattle. In 2008, ICA introduced free range corporate brand beef from this project with the WWF, a project developed over 10 years. The Natural Pasture Meat project started out as a way to preserve biodiversity in natural pastures. In order to achieve that, grazing animals were introduced. This developed into an idea to introduce meat from cows that have been allowed to graze freely.

Albert Heijn
Good living conditions and proper treatment of animals are important factors contributing to animal welfare. Appropriate living space, good nutrition and housing are important elements of this.

The consumer and some groups in civil society are increasingly concerned about the welfare of farm animals. The food scares of the past years are seen as a direct result of the poor living conditions and treatment of animals. Albert Heijn therefore believes it is important to supply clear information to the consumer about animal welfare initiatives. Albert Heijn listens to the consumer, being an organisation in the middle of society as whole, and lives up to the expectations of improving the treatment and living conditions of farm animals. As a starting point, Albert Heijn uses the animal welfare standards prescribed in Dutch or European law.

Animal welfare means the physical and mental well-being of animals. The so-called “Five Freedoms” of animals have been defined as:

The welfare of an animal includes its physical and mental state and we consider that good animal welfare implies both fitness and a sense of well-being. An animal's welfare should be considered in terms of 'five freedoms'[1]. These freedoms define ideal states rather than standards for acceptable welfare.

1. Freedom from Hunger and Thirst - by ready access to fresh water and a diet to maintain full health and vigour.
2. Freedom from Discomfort - by providing an appropriate environment including shelter and a comfortable resting area.
3. Freedom from Pain, Injury or Disease - by prevention or rapid diagnosis and treatment.
4. Freedom to Express Normal Behaviour - by providing sufficient space, proper facilities and company of the animal's own kind.
5. Freedom from Fear and Distress - by ensuring conditions and treatment which avoid mental suffering.

Albert Heijn deems it important that the consumer knows that the animals, in general, have enjoyed a good life and respects as such the above mentioned freedoms. However, there is differentiation among products and species. In general, three levels of animal welfare can be distinguished:

- Regular meat products – Compliance with minimal Dutch or European legislative requirements for animal welfare
- Free-range meat products – More attention given to available space and animal welfare
- Organic meat products – Specific focus on animal welfare

For consumers who do not want to eat meat, Albert Heijn offers a variety of vegetarian products.
The track record of Albert Heijn in selling animal friendly products is long and some major milestones are:

- Grass-fed beef (Greenfields) since 1984
- Ban on Foie Gras since 1985
- Ban of fresh battery-cage eggs since 1986

[1] Adapted from the Five Freedoms as developed by the UK’s Farm Animal Welfare Council.

- Veal from group housed and roughage fed calves since 1989
- Milk only from pasture cows since 2005
- Halal meat from animals stunned before slaughter since 2006
- Anaesthetized pigs before castration since 2008
- Introduction of Dutch SPA labeled meat products since 2009

For many years there has been a discussion going on in Dutch society regarding an end piglet castration. Since 2005 the umbrella organisation of Dutch supermarkets has been involved in talks to set up the necessary research for this. In 2007 the Dutch supermarkets announced that from 2009 on they only want to sell pork from pig litters of which the male piglets are castrated under anaesthesia. This led to an agreement between the supermarkets, the slaughterhouses and the pig farmers, supported by the Minister of Agriculture and the Dutch SPA, to make castration under anaesthesia possible and to speed up the research to move toward avoidance of castration.
In the Netherlands, Albert Heijn supports the production of milk from cows that have been at pasture for at least 120 days per year. To do so, the company provides support to the organization "Stichting Weidegang".
The partner that Albert Heijn uses for its main animal welfare activities is the Dutch Society for the Protection of Animals (the Dutch SPA) which in the past has supported animal friendly produced products in writing, but recently has developed a hallmark called "Better Life" to label products so the consumer can more easily recognize them.
The Better Life hallmark includes the logo of the Dutch SPA and three stars representing three different levels. One star means the welfare level is halfway regular and organic farming and includes important welfare improvements, two stars means further improved welfare and three stars means organic or a welfare level comparable with organic.
The Dutch SPA started in January 2007 to experiment with the better Life hallmark on chicken meat origin from a slower growing breed kept in a stable with outdoor access in a winter garden. This concept was developed by the Dutch SPA in cooperation with a feed mill, a slaughterhouse and a regional branch of the Dutch Farmers Union. It was granted the Better Life hallmark with one star.

Besides chicken meat from a slower growing breed, the better Life hallmark with one star has so far been granted to pork from pigs kept on $1m^2$ per animal on a thick layer of saw dust. This helps to solve the two biggest welfare problems of fattening pigs; lack of space and boredom.

In January 2009, the Dutch SPA granted its hallmark with 1 star to veal coming from calves living under improved conditions. The most important improvements are a minimum blood iron level guaranteeing no calf suffers anemia, twice as much roughage as legally compulsory, transport journeys no longer then 8 hours and research and introduction of a soft lying area.

Albert Heijn has brought its organic meat product range under the Better Life hallmark with 3 stars. During the Autumn of 2009, Albert Heijn will introduce chicken and beef under the Better Life hallmark with one star and pork with two stars.

Improving animal welfare during transport improves the production of beef cattle in Uruguay

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Introduction

Uruguay is a South American country, of less than 200 000 km², with 3 M people and almost 13 M Hereford cattle. The Uruguayan population is proud to have one of the highest proportions of cattle per people in the world (4.3 head/person). Cattle farms occupy 87% of the country's surface. Beef represents 6% of the Uruguayan gross domestic product and 29% of Uruguayan exports. 80% of beef production is exported, making Uruguay the 5th largest beef exporter.
Production systems are mostly extensive with cattle grazing freely on pastures. 85% of the land is native pastures and 15% cultivated pastures. Uruguay is in third place in a World Environmental ranking (www.yale.edu/esi).
Anabolics, growth hormones, and animal proteins are banned by law. No cases of *E.coli* 0157:H7 have appeared in the country. The country's sanitary status is excellent, with vaccination allowing it to be free of foot and mouth disease. It is one of the 4 countries with the lowest risk of Bovine Spongiform Encephalopathy BSE as defined by the OIE (2006). Traceability is assured by a National Identification Program implemented 35 years ago and relies on herd identification. All animals will be individually traceable by 2010.
Uruguay has 35 slaughterhouses, 19 of which were approved for export to the US & EU. The slaughter rate has increased in the last few years, being currently around 3 M head per year [3]. Many carcasses present with bruises, probably due to poor handling of animals at pre-slaughter stages.
In most world abattoirs, carcass bruises are very common [6,8]. Damage lowers the meat quality and produces great economic losses [7]**.** On some occasions, cattle come from auction markets with several loadings and unloadings, therefore increasing the probability of being injured [1,2,9,10]. Poor handling causes animal stress and can reduce meat quality, leading to "dark cuts" and meat discarded from sale [4,5,8].
In Uruguay, animals to be slaughtered are transported mostly in trucks, and sometimes in poor conditions. Once at the abattoir, cattle are unloaded and left in pens overnight. Often, these pens lack basic conditions for animal welfare: water may not be available, the floor may be slippery and shade is often lacking. Concern for animal welfare is becoming more important, and stakeholders increasingly recognize that improving animal health can increase productivity and help maintain the food supply.

Uruguay is part of the International Scientific Cooperation INCO[2] project linked to Welfare Quality® which studied the integration of animal welfare in the food chain. We tested the animal welfare monitoring system developed in Welfare Quality® in the conditions encountered in Latin America and we developed practical strategies to improve the welfare of farm animals with particular emphasis on animal handling during transport.

[2] INCO International Scientific Co-operation http://cordis.europa.eu/inco/

Materials and methods

Thirteen slaughterhouses licensed by the Uruguayan Agricultural and Livestock Ministry were visited periodically during two years. The arrival of trucks transporting cattle and the unloading of animals was observed. All carcass bruises were noted with reference to carcass zone and tissue damage by two trained observers.

4 zones were distinguished:

The loin, including *L. dorsi* muscle;

The ribs, including rib plate, spencer roll cuts, involving the cranial part of *M. longissimus dorsi* and the intercostal muscles;

The butt (or round zone), including the silverside, rump, sirloin, and eye round cuts, involving the *M.tensor fasciae latae*, *M.gluteus bíceps, M.sacrocaudalis, M.gluteus medius,* and *M. semitendinosus;* and

The shoulder, including chuck and brisket, neck and scapular muscles.

Three degrees of tissue damage were distinguished:

1. only superficial tissues are damaged;
2. fat, connective tissue and muscular tissue are damaged and part of a muscle may need to be removed and discarded;
3. a large part of muscle or a bone is removed and discarded, possibly leading to a change of carcass destination.

10% of carcasses were selected at random and the tissue discarded were weighted. The economic losses were estimated by taking into account the weight of muscles discarded and the average price of meat.

Two years of extension courses on good management practices at farm and transport levels aimed at stockpersons and truck drivers were conducted.

Results

Out of the 30,314 half-carcasses observed, 48% presented bruises. Most of the bruises were on both sides of the carcass. 50% of the injured carcasses had only one bruise, 31% had two, 11% had three and 8% had more. Bruises were detected on 10% of loins, 86% of butts, 17% of ribs and 17% of shoulders. 20% bruises were deep. Discarded zones (n = 100) weighted 1600 ± 75 g leading to 1080 g of muscle losses on average per carcass (Table 1). Preliminary results suggested that the percentage of carcass bruises decreased dramatically during the study, as extension courses were provided.

Table 1: Weight of discarded muscles (g) according to zone and tissue damage.

Tissue damage	Loin	Butt	Ribs	Shoulder
Degree 1	800 ± 14	780 ± 15	625 ± 27	
Degree 2 or3	1700 ± 27	1100 ± 46	2100 ± 80	1700 ± 26

Meat price "on hook" was approximately US$ 2 per kg (Instituto Nacional de Carnes) and Uruguay slaughter almost 3 M head per year, we estimated that the country loses approximately 6 M US$ per year.

Conclusions

Poor management during transport leads to bruises, 20% of which being associated to deep tissue damage at present in Uruguay.

Tissue damage is likely to result in pain and thus poor welfare, and may also result in huge economic losses. Therefore improving management practices, specially by providing courses on the handling of beef cattle during transport, would have benefit both to animals and to people.

Strategic alliances between countries and continents in order to develop widely applicable welfare assessment systems, to promote practical solutions for animal welfare problems, to build capacities and to develop information, consumers' awareness in the area of animal welfare area are essential. The INCO project in WelfareQuality® was a good opportunity of sharing experiences between Latin American and European scientists.

In South America, the support of OIE has allowed Chile and Uruguay (Universidad Austral de Chile and Universidad de la Republica) to create an OIE Animal Welfare Collaborating Centre in order to share experiences, develop research and strategies, and spread animal welfare concepts and training in the region.

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Statement from the World Organisation for Animal Health (OIE)

The OIE, the World Organisation for Animal Health, is the intergovernmental organisation responsible for improving animal health worldwide and was created by the International Agreement of 25 January 1924. It is recognised as a reference organisation by the World Trade Organization (WTO) and, in 2009, had a total of 174 Member Countries and Territories. The OIE maintains permanent relations with 36 other international and regional organisations and has Regional and sub-regional Offices on every continent.
The OIE's priority missions are as follows:

Transparency of the animal disease situation worldwide
Each Member Country and Territory has a commitment to inform the OIE of occurrences of animal diseases, including those transmissible to humans. The OIE then disseminates the information to all other countries so they can take the necessary steps to protect themselves. This monitoring, surveillance and information mission applies to both naturally occurring and deliberately caused animal disease events.

Scientific excellence
Through its first-rate worldwide scientific network, the OIE collects, analyses and publishes the latest scientific information on control methods for animal diseases, including those transmissible to humans. This information is intended to help Members improve their disease prevention and control methods. The information emanates chiefly from the OIE's worldwide network of about 200 Collaborating Centres and Reference Laboratories.

International support to developing countries and the role played by Veterinary Services
The OIE's core objective is to improve animal health throughout the world. This mandate benefits all Member Countries and Territories. The OIE endeavours to persuade developed countries and financial institutions to show solidarity with poor countries and their Veterinary Services. Solidarity is also in everyone’s interest since one single country infected with a disease can pose a threat to all other countries.
The OIE sees Veterinary Services as a global public good and their compliance with international standards (structure, organisation, resources and capacities) as a priority for public investment.
The Veterinary Services and their laboratories, particularly in developing and transition countries, are in urgent need of support so they can acquire the necessary infrastructure, resources and capacities that will enable their countries to derive greater benefit from the WTO Agreement on the Application of the Sanitary and Phytosanitary Measures (SPS Agreement) and provide greater protection for animal welfare and health, as well as public health.
Through its Veterinary Services support programmes and the “PVS” tool, the OIE actively helps developing countries to comply with the international quality standards that it adopts and publishes with the full approval of its Member Countries and Territories. For Member Countries and Territories requesting assistance with capacity building, the OIE also provides expertise and training for senior officials, both to improve sanitary governance and to help prepare and implement animal disease control and eradication programmes.
Finally, the Organisation is in permanent contact with specialised International Organisations that finance and support disease control programmes and strengthening of the Veterinary Services, including providing them with technical support.

Safety of international trade of animals and animal products
The OIE develops standards for use by its Members to protect themselves from incursions of diseases or pathogens while avoiding unjustified sanitary barriers.
OIE standards are recognised as the international reference under the terms of the SPS Agreement. They are scientifically based and are prepared by internationally recognised experts in the relevant fields.

Food safety
The Member Countries and Territories of the OIE and of the Codex Alimentarius Commission have decided to provide better guarantees for the safety of food of animal origin by improving coordination between the activities of each organisation. The OIE's standard-setting activities in this field focus on eliminating hazards existing during production at the farm and prior to the slaughter of animals or the primary processing of animal products (meat, milk, eggs, etc.) that could pose a risk to consumers.

Animal welfare
Since it was created, the OIE has played a key role in its capacity as the sole intergovernmental reference organisation for animal health; it enjoys international recognition and benefits from a strong collaboration with the Veterinary Services of all its Member Countries and Territories. Due to the close relationship between animal health and animal welfare, the OIE has become, at the request of its Member Countries and Territories, the leading international organisation for animal welfare and for the publication of standards and guidelines in this field.

Animal Welfare in a Global perspective

Keith Kenny
McDonald's

Globally McDonald's has over 31,000 restaurants in 118 countries serving around 58 million customers every day. Approximately 70% of these restaurants are owned and operated by local business men and women. In Europe McDonald's serves around 12 million customers a day from one of 6,600 restaurants located in the 40 different countries in Europe where we are present. In 2008 McDonald's Europe spent around € 3.5 billion on food drink and packaging items to supply these restaurants, most of which was sourced locally and all according to very exacting specifications.

McDonald's made a conscious decision not to own any part of its supply system. It is therefore an independent system. McDonald's does not own manufacturing facilities, transport networks or abattoirs. We don't breed our own animals. The foundation of our supply chain system is partnering, our suppliers have grown with us in new and existing McDonald's markets, and they work hard to apply continuous improvements on our behalf. We involve our suppliers in our business, all the way through to customer delivery.

Sustainability is, and has been for many years, a core part of our supply chain strategy. Our global vision is of a supply chain that profitably yields high-quality, safe products without supply interruption while leveraging our leadership position to create a net benefit by improving ethical, environmental, and economic outcomes: Or in other words, in terms of agriculture, we want suppliers to produce enough, good quality, affordable food in ways that are socially and ethically acceptable, without damaging the planets ecosystems and our environment.

McDonald's cares about the humane treatment of animals. We recognise that our responsibility as a purchaser of food products includes working with our suppliers to ensure good animal health and welfare practices. Our commitment is governed by McDonald's Global Animal Welfare Guiding Principles. Our animal welfare program is an ongoing process of study, consultation, and innovative improvement. Implementation of this overall programme is based on a global framework within which, individual geographic business units have the flexibility to develop programmes and performance measures appropriate to local conditions.

The McDonald's Agricultural Assurance Programme (MAAP) is the tool that we use in Europe to assess the agricultural production standards employed in growing the farm products used in our menu. We also use this tool to try and ensure we source more products from farms that work to higher standards.
MAAP covers our core **agricultural** products; including beef, chicken, eggs, milk, cheese.

It enables us to monitor to following key areas of agricultural production:
- environmental management
- good agricultural practices
- animal welfare
- animal health

- transparency, and
- genetics.

Covering each of these areas are extremely detailed standards that we request suppliers to adhere to; providing some ‘required’ and some ‘future’ targets. We assess compliance in each product area, and set goals for the following year. Through this mechanism we drive continuous improvement within our supply chain. Standards are reviewed annually, taking into account revised industry guidelines, reflecting current issues and driving improved performance.

Statement from Philip Seng

President and CEO of the United States Meat Export Federation (USMEF).
Chairman of the IMS Animal Welfare Committee and Immediate Past President of the IMS

The U.S. Meat Export Federation (USMEF) is a non profit trade association working to create new opportunities and develop existing international markets for U.S. beef, pork, lamb and veal. Headquartered in Denver, USMEF has offices in Seoul, Tokyo, Beijing, Hong Kong, Shanghai, Singapore, Taipei, Moscow, St. Petersburg, Mexico City, Monterrey and Brussels. USMEF also has special market representatives covering China, the Middle East, Central and South America and the Caribbean.

This worldwide network of offices has forged a series of partnerships, which has ensured that USMEF, U.S. companies and U.S. products have become integral parts of international red meat markets. An extensive international presence allows USMEF to have a finger on the pulse of vital markets from Moscow to Singapore. USMEF shares its local intelligence and two decades of experience with U.S. exporters, traders and buyers in addition to end users and processors in each market.

As high-quality U.S. beef and pork have taken a lead position in international markets, exports play a more prominent role in industry growth and prosperity.

USMEF has eight distinct sectors representing the entire U.S. production, processing and distribution system. Allied industries, which provide critical inputs to the red meat industry, also are active on the USMEF Board of Directors. USMEF receives funding and support from USDA, exporting companies and the beef, pork, corn, sorghum and soybean check off programs.

View from an exporting country

Paul J Strydom
General Manager, Meat Board of Namibia

Namibia, bordering South Africa, Botswana, Angola, Zambia and Zimbabwe is, due to its fragile natural pasture resource base and erratic rainfall highly dependent on the production and export of meat. Approximately 80% of the country's annual production of meat is being exported mainly to the European Union (EU), South Africa, and Norway. Over the years, livestock production has been developed for cattle (for both beef production and export purposes), sheep (for sheep meat production and export purposes) and goats (for export purposes) and recently also game (springbuck) meat exports.

Cattle and small stock numbers vary between 2.3 million cattle, 2.6 million sheep and 2 million goats. However, approximately one million head of cattle are enclosed in an animal disease restricted zone and thus not eligible for export. In addition, besides exporting approximately 150 000 weaners (young cattle) to neighbouring South Africa's feedlots due to limited grazing capacity and financial non viability of local feedlots, Namibia also exports 250 000 sheep and 270 000 goats to South Africa. Approximately 10 000 tons and 9 000 tons of beef are exported to South Africa and the European Union respectively, while 800 000 lamb carcasses and 360 tons of sheep meat are being exported to South Africa and Norway per annum, respectively.

The total export value of the industry is N$1.6 billion (US$0.21 billion), which excludes the financial contribution made by pork, game, hides and skins. The agricultural sector contributes 4% to the Gross Domestic Product of Namibia of which the livestock sector is contributing approximately 80%. Furthermore, 60% of the population of Namibia is directly or indirectly dependent on agriculture. The sector is divided into different farming systems, i.e. a title deed commercial sector and a non-title deed communal sector, which contributes in one way or another to the agricultural GDP.

The country is privileged to have three European Union approved beef and two European Union approved sheep export abattoirs and which as such are regularly audited by European Union Food and Veterinary officials. Namibia is together with Botswana and Swaziland one of the few countries in Africa able to export beef and the only country in Africa able to export sheep meat to the European Union. Going a big step further, Namibia is in a process of acquiring USDA FSIS certification for fresh chilled beef, sheep meat, goat meat and game meat exports from its Foot and Mouth Disease free zone, which as such has been certified by USDA Aphis.

Cattle, sheep, goats and game graze large paddocks/camps of approximately 150-250ha each with grazing intensity of one cattle unit per 12–15ha and one sheep unit per 3-6 ha. The animals are marketed directly from the natural pastures, only being supplemented during the off season, if on nutrient deficient pastures or being fed during drought periods, while water is freely available. There is only one cattle feedlot and one sheep feedlot in the country.
The main beef breeds are the Bos Indicus Brahman, indigenous Sanga and European Simmental while the Dorper breed is the major sheep breed. No antibiotics (except for medical treatment), animal by-

products or hormones are used in any feeding system as it is prohibited by law. Livestock are (on average) being handled quarterly, and occasionally annually depending on the management intensity of the enterprise.
Farms are audited by the Directorate Veterinary Services as well as Meat Board officials/auditors. During handling livestock are vaccinated against diseases demanded by the Directorate Veterinary Services, identified and/ or weighed.

As an export industry and in support of the certifying competent authority, Directorate Veterinary Services, the Meat Board developed and implemented a Farm assured Namibian meat scheme (FAN Meat). This assurance scheme implements minimum standards and a livestock traceability system. Other components of the scheme are audits and database management. The FAN Meat scheme is a consumer orientated, total meat quality assurance scheme which, through a process of inspections, monitors and certifies Namibian meat for the export market according:

- to the highest European Union requirements/standards, with respect to food imports
- to internationally accepted bio–safety, food safety, animal welfare and meat quality standards
- to adequate provision for individual traceability
- to subscription to Good Agricultural Practices
- to support of existing quality assurance systems, ISO, HACCP; and
- to certification by the competent authority: Directorate Veterinary Services.

This scheme has achieved good co-operation between producers, government veterinarians and other officials and industry, in support of the long term vision of the industry. The Meat Board is a statutory body that works in coordination with both the government agriculture department and with industry organisations, including producers, abattoirs, processors, and livestock auctioneers - to devise, approve and implement industry policy and strategy, and in particular, to enhance the long term interests of the industry as an export industry. The success of the FAN Meat scheme, the quality of the country's products, and the adherence to EU standards lead to Namibia being able to comply with private standards and supply to two of the leading supermarket chains in South Africa. Both these chains place a premium on the standards of the FAN Meat scheme, for their respective brands, Free range and Country reared.

Additionally, all beef products exported from Namibia are supported by an individual cattle identification system with full trace-back overseen by the country's Directorate Veterinary services. During the next few months the system will be expanded to mandatory double ear tagging with electronic ear tags (RFID). The RFID system will be used in conjunction with an internet based computerised database chronicling the animals and their locations throughout their lives in Namibia. Electronic reading of cattle identification especially at bulk-handling places such as abattoirs and auctions, will contribute to animal welfare. This system will allow for significantly lower handling of animals leading to lower stress levels, less injuries and higher meat quality.

Internationally acceptable standards are also being applied for animal welfare systems, food safety and environmental sustainability. Furthermore, the Directorate Veterinary Services has obtained full approval by officials of importing countries for its hygiene and product testing systems.

Animal welfare standards have been developed and implemented by the industry and are based upon international requirements, mainly European Union directives and as such are being enforced by the

Directorate Veterinary Services. In addition, private retail standards as well as consumer demands also dictate animal welfare compliance, albeit on a voluntary basis. These animal welfare standards are being covered in the FAN Meat manual, which is in possession of most of the livestock producers of the country. Specific emphasis is provided for the handling and transport of livestock and depicts the five freedoms.

It is crucial that animal welfare standards are being based upon each country's unique circumstances, as animal welfare standards applicable to Europe are not necessarily applicable to commercial exports from Africa, e.g. Namibia which uses extensive farming systems in cattle and sheep production. Specific discrepancies do exist and remain applicable to third country imports, e.g.:

- 'In transit' times of animals is set at 6-8 hours (nearest slaughterhouse from furthest farm 7-8 hours drive)
- Castration/dehorning/branding at AN age before three months (calves are born in the field and not normally handled at A very young age)
- Appointment of an animal welfare officer at slaughterhouses (which will add to cost)
- Incorporation of animal welfare in trade negotiations (will require new expertise)
- Lack of education and financial resources at production level to fully implement animal welfare
- Lack of capacity to fully enforce legislation and standards

Some of these animal welfare issues are based on public opinion, through the use of surveys and not necessarily based on scientific measures. Another recognised challenge is the very different tradition of animal welfare and the perception of 'the animal', which is rather underdeveloped in poorer countries. However Namibia needs the European Union export market, thus we have no other choice than to comply, if required to do so.
Namibia as a member of the OIE adopted the following five animal welfare standards to be included in the OIE *Terrestrial Code*. These cover:

- the transport of animals by land
- the transport of animals by sea
- the transport of animal by air
- the slaughter of animals for human consumption
- the killing of animals for disease control purposes

In order to ensure these standards are implemented, Namibia has to start a consultative process to review existing animal welfare legislation. With respect to OIE standards, member states have to ensure that their legislative frameworks are consistent with the standards in order to enable enforcement. In terms of policy, DVS recognises the five standards listed above, and has appointed an OIE Animal Welfare Focal Point to facilitate consultation on animal welfare in Namibia in view of reviewing current animal welfare legislation and/or preparation of a welfare code in consultation within the Veterinary Association of Namibia (VAN). Such legislation of Welfare Code will be provided to the FAN Meat Committee for further discussion or adoption. The welfare code will be a summary of humane handling of food animals on the farm, transportation, at auctions and at abattoirs. All VAN members (state or private) will be encouraged to promote this code to producers. Public consultation is important as it has helped ensure that every stakeholder in the industry could be heard and contributes to success of implementation.
Namibia could expand its exports if:

a. beef exports from its rural areas north of its veterinary cordon fence, and originating from the Foot and Mouth Disease (FMD) buffer zone could be allowed to be exported internationally without pre - and post quarantining of cattle

and:

b. bone–in lamb exports from its OIE declared FMD free zone could be allowed to be imported into the European Union.

Statement from Gretchen H Stanton

The World Trade Organization - the WTO - is the international organization whose primary purpose is to facilitate trade for the benefit of all. The WTO provides a forum for negotiating agreements aimed at reducing obstacles to international trade and ensuring a level playing field for all, thus contributing to economic growth and development. The WTO also provides a legal and institutional framework for the implementation and monitoring of these agreements, as well as for settling disputes arising from their interpretation and application.

The current body of trade agreements comprising the WTO consists of 16 different multilateral agreements, to which all WTO members are parties. Several of the WTO agreements might be relevant to trade restrictions imposed for animal welfare objectives.

Gretchen Stanton will discuss 3 of the agreements and some of the questions that arise in this context.

Welfare Quality®
Science and society improving animal welfare

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Farmers' perspectives

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Throughout the Welfare Quality® project several studies have looked into the perspectives of farmers on animal welfare, the monitoring of animal welfare and more specifically the Welfare Quality® assessment. We carried out case-studies among pig, cattle and poultry farmers in six European countries (Italy, France, United Kingdom, Norway, Sweden, and the Netherlands) and a small pilot-study in Hungary. We tested the assessment system in various sectors and discussed with the farmers their experience of the assessment on their farm. In addition we organised so-called 'farmer juries' with pig farmers in the Netherlands, Italy and Norway in which we discussed the assessment and monitoring system and its implementation in detail. The following short report focuses on the farmer juries.

The farmer juries – the methodology

The farmers' juries took place in the Netherlands, Norway and Italy in the autumn of 2008. We invited pig farmers of different ages and gender, whose farms varied in terms of specialization (breeding, fattening, integrated), production method (organic, conventional), region and size. All juries met for six sessions during two days in which we discussed the definition of animal welfare; the principles and criteria of the Welfare Quality® assessment tool as well as its potential implementation in practice. The same protocol was followed in all three countries. We used power-point presentations to introduce issues, and these had been prepared and were presented by animal scientists from Welfare Quality® . The representations were the same in all of the countries, except that they were translated into the national languages. Differences in the findings were therefore likely to reflect differences between the three countries and farming communities.
It was considered important to determine how farmers perceived the tool because they were assessed 'to its requirements', and so will be the future focus of its application. The basis of our work was the expectation that working with a selection of farmers would provide insights into how farmers more generally might react to the final tool and how their opinion would potentially develop. We therefore used a method that allowed us to witness how a group of respondents (the 'jury') developed their opinion with time, in response to information input and in exchange with others.

Defining and monitoring animal welfare

The farmers that took part in juries were concerned about animal welfare, as entrepreneurs but also because they wanted to be good farmers. Treating animals well was part of their professional ethic and pride. But farmers also repeatedly pointed out the need to be realistic in the sense that farm animals are meant for production and that farming is an economic business. They also stressed the need to monitor and evaluate animal welfare within the frame of an intensive husbandry system.

In general the farmers' definition of animal welfare was similar to the definition used in the Welfare Quality® assessment tool. They saw the Welfare Quality® 12 criteria and 4 principles of welfare as a relevant to approach animal welfare.

They saw some principles and criteria as being clearly more important than others. Most farmers considered health and bodily fitness as the most important aspects of animal welfare.
They nevertheless acknowledged the importance of feelings of wellbeing. They agreed that hunger, thirst, comfort around resting, thermal comfort, and absence of disease are important criteria. Behavioural aspects and ease of movements were seen as less important. Most of the farmers also considered pain, injuries and fear to be important indicators of welfare as well as of a good human animal relationship.

In general farmers were in favour of an objective measurement of animal welfare. They considered that such measurement should be rooted in a standardized monitoring system which could be used all over Europe (and preferably the whole world). They were also in favour of the monitoring of animal welfare by taking into account measures on animals themselves, as this would be very close to the way in which they watch the wellbeing of their own animals.

Farmers were concerned about some measurements, especially regarding behaviour, fear and human animal relationship. They perceived such measurements as subjective and unreliable. In addition farmers often underlined the context-dependency of results as a result of the management style, the production system, and the animal's character. They were also concerned that the timing of measurement might influence the results. These comments reflect the farmers' more general worry about the evaluation and scoring of their farms. Farmers were somewhat concerned about the impact that incidental measurements may have on the score they finally get. Although they principally liked animal-based measurements, they worried a lot about the unpredictability of the monitoring results. With resource based measurement, they generally know the results beforehand and also know more readily how to improve the results of these types of measures.

Implementation
In all three countries farmers believed that the Welfare Quality® monitoring tool could be used to inform consumers about animal welfare. They doubted, however, that it would convince consumers to actually buy and pay more for animal friendly products. They also stressed the need to implement a label or information system at European level, and with the support of all parties involved in the chain as well as NGO's. They underlined that better results in animal welfare need to be rewarded by higher prices.

Differences between countries
Dutch, Italian and Norwegian farmers experienced the discussion of animal welfare and the monitoring tool in a different way. Farmers in all three countries feared that monitoring might lead to more stringent regulation which would threaten their business interests. Dutch farmers were very worried about how the assessment tool might be used in the public debate and how results might be used against them. In several incidences they expressed offence by the implicit suggestion that external assessors would need to assess basic issues such as hunger, whereas in their view only in exceptional cases was this not already assured by farmers. They were afraid that NGO's could misuse information to portray farmers as cruel and careless. Their reaction reflected the political situation in the Netherlands and the high level of public concern and media attention regarding animal welfare. The highly political character of the issue was also reflected in the political behaviour in the group and the Dutch participants gave up individual differences in opinion and came together to bring forward their opinions with the Welfare Quality® team with once voice.

In Norway and in Italy farmers reacted differently. By contrast to the Dutch, the Norwegian farmers agreed on the terms used to describe measurements.
They nevertheless worried about the feasibility of the assessment. In their view, some resource-based standards need to be maintained in legislation to ensure that every farmer keeps up a certain standard.
Italian farmers worried about the subjectivity, representativeness and context-dependency of measurements. Moreover, they were concerned that implementation would limit their entrepreneurial freedom. They preferred the tool to be used for voluntary quality certification. But they also stressed the potential use of the tool for informing farmers and providing them with useful advise on how to solve critical animal welfare problems at the farm.

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Citizen Juries: testing the legitimacy of the Welfare Quality protocol

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The citizen juries were designed to examine societal opinions in three European countries (UK, Italy and Norway) on the new approach and the outcome-based farm animal welfare assessment scheme developed by the animal scientists. With this research method we attempted to open up the scientific 'black-box' of the construction of the animal welfare standard to broader societal scrutiny and reaction. The 'citizen juries' are representative of a relatively new set of methodologies developed to engage citizens in complex technical and ethical decision-making processes, for example, they have been used in fields as diverse as nanotechnology, biogenetics, water management, and drug policy both in the UK and in the Netherlands. They differ from other qualitative methods such as focus group discussions, consensus conferences or expert workshops, because they involve a mixture of citizens and experts with different and clearly defined roles, where the citizens are leading the discussion to the issues that matter to them and the 'experts' act as witnesses and are required to contribute to, rather than to lead the discussions and to provide answers on their proposals and research. The WQ citizen juries were citizen-led and experts/witnesses were called upon to give short presentations and to answer specific questions on the development of the WQ assessment and monitoring protocol. The juries met 4/5 times over a period of 6 weeks and this long engagement enabled us to gain a deep insights into citizens' concerns, reflections, and to examine how citizens' views changed (or did not change!) over time, and how they responded to new information. Specific 'scenario' based tasks were set up so as to enable us to monitor practices of deliberation as well as the actual outcomes of those deliberations. As social scientists we were interested in the actual dynamic processes of jury deliberation: whose opinion was trusted the most, who they were talking about in the successive weekly discussions, which argument was most convincing, what values were not negotiable, and so forth. In general, the animal scientists involved in the process were more interested in the actual comments and evaluation of the WQ protocol.

The main objective of the citizen juries was to assess citizen/consumer responses to the degree of acceptance of the WQ assessment and monitoring scheme, its scoring system and potential implementation. There were three specific aims:

To explain to the jury members what is assessed and monitored on farm and how it is done, to find out whether this information addresses their concerns and is considered useful for evaluating the 'welfare' of the animals in a market context.

To provide immediate feedback on the most crucial aspects of the assessment scheme to the scientists who have developed it and are still in the process of finalising it.

To explore citizen/consumer opinions on the possible ways to implement the WQ scheme.

From previous investigations (i.e. focus groups and the telephone survey) we learned that the four principles and twelve criteria categories of welfare proposed by the WQ scientists address (the majority of) citizens' concerns regarding the quality of life of farm animals (Evans and Miele 2007). However, our research also showed that some concerns were not explicitly addressed in the WQ scheme (e.g. indoor versus outdoor, natural life cycle) and there are potential areas of misunderstanding (e.g. the interpretation of good feeding, addressing the quantity/availability of food, but not its quality).

The main results from the three juries confirm the insights from the focus group discussions and the survey: The WQ monitoring scheme is largely accepted and deemed legitimate by the majority of the jury members. The scheme is considered effective especially for highlighting problems in intensive production, but less useful for promoting or rewarding systems developed for offering higher chances of welfare to animals. The jury members mentioned several areas of concern that are not addressed explicitly: the environment in which animals live is considered a crucial element of their welfare, outdoor access and natural light being essential conditions for good welfare. Any indoor system, no matter how the animals 'experience' it, is always considered less 'animal friendly'. The quality and modality of feeding are considered important areas neglected in the WQ monitoring, as are the lack of assessment of risk factors such as breed and the life cycle of the animals (lifespan, social groups). The Italian and UK jury members viewed the organic monitoring scheme to cover issues that were very relevant to them, even though they learnt that welfare (in terms of health) cannot always be delivered by these system. The Norwegian participants were less clear on this issue, perhaps because there has been little attention towards animal welfare in organic farming in Norway.

Conclusions

The citizen juries confirmed that product labels and brands are considered useful sources of information for assessing the animal friendliness of products, even though are not consistently used at the current time. The importance ascribed to labels varies across countries, consistent with availability: being most important in the UK, and least important in Norway. In Italy, 'brands' are considered important for assessing the welfare friendliness even though most brands have little or no explicit reference to animal welfare. Disclosing what the claims on the labels mean was considered extremely interesting by the jurors, as were insights into how assessment and monitoring of the welfare of farm animals took place - was considered most valuable: all the participants in Italy and in the UK lamented that the welfare claims (but also quality claims, such as 'corn fed') were often difficult to interpret, because the 'consumers' lacked information on the modern farming practices and the welfare problems that they might cause to the animals. Quality labels, even without welfare claims, are perceived as an indication of 'animal friendliness' as well as 'place of shopping' (e.g. quality retailers, local shops, direct sales….). 'Organic' is unanimously perceived as the most welfare friendly system of production, both in Italy and in the UK and the organic monitoring scheme addresses the ethical concerns of most members of the jury. This is less clear in Norway. The WQ monitoring scheme was considered useful in addressing the majority of their concerns and best suited to identify the problems of intensive systems of production. The priority of the 'citizens' largely coincided with the principles identified by the WQ animal scientists. However the WQ monitoring scheme was considered less useful for addressing some ethical issues (living outdoor, lifespan, breed selection, social groups, the quality of animal feed, GMO) best identified in the organic system of production. The distinction between 'ethical issues' and more narrow 'welfare issues' in many cases was considered confusing if not misleading, even though most participants did consider the WQ monitoring scheme a step in the right direction and a useful tool for increasing the transparency of the market.

The aim of these investigations, citizens and farmers juries, has been to make steps toward (re)introduction of democratically mandated preferences into the framing and conduct of research activities. The voice of the 'users' was introduced at an early stage of the development of the WQ monitoring scheme, in a debate that, up until now, has been mostly limited to actors of the supply chain. In this way WQ has attempted to establish a meaningful science–society dialogue, and to engender opportunities for mutual learning and cross-fertilization of ideas and values between scientists in the project and the lay public.

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Statement from Leif Erland Nielsen

Animal welfare is part of the ethical values in the "European model of society" and it also affects product quality, pathology and disease resistance.

The research program is thus fundamental in developing standards for on-farm welfare assessment and product information systems on an objective and sustainable basis, as well as practical strategies for improving animal welfare.

It makes significant contributions to the societal sustainability of European agriculture by improving animal welfare in EU and internationally.

An NGO view

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Eurogroup for Animals is the largest animal welfare federation in the EU, representing the views of 42 animal protection organisations and millions of consumers. It is our aim to integrate the concerns for animal welfare into policymaking and standard setting – to this end, we work with EU institutions, national governments and private companies. As member of the Advisory Committee, Eurogroup has closely monitored the developments in the Welfare Quality Project since its inception.

Benefits of Welfare Quality
We recognise and appreciate the great investment made by many research institutes and individual researchers, which has contributed to a deeper understanding of farm animal welfare and how it is measured, as well as how consumers and citizens view the welfare of animals that are reared for food. These findings will provide a useful basis for animal welfare science and practice for years to come.

Delivering transparency?
Welfare quality (WQ), as such, does not contribute to transparency in the market but will need to be integrated and applied practically on farms and through the retail chain to provide better clarity. In most countries, there is a dearth of information concerning how animals are reared for food production. Renowned economist George A. Akerlof[1] describes the situation in *The Market for Lemons* as "quality uncertainty and asymmetry in available information", namely that the retail seller/producer has more information than the consumer, which can lead to a loss of trust in the market, and also to market exclusion of quality producers by mainstream manufacturing. This is certainly the case for animal welfare, but any improvement strategy will need to be adapted to the market's specific characteristics. The results of the social science research in WQ should be considered, in particular *each country's social distribution of responsibility for animal welfare.*[2]

Risk assessment/risk management tools
Eurogroup welcomes the results of the Welfare Quality assessment scheme, as these can be a good tool to determine welfare risks more precisely and provide feedback to producers on the level of welfare. The scheme should in no way completely replace current risk-management tools, such as legislation with outcome-based measures, as has been suggested by some policy makers. Both animal- and resource-based measures should be used to improve welfare.

EU institutions and other actors in the food chain
The results of WQ provide valuable information and resources to improve animal welfare. However, further action, as described below, needs to be taken to ensure that the 17 million investment is in reality going to make a difference for individual farm animals:
- investing in further research to integrate and implement the important findings of Welfare Quality;

- addressing citizens' concerns by continuing to develop animal welfare legislation that combines resource- and animal-based outcomes for the large number of species that at present have no legal protection (such as farmed fish, cattle, rabbits, sheep and goats);
- addressing the most obvious animal welfare issues for which scientific evidence is available but which are occurring regularly in modern farming – the castration of piglets, use of farrowing crates for sows and other types of cramped confinement for rabbits and geese, slaughter without stunning, and so on;
- considering social-science research results in the upcoming EU debate on animal welfare labelling;

and

- encouraging the EU to take the lead in advancing animal welfare in line with the requirements in the Lisbon Treaty3 by preparing a second Action Plan on the welfare of animals (2010-2015), to bring together future regulatory and voluntary initiatives and to address the information deficit on the part of consumers and citizens in a coherent fashion.

[1] 2001 Nobel Prize for Economics winner (chaired with Stiglitz and Spence)
[2] See Welfare Quality Sub-Project 1: Consumers and animal welfare: a comparative European analysis.(Ingrid Kjorstad and Unni Kjærnes)
[3] Lisbon Treaty, article 6B

An Outcome-Based Approach to Animal Welfare During Transport

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Being able to impose duties and prohibitions on citizens to limit what they are allowed to do, or to coax them to do things they would not otherwise do is a considerable power. It is fair to give governments, for the most part, the benefit of the doubt that their motives for crafting animal welfare-related acts and regulations are sound and the intention is to protect animals.
However, what clever minds have created and thought through, is often not exactly what is finally said. What is finally said is not necessarily what is written down, and what is written down does not always survive the consultation process, where lawyers and a wide spectrum of stakeholders and their specific interests influence the end content and structure. Similar to a "one-size-fits-all" piece of clothing, the resulting piece of regulation can sometimes turn out to be quite ill-fitting; too loose for some, too tight for others.

Canada introduced provisions for the transportation of animals into the Health of Animals Regulations back in the 1970's. At the time, railroad long-distance transport was the method of choice for cattle, especially calves. In this context, a provision demanding that animals be fed and watered within five hours before being loaded for a transport that will take 24 hours or more was certainly well intended.
But what does such a provision mean in 2009? What does it mean for an animal today, an animal which may not be precisely the genetic type or conformation for which the regulation was originally written and intended to protect almost 40 years ago? Is it possible that, in the case of pigs, or for a Siberian tiger in transit, for example, this well-meaning provision would actually cause a negative impact on the animal?

The results of compliance inspections and rulings in cases heard before courts and administrative tribunals can give us a good indication of how well the current regulations "fit" the needs of today. As a result of this, some regulations have been subject to consideration for modernisation. However, in the process of discussion on modernisation, it was usually not difficult to point out defects, but it proved to be much harder to find solutions.

The two subject matters which we found to be least likely to unite lawyers, regulators, politicians and stakeholders were:
- "how long is too long" with respect to time in transit or feed/water/rest deprivation
- "how many is too many" in the context of loading density (how many animals fit into a given volume).

We discovered that true "consensus" could not be reached. While most stakeholders involved would agree that the current permitted duration of 52 hours for transporting cattle is too long, no clear "cut-off" time could be found that could be well supported by scientific studies and by practical experience.

The attempt to set a time limit, however reasonable, appeared arbitrary and difficult to defend against criticism.
An arbitrary time limit may be ideal for certain animals, but too stringent for others, and even potentially way too lenient for yet another sub group of the same species. A compromise would not be a complete failure, but similar to a broken clock: it would is still be accurate, but only twice per day.

We began to think that, perhaps, it was not the problem as such that was difficult to solve, but the way we described the problem. Do the animals really suffer because the clock is ticking and time is passing? Is it not true that the animals suffer because they are dehydrated and do not get what they need – water?
Should we then not focus on the underlying need of the animal, rather than on a substitute for the actual problem, such as time?

Ideally, effective regulation is based on concise and clear direction which has a desired goal in mind, while allowing those people who are affected by the regulation to employ any means available to them to reach the desired goal.

It would be preposterous for a government to assume a position where the regulator, and no one else, knows best how to go about a certain business. Companies and individuals engaged in animal transportation often have tremendous experience and knowledge. We live in a world of innovation, and what was 'top-notch' yesterday is often outdated tomorrow. What does not change, is the desire and need to transport healthy animals in good condition and deliver them in the best possible state at the end of the journey.

"Goal-oriented regulation" describes a specific regulatory approach that balances;

Prescriptive elements (detailed, technical provisions);

Performance-based elements (indicate an objective and quantify it, but do not prescribe the way to achieve it);

and;

Goal-based elements (indicate an objective but neither quantify it nor prescribe the way to achieve it)

Often called "outcome-based" regulation, the focus is on the desired end result of the activity, not on the technical details leading up to the result.

The responsibility to transport animals in a manner accepted by society rests exclusively with those that engage in this activity. As a regulator, it appears prudent to ensure that responsibility rests where it belongs and can be influenced, and outcome-based regulation appears to be a good tool to achieve this.

For example: Floor space for pigs inside a trailer

Traditional, prescriptive	Outcome-based
15 kg 0.13m^2 25 kg 0.15 m^2 50 kg 0.35 m^2 100 kg 0.51 m^2	Every person that transports or causes to be transported a pig must provide, at all times, sufficient room for each pig to lie down without being forced to lie on top, or to be positioned underneath another pig.
Difficulty of this approach: *What about a 75 kg pig or pigs of slightly different weight?*	Difficulty of this approach: *Can the authority prove, in court, that every element contained in this provision was upheld? I.e. in a legal case, is this requirement difficult to assess in practice?*

At the time of this conference, the updated 'Canadian Health of Animals regulations, Part XII – Transportation' is undergoing final review. Time will tell whether or not we have truly found a better way to motivate everybody in the transport chain to handle animals carefully, and to protect animal well-being during all stages of transport.

I firmly believe that regulation alone is a 'bad choice of tools' to convince citizens to "do the right thing". When a majority of stakeholders can agree on a common goal, through a process that includes science, government regulation and enforcement as well as through use of industry standards, then the combined buy-in of industry groups, regulators and the general public provide a much larger incentive and, therefore, more likelihood of success in the long run.

The Welfare Quality® program: a farmer's view

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Producers' associations were invited to participate in the Welfare Quality® (WQ) Advisory Committee (WQAC); I am a pig farmer and I represent the European Pig Producers (EPP). Furthermore, my farm was included in the evaluation of the WQ on-farm welfare assessment system for pigs. I will now present my 'farmer's view' of the goals, principles, and framework of the WQ project.

About the goals of the Welfare Quality® program:
The goal of the European commission, as stated by Mr Gavinelli in 2007 during the Berlin WQ conference is to succeed in communicating more clearly with consumers about animal welfare. This opinion is shared by the producers, but the first task for farmers is to evaluate and to assure the true welfare of their animals: if a farming system is good for animal welfare, it will be good for communication. Image and naturality belong to another debate. That is why the farmers and persons managing the animals are responsible for their proper care and treatment. Farmers consider animal welfare an important issue and constantly seek to improve the quality of their production systems: They want an objective welfare scoring system.

Welfare Quality® has developed on-farm welfare monitoring systems and farm scoring methods for selected farm animal species. These may be one element that farmers can use to develop practical ways of improving animal welfare. Every farmer in Europe should then be able to reach a good score. If not, there is a risk that the scoring method will be implemented by only a "happy few" farmers for a "happy few" animals. This is not consistent with the initial objective of WQ. The scoring system should not only apply to the producers. To be coherent the system should apply to the whole production chain, i.e. it should be implemented on the farms, and also during transport and at slaughterhouses.

About the principles of Welfare Quality® program:
The main principle of welfare quality is an animal-based approach.
This animal-based approach was anticipated by the farmers for different reasons:
- It is an objective approach: the tests I saw on my farm were very precise and let very little room for subjectivity
- The method created by scientists should help to provide a guarantee for objectivity
- The requirements of animal welfare must be based on scientific results about the biological needs of the animals
- The auditor, observing and analyzing the status of the animals, does the same job as farmers do every day: this means that the method is easily accepted by the farmers.
- A system of welfare evaluation, with scoring of some animal based indicators, introduces a new approach, and in so doing creates a link (a sort of obligation) between the producer and his farm results, and this could be an interesting challenge for farmers, and much more 'understandable' than a resource-based system

- The WQ system seems to be offer the possibility of communication of information to the producer, and this may be an improvement over present schemes

However, the method needs adjustment:
- Some resource-based data are used, as there are no appropriate or practical animal-based measure. So, we might imagine that if they the results are not reliably observable on animals, either they are not important or they have consequences for other data which are observable. For instance if we can't detect the lack of water by direct observation of sows – then perhaps appetite and urine analysis, which are animal-based data, could detect it.
- We need it to include more data automation, use of existing records and technology based solutions to safeguard the future development of animal welfare assessment systems which are more precise and time efficient.

About the framework:
The welfare status of the farm animals has to be considered in a larger framework. The risk of a scoring method is to isolate animal welfare from other issues which are sometimes contradictory. Increasing welfare must be balanced with the following issues and legislative requirements:
- Environment: straw, carbon balance and fossil energy supplies, land surface required for keeping animals and overall energy use;
- Health: total or party solid concrete floors and the link with Salmonella, dusty farming conditions;
- Workers welfare: the physical burdens which come along with some cleaning tasks;
- Economy and competitiveness

In the overall balance, human welfare must be the major focus. The Welfare Quality® system has to be connected to other elements like food safety, environment, social responsibility, health and workers welfare. For this reason it is not feasible for farmers to be scored only on animal welfare. Farmers will need to be ready to be evaluated on general sustainable farming. A more integrated evaluation of farms should be an effective tool for qualification and for communication with society and for improving sustainable farming and animal welfare. An integrated approach should simplify the issue of inspection and certification as farmers prefer to be audited once for a general operation rather than ten times for ten different items.

A holistic approach and integration into existing quality assurance standards are the key issues for the successful implementation of the WQ systems and commercial integration will also be important:
As a farmer I produce a pig carcass, but this is then cut up into many different cuts that are sold to many different markets. Farmers are not selling a "whole" pig to single buyer or consumer and different markets have completely different demands and ways of trading.

Economic conditions
New forms of interdisciplinary research have been achieved in the WQ project but studies of economics and the potential impact on farmers' competiveness have unfortunately not been given a high priority. It would be very valuable to understand more about the framework in which farmers operate in the food market, particularly in a context of tough and open international competition.

All costs not covered by consumers will stimulate imports, and measures for welfare that increase production costs of an animal in Europe may make it more likely that this product will be produced abroad (under presumably worse conditions).
For this reason the UK lost half of its pig production in the last fifteen years, and that is why considerations of international competitiveness are an absolute condition for success in improving animal welfare. The role of WTO in this context has to be defined.

Two threats:

- A single scoring method used just for animal welfare, by the relative weight of some data, could make farming more costly without necessarily improving animal welfare in general in the EU: The issue of the hierarchy of the data will have much influence on the future competitiveness of farming.
- To implement this complex WQ scoring system the question of the reliable inspector and robust inspection must be solved. On my farm, the inspector spent a whole day assessing the slaughter pigs. Multiplied by the number of pig producing farms in Europe, the duration of audits is likely to make the scoring extremely expensive. It will also take enormous resources to educate auditors to work within this system and this will not be initially feasible regarding practicality and acceptance.

To make auditing more cost and time effective, scoring must take more account data that are already present on the farm, e.g. KPIs used for managing production results, feeding or health status. New technologies for automated recordings of animal welfare should be developed in order to have less direct human auditing ,and more automated analyses. This will provide the potential for objective, transparent, complete and immediate auditing and this is essential for a good communication with the consumer.
Although the implementation of a scoring method may improve animal welfare it will impact production costs - who will pay for this? In some countries, local markets may return some of the money to some farmers, but this is not the case in every EU country. Even if the intention of the consumers is to foster animal welfare by spending more money on food (as Eurobarometer suggests) the reality shows that consumer don't do that in most European countries. Based on these facts, most producers can't afford to improve animal welfare just for a "happy few" consumers.

To keep animal farmers in production and to improve welfare conditions, costs and welfare improvements have to be purchase based. If consumers are not willing to pay the costs of welfare improvement via the market, it might be proposed that EU citizens would finance the implementation of higher welfare levels via public subsidies. A special premium might be granted for those producers that can prove their animals have a high welfare status.

Conclusions

Farmers generally have a positive view on the Welfare Quality® project. They welcome the research behind the project but they see obstacles to the integration and implementation of some of the outcomes. They see a real danger of over-anticipation regarding the results by eager civil servants and politicians, and so the way the outcomes are communicated is extremely important.

In view of the complexity of the WQ system, the on farm assessment procedure must be developed in close cooperation with the farmers´ organizations. If they are included 'in the heart of the development': then improvements will be practical. An on farm assessment of animal welfare must not be a stand-alone tool, integration into existing schemes for the assessment is desirable.

Producers investing in, and implementing high welfare status must be awarded economic incentives to compete in the globalized market

Filling gaps, exploiting new technologies, maintaining an assessment system and keeping up the momentum

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Introduction

After almost six years the Welfare Quality® project will end in December 2009. The project has become well known not only in Europe but also worldwide. People from outside Welfare Quality® frequently refer to our project at a wide variety of conferences and meetings which also often include contributions from Welfare Quality® partners. Welfare Quality® also features in policy papers and discussions (e.g. within the European Commission and in the European Parliament). What was originally a project acronym has developed into a catch phrase that is even used in normal everyday language like: 'we need to improve the welfare quality of our product'. This illustrates the widespread recognition of the aims of Welfare Quality® and contributes enormously to the impact of our work.

However, even if Welfare Quality® can be regarded as a successful and influential project delivering a multiplicity of results, this does not mean that the overall vision has been fully realised. When considered in a wider context we have to be modest and accept the fact that there is still a way to go.

Filling gaps

Even if Welfare Quality® was the largest ever collaborative project in animal welfare science, it is clear it could not have covered all the questions and every detail. So, it is not surprising that there are still unanswered questions and discussion points about specific welfare measures or the lack of animal based measures for some criteria (e.g. no animal based measure for prolonged thirst on the farm nor for thermal comfort in adult cattle). Furthermore, no measures were developed for the welfare at slaughter of dairy cows, veal calves, sows, piglets and hens. We also had to prioritise some tasks and species at the expense of others because of budgetary and other constraints. Thus we were unable to fully develop the models for integrated assessment for all animal types (e.g. not for sows and piglets on farm, laying hens on farm, buffaloes and not at all for animals at slaughter). However, the necessary processes and principles have been developed, so it is now just a matter of securing the support to carry out the work.

Another gap relates to species and types of animals that could not be included in Welfare Quality®. The other animals that clearly merit study include a number of domestic species such as sheep, horses and turkeys. These are all very important for the continued agricultural and rural development in Europe.

Fittingly, within the context of the Seventh Framework Programme (FP7) the EU recently called for research proposals to further develop and refine the welfare assessment and monitoring system and bring other important species into the model (European Commission, 2009).

Exploiting new technologies

At present, most welfare parameters applied in the Welfare Quality® project are measured by an assessor during a farm visit. This is obviously time consuming, and there are inevitably quite extensive time lags between consecutive visits.

Moreover, assessors need training to reliably assess the different parameters, and there are biosecurity risks associated with farm visits. The automation of (some of) the measures would be of great help in solving some of these problems (c.f. ETAG, 2009).

The field of automated recording of animal-based parameters is relatively new. Some electronic tools are currently available to farmers (e.g. individual recognition in dairy cattle and sows at the concentrate feeder, automatic weighing of broiler chickens). But, most of these tools and the associated research efforts focus on specific research goals (often developed for laboratory animals) or production-related parameters, rather than welfare parameters. The available technology is not yet ready for on-farm use and the expertise seems to be fragmented (ETAG, 2009).

Welfare Quality® focussed on developing the relevant criteria and parameters and we only had very limited opportunities to look into automation of measures. However, one project within Welfare Quality® successfully developed a prototype for automatic assessment of foot pad lesions in broilers (De Jong, 2008). The system was developed in collaboration with the industry and is based on existing video imaging techniques used to monitor aspects of carcass classification. Another recent example in broiler chickens is the automated measuring of high gait scores (poor walking) using optical flow statistics derived from flock movements recorded on video or CCTV (Dawkins et al., 2009).

Essentially, automated recording through the exploitation of new techniques may increase the feasibility of large scale animal welfare assessment.

Maintaining the assessment systems

Welfare Quality® established a range of implementation strategies and tools to support the effective use of the assessment outcomes. In this way the project itself creates a good basis for consolidation, implementation and further development of the results. However, Welfare Quality® as an integrated and collaborative structure will cease to exist. To ensure the best conditions to support the application and implementation of the Welfare Quality® results there is an urgent need for an independent and respected body to manage and maintain the welfare assessment and product information systems as well as an information resource describing practical welfare improvement strategies, support instruments and tools.

Scenario analyses within Welfare Quality® (Ingenbleek *et al*., 2009) stressed the importance of establishing a body or an institution to facilitate the implementation of a harmonised animal welfare assessment system. Such an institution would have strategic responsibilities for developing a common vision on to how support and manage the implementation of harmonised assessment systems for the various species. Also in other contexts (e.g. sustainability) the need for new kinds of institutions to coordinate policy and guide innovation and development in industry was highlighted (Lundvall *et al*., 2002).

The roles of such an institution could include the following (cf. Ingenbleek et al., 2009):

- a supporting role in stimulating adoption of the assessment system among farmers and business, and a management role once adopted. Here one can think of advisory services, training and support packages that help individual farmers, farmer organizations, or farmer – retailer groups, as well as quality assurance checks to ensure that the system is used correctly.

The increasing amount of animal welfare data that will become available will help to develop these support products and services and the resulting database will be a valuable future resource that would need to be managed responsibly;

- a scientific role, updating the assessment measures and systems with the latest scientific insights as well as incorporating societal views, and facilitating research using the above mentioned animal welfare database;

- a level-setting role, turning the system into a measuring scheme against which farms, farming systems and brands and products can be benchmarked;

- a legitimizing role, in ensuring that the system has a solid acceptance basis among stakeholders in society, both within animal interest groups and beyond, and with the wider group of stakeholders concerned with sustainable development.

I believe that a European Centre for Animal Welfare as suggested by the European Commission in their 'Action Plan on Animal Welfare' (European Commission, 2006) would be admirably suited to fulfil the above roles. Because national environments may vary considerably within Europe, and specific expertise is available in several Member States, such a centre could take the form of a network and be clearly linked to national information and practices

Keeping up the momentum

During its lifetime the Welfare Quality® project has generated a multitude of results including an innovative way of assessing animal welfare in an integrative way, several concrete strategies to improve animal welfare, many insights into the concerns, initiatives and conditions for involvement of consumers, retailers and farmers as well as support mechanisms to enable uptake and implementation of our results by the relevant stakeholders and market actors.

With so many people involved in the work and connected to the project which has run for such a long period, Welfare Quality® is sometimes perceived as an institution that will for instance actually implement the assessment systems and regulate their use. This is a misconception: Welfare Quality® remains a limited (in time and scope) research project and other actors are required to ensure the use, improvement and implementation of the results.

As argued above, there is an urgent need for the establishment of a 'real' institution to fulfil some urgent roles. But, keeping up the momentum also requires the active involvement of many other actors. In this context, the main drivers are: citizens, NGO's, production chains, European Union, and scientists (Blokhuis,2009).

Not all things develop through gradual trends; sometimes shocks and 'spike changes' occur as a result of the actions of influential individuals or groups, (e.g. the role of Al Gore in generating awareness on climate change). The nature of such a 'dominant leader' may vary substantially; for example, a large retailer might adopt the Welfare Quality® methodology in its purchasing criteria, or a farmer organisation may support Welfare Quality® and be supported by celebrities.

I sincerely hope that many such dominant leaders will keep up the momentum.

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Statement from Timothy Hall

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With the recent development of Community policy in the field of animal welfare, in particular concerning the protection of animals kept for farming purposes, it is necessary to ensure that future policy options are duly substantiated and scientifically based. EU research on animal welfare is covered in the 7th Framework Programme (FP7) under the Specific Programme 'Cooperation' in the Thematic Area 'Food, Agriculture and Fisheries, and Biotechnology.

After the challenge taken up by the integrated project 'Welfare Quality' in the 6th Framework Programme (FP6) and other smaller projects, new needs have been identified and will be addressed in FP7. These include developing indicators for new species, such as small ruminants or fish, and assessing the status of animal welfare implementation in an enlarged EU and the specific socio-economic context of animal welfare.

Animal welfare research supported by the EU has clearly a role to play in addressing the main social and economic challenges of the century as it has to be fully integrated in any policy development relating to agriculture and food sustainability.

Biographies of the key speakers and chairs

Martin Appelt graduated from the UVM (University of Veterinary Medicine in Vienna, Austria; third-oldest vet school in Europe, founded 1765) in 1996 and worked in farm animal practice in Austria and the UK, "trying his best to cure and do no harm". Prior to that, during a year at the vet school in Dublin, Ireland, he not only sampled local brews but also sailed on livestock ships, carrying slaughter and breeding cattle to Libya and Egypt. He subsequently pursued a PhD at the UVM in Vienna, with a project on cattle transport at sea, which he completed in 2001.
Between 1998 and 2002 he worked as port veterinarian at an EU port of entry and part-time in mixed practice. He joined the Canadian Food Inspection Agency in 2003 and works exclusively in animal transportation and welfare. Martin lives in a small rural community outside of Ottawa, Canada.
Some recent publications:

- The Canadian Approach to Science-Based Regulation of the Long Distance Transport of Animals (2008), *Veterinaria Italiana* 44(1) 95-99
- Stunning and killing cattle humanely and reliably in emergency situations — A comparison between a stunning-only and a stunning and pithing protocol , *Can Vet J.* 2007 May; 48(5): 529–534
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David Bayvel obtained his initial veterinary degree from the University of Glasgow in 1967, and then gained a Diploma in Tropical Veterinary Medicine from the University of Edinburgh in 1968. He became a member of the Australian College of Veterinary Scientists by examination in Veterinary Pharmacology in 1983, and obtained a Masters Degree in Public Policy from Victoria University of Wellington in 1994. David's career has involved periods in private veterinary practice, the international pharmaceutical industry and government service. He has worked in the UK, Zambia, South Africa and Australia and moved to New Zealand in 1982.
From 1989 to 2005, David represented the Ministry of Agriculture and Forestry (MAF) on the New Zealand National Animal Ethics Advisory Committee (NAEAC) and the National Animal Welfare Advisory Committee (NAWAC) and, from 1993 to 1996, was a member of the ANZCCART (NZ) Board. He has been a member of the trans-Tasman Animal Welfare Working Group since 1990 and is currently actively involved with the OIE in addressing animal welfare issues at an international level.
David has chaired the permanent OIE Animal Welfare Working Group since 2002. He was the coordinating editor for the Scientific and Technical Series review "Animal Welfare: Global Issues, Trends and Challenges" and is chair of the OIE Laboratory Animal Welfare *ad hoc* Group.

Harry Blokhuis started his scientific career in 1979 at the former Centre for Poultry Research "Het Spelderholt", The Netherlands. For many years Harry Blokhuis led different research groups focussing on animal behaviour and welfare. From 1994 until 2007 he worked at the Animal Sciences Group of Wageningen University and Research Centre. From 2005 to 2007 he was also a visiting professor in Integrative Animal Welfare Science at the Swedish Agricultural University (SLU) in Uppsala. Since 2007 Harry has worked in Sweden and is Professor of Ethology at SLU.
Harry Blokhuis coordinated has several EU-funded international research programmes. At present he coordinates the EU funded project 'Welfare Quality' as well as another EU project entitled: European Animal Welfare Platform (acronym: EAWP).

For many years Harry served on advisory bodies to the EC. From 2002 until June 2009 he served on the Scientific Panel on Animal Health and Animal Welfare of the European Food Safety Authority (EFSA).
Harry Blokhuis' field of specialization is poultry behaviour and animal welfare in general. His studies have included those on abnormal behaviours such as feather pecking and the development of alternative housing systems for laying hens.
He has also been involved in studies of many other species and managed and coordinated projects with all the major farm animal species as well as horses and dogs.

Bettina B. Bock is Associate Professor in Rural Sociology at Wageningen University. She finished her PhD in 2004 on rural women's engagement in rural development politics and rural entrepreneurship. Her recent research projects have been concerned with regard for care and social farming, the social acceptability of animal farming, rural-urban relations as well as citizens' engagement in sustainable agriculture and the (urban) food movement.
She teaches in various subjects including the sociological and political aspects of health and has coordinated various studies into farmer's attitude towards animal welfare within the Welfare Quality® Project.

Henry Buller holds the Chair of Rural Geography at Exeter, where he is Director of Human Geography Research and was, until recently Director of the BA Human Geography. He is also convenor of the Department of Geography's NatureCultures Research Group. He is Editor of the international rural social science journal *Sociologia Ruralis*, recent Chair of the IBG/RGS Rural Geography Study Group (2003-2007) and is a member of the Executive Committee of the European Society for Rural Sociology. Henry Buller sits, as an appointed member, on the Farm Animal Welfare Council of Great Britain.
Author and editor of over 100 books, articles and reports on rural development, rural Europe, EU agricultural, environmental and rural policy, animals and animal welfare, Henry Buller was, from 1990 to 2001, lecturer then senior lecturer in the Département de Géographie at the Université Paris VII. Currently a member of the EU funded *Welfare Quality* research project (2005-2010), he has recently completed work on the role and place of farm animal welfare within retailer strategies in Europe and on the negotiation of welfare conditions within European farm assurance schemes.
Other recent and current research includes '*Eating Biodiversity*' (2005-2007) funded by the UK Economic and Social Research Council, which looked at the relationship between food quality, biodiversity and animal grazing and *Understanding Human Behaviour through Human/Animal Interaction* (2009-2010), funded by the Economic and Social Research Council.

Ian Burton is an agriculturist with 25 years of practical experience with most species of livestock. This has included working in Farm and Estate management and spending 5 years working in Agricultural Education. Ian has spent the last 9 years with PAI, a leading Certification Body in the Agri Food sector based in the UK but operating internationally.
Ian has been responsible for the successful UKAS accreditation of the PAI schemes for ADF, Genesis (all modules), ABM, ABP and ACCS. Ian's role within PAI has been to manage the Agricultural Schemes which includes liaising with all the sector schemes under Assured Food Standards.

He has been heavily involved in the companies work in slaughterhouses and on farms across Europe and this includes key account work with a number of the leading retailers/manufacturers in the UK. Ian is also a member of the Advisory committee to the Welfare Quality Project.

Andy Butterworth has a first degree in zoology (1986) and graduated as a veterinarian in 1992. He worked in mixed agricultural veterinary practice until 1999 and then moved into research and a PhD on Poultry Welfare and Pathology (2002).
He now carries out research with particular interests in welfare assessment methods for both farmed and wild animals, and teaches biology and vet students about animal welfare, disease, ethics and law at the University of Bristol Veterinary School.
He has co-ordinated government and charity funded research projects in welfare assessment and animal use issues, and is co-ordinator of the SP4 component of the Welfare Quality® project. He is part of AWTraining http://www.awtraining.com/ an initiative which provides pragmatic training in animal care and welfare issues and which won the 2006 RSPCA/BSAS Animal Welfare Award (http://www.bsas.org.uk/) for its technology transfer courses around the world. He has sat on the UK Advisory Body on Organic Standards (www.defra.gov.uk/farm/organic/acos) since 2008 and has published many academic papers, book chapters, proceedings, review articles and trade journal papers.

Eskil Erlandsson worked as a Union worker in Sweden in 1979 and 1982.
In 1983 he was appointed as Municipal Commissionaire of Ljungby (Sweden) before becoming a member of the Swedish Parliament in 1994. During his parliamentary period he was a member, deputy member or chairman of many committees including the Committee on Environment and Agriculture, the Committee on Industry and Trade and the Committee on Defence.
His current position (since 2006) is Minister of Agriculture in Sweden.
His areas of responsibilities are Agriculture and Environmental issues relating to agriculture, fisheries, reindeer breeding and horticulture, livestock protection, matters relating to food, rural development, Sami policy, research and education in land-based industries and forestry.
The Green industries in Sweden must compete on the same terms as in the rest of the EU. This to safeguard the modern countryside which is so important, as it brings safe and healthy food, renewable energy and open landscapes. The green industries are a vital resource in the drive for sustainable development and he wants to make it easier to create new and exciting businesses everywhere in Sweden.

Timothy Hall worked as a research scientist in the UK before joining the Commission services in 1983, becoming Head of Unit for Scientific and Technological Cooperation with Developing Countries in 1994. He has also headed units in the Quality of Life Directorate under the 5th Research Framework Programme (FP5) and in the Health Directorate under FP6.
His current position (since October 2006) is Head of Unit for Agriculture, Forestry, Fisheries and Aquaculture Research, DG Research, European Commission - with primary responsibilities for overseeing collaborative research and coordination activities related to "Sustainable production and management of biological resources from land, forest and aquatic environments" in FP7.

From September 2007 to June 2009, he also held the position of Acting Director for Biotechnologies, Agriculture and Food.

Aldin Hilbrands has worked for Royal Ahold since 2006, one of the largest food retail companies in Europe and the USA. His responsibilities include the development and enforcement of group policies in the fields of product safety and sustainability. He is actively involved in industry wide, non-competitive standard setting processes such as GFSI (Global Food Safety Initiative), BSCI (Business Social Compliance Initiative) and GlobalG.A.P. (Global Partnership for Good Agricultural Practice). He also represents Royal Ahold in the Advisory Committee of the Welfare Quality project and is on the management committee of the European Animal Welfare Platform.
Aldin Hilbrands holds a Master of Science degree in Animal Husbandry and the Environment from Wageningen University, The Netherlands.
After graduating in 1996, Aldin worked for Agro Eco Consultancy, focusing on the development and implementation of sustainability standards in fisheries operations and aquaculture businesses. One of his key activities was market development for sustainably produced seafood products. In 2000, he became the Seafood Certification Director with SGS (Société Générale de Surveillance), one of the world's largest inspection, auditing, and testing companies. He was responsible for managing the certification programmes for MSC, MAC (Marine Aquarium Council) and GlobalGAP. Besides environmental audits, he was also involved in food safety auditing in the international seafood industry.

Stella Maris Huertas Canén obtained her title as Doctor in Veterinary Medicine and Technology (DMTV) from the Veterinary Faculty of the University of the Republic of Uruguay in 1981 and her Master in Animal Health at the same University. Currently she is the Coordinator of the Animal Welfare Program at the Veterinary Faculty (Uruguay) and she is a Professor at the Biosciences Department in the Veterinary Faculty, dictating courses on animal welfare in the national public and private, national and regional institutions.
Dr. Huertas is currently actively involved with the OIE in addressing animal welfare issues at national and international level. She is the co-director of the OIE Collaborating Centre on Animal Welfare between Uruguay and Chile. Recently she was member of the OIE *ad hoc* expert group on animal welfare and beef cattle production systems.
She coordinates several research programs related to Animal Welfare and Good Management Practices at farm animal, transport and slaughter animals for human consumption, in cooperation with the Ministry of Agriculture and Livestock, the Farmers Association, the Extension Services, Agriculture Research Services and the Meat Board in Uruguay. She also coordinates in Uruguay the activities of the INCO-Welfare Quality® project for Latin America. In relation to meat quality related issues, she has worked for ten years in the inactivation of Foot and Mouth disease virus in meat and meat products on a UNDP research project in Uruguay. She has published numerous papers and articles on different topics.

Sarah Kahn joined the OIE as the head of the International Trade Department in 2006. Sarah graduated in Veterinary Medicine from Melbourne University (Australia) in 1978 and obtained a Masters Degree in Science at the University of North Queensland (Australia) in 1997. She worked for a short time in private practice before moving to the regulatory world.

Sarah has managed programmes relating to animal health, veterinary public health and international trade in Australia, the United States, Canada, the United Kingdom and, before joining the OIE, with the Food and Agriculture Organization Rome.

Linda Keeling is Professor of Animal Welfare at the Swedish University of Agricultural Sciences, where she manages an active group of researchers and is responsible for education in animal welfare to veterinary, agriculture and biology students. Her research has been mainly in the area of animal behaviour, asking fundamental questions related to social behaviour and motivation, as well as applied questions related to the welfare of agricultural and pet animals.
She is coordinator of a Nordic collaborative research project on group housing of horses, a subproject leader in the EU project 'Welfare Quality' and a work package leader in the EU project "Econ Welfare". She sits on several animal welfare boards, including the EFSA Animal Health and Animal Welfare panel, and speaks regularly at national and international conferences on animal welfare issues.
She is a member of the Royal Swedish Academy of Forestry and Agriculture and on the Biology Committee of the Swedish Academy of Sciences.

Keith Kenny is a Senior Director for McDonald's Supply Chain in Europe. Keith deals with the development and implementation of the company's sustainable supply strategy and food related issues management. Keith pioneered the development of the pan-European McDonald's Agricultural Assurance Programme in 2001, which implements McDonald's sustainable agriculture requirements into the supply chain.
Keith also leads the company's involvement in the research and development of commercially-viable sustainable farming systems and also participates in numerous industry and multi-stakeholder groups. This includes being a member of the Management Committee of the European Animal Welfare Platform. The platform is funded under the EU's Seventh Framework Programme for Research. It enables the establishment of a stakeholders' platform aimed at facilitating the exchange of knowledge, expertise and best practice thereby resulting in improved animal welfare in the food supply chain.

Leif Erland Nielsen is a senior consultant and a Member of the European Economic and Social Committee. He was born in 1942, has practical training in agriculture and studied law at the University of Copenhagen. He obtained his degree in Agricultural Economy and Politics at The Royal Veterinary and Agricultural University Copenhagen, and has worked at the Danish Agriculture and Food Council between 1968/73, 1980/2000, and from 2004-present, for much of this time as head of department. Between 1974 and 1979 he was principal administrator at the European Commission, DG Agriculture, and between 2000 and 2003 Secretary General of the Federation of Danish Cooperatives, a member of the Danish Competition Council and on the board of the European Committee for Agricultural Cooperation in EU (COGECA). He has been a member of the European Economic and Social Committee since 1994, and was Vice-President from 2002 to 2004.

Xavier Manteca Vilanova received his BVSc degree from the Autonomous University of Barcelona and a Master's degree in Applied Animal Behaviour and Animal Welfare from the University of Edinburgh. He has a PhD from the Autonomous University of Barcelona.

Currently, he is associate professor at the Department of Animal Science, School of Veterinary Science in Barcelona, where he teaches animal behaviour and animal welfare.
His main research interests are in the field of domestic animal behaviour and welfare. He has published many papers in national and international journals.

Mara Miele has been a senior fellow at the School of City and Regional Planning at Cardiff University since 2004. Previously she was senior lecturer at Pisa University, Italy. She is currently a member of the Steering Committee of the EU project Welfare Quality. Mara Miele is also coordinator of the EU VI framework SSA project Dialrel (2006–2009). This project is dedicated to the investigation of practices of religious slaughter (for halal and kosher foods) and aims to establish a dialogue between the various stakeholders involved in these practices and animal scientists and NGOs to address animal suffering at time of slaughter.
Mara's research interests concern food consumption practices and human/non human animals' relationships. She has developed a growing interest in how ethical relations are enacted and articulated within the different practices and encounters between human and non-human animals.
Recent publications include: Mara Miele and Adrian Evans (forthcoming 2010) 'When Foods become Animals, ruminations on Ethics and Responsibility in care-full spaces of consumption', *Ethics, Place and Environment*; Mara Miele, Jonathan Murdoch and Emma Roe (2005) 'Animals and ambivalence: governing farm animal welfare in the European food sector', in V. Higgins and G. Lawrence (eds), Agricultural Governance, London and New York: Routledge.

Kees de Roest graduated in Agricultural Economics (M.Sc.) in 1980 at Wageningen University. In the year 2000 he obtained his Ph.D, at the same university with the title "The production of Parmigiano-Reggiano cheese, the force of an artisanal system in an industrialised world". From 1980 to 1982 he worked as research assistant at the Institute of Animal Production of the University of Udine (Italy). After his civil service dedicated to an economic analysis of collective biogas plants he starts to work at the Centro Ricerche Produzioni Animali of Reggio Emilia (Italy).
From 1985 until the present time, he has headed the department of Economic Research of CRPA and has gained a large amount of research experience in the economic analyses of supply chains of animal products. A significant part of his work is dedicated to the technical and economic efficiency of livestock farms in different regions of Italy interesting dairy cows, beef cattle, pigs, sheep and poultry. He participates in the EDF, IFCN and Agribenchmark networks.
He is a partner in many regional and national research programmes in Italy and since 1995 has participated in several EU funded projects such as: "PDO and PGI products: markets, institutions and supply chains,", "The socio-economic impact of rural development policies: realities and potentials" "Cross-compliance: Facilitating the CAP reform: compliance and competitiveness of European agriculture", "Encouraging collective farmers marketing initiatives".
Currently he is involved in the "Welfare Quality" project and in EconWelfare: "Good animal welfare in a socio-economic context: project to promote insight on the impact for the animal, the production chain and society of upgrading animal welfare standards"

Peter Sandøe was educated at the University of Copenhagen (MA in philosophy 1984) and at the University of Oxford (D.Phil. in philosophy 1988).
He is Professor in Bioethics at the Faculty of Life Sciences, University of Copenhagen; and he is the director of the Danish Centre for Bioethics and Risk Assessment (CeBRA), an inter-disciplinary and inter-institutional research centre founded January 2000. Since 1992 he has served as Chairman of the Danish Council for Animal Ethics, an advisory board set up by the Danish Minister of Justice. From 2000 till 2007 he was President of The European Society for Agricultural and Food Ethics. From 2009 he has been Special Professor of Animal Ethics at the University of Nottingham.
Since 1990 the major part of his research has been within bioethics with particular emphasis on ethical issues related to animals, biotechnology and food production. He is committed to interdisciplinary work combining perspectives from natural science, social sciences and philosophy. Together with Stine B. Christiansen, he is the author of *Ethics of Animal Use* (Blackwell, 2008) and he has published many articles and books covering his wide range of research interests. Please see http://www.bioethics.kvl.dk/pes/index.htm for a full list of publications.

Philip M. Seng, the president and CEO of the U.S. Meat Export Federation and immediate Past President of the International Meat Secretariat (IMS), has directed USMEF strategies in international programs, research, technical services, industry relations and global communications since January, 1990.
Mr. Seng was a member of the President's Agricultural Policy Advisory Council in Washington and served four terms as IMS President, the only American ever to hold that position.
He played a central role in U.S./Japanese beef negotiations leading to the historic 1988 beef liberalization. His marketing strategies served as a case study in Harvard University Business School, where he has been a guest lecturer several times.
Mr. Seng was identified by the "2004 Morse Target" as one of the Americans “who influence overall policy toward East Asia.”

Gretchen Heimpel Stanton is a Senior Counsellor in the Agriculture and Commodities Division of the Secretariat of the World Trade Organization (WTO). She joined the Secretariat of the General Agreement on Tariffs and Trade (GATT) in 1985. During the Uruguay Round negotiations, Gretchen served as the Chairman of the Working Group that negotiated the Agreement on the Application of Sanitary and Phytosanitary Measures (the "SPS Agreement"). She is now Secretary of the WTO Committee on Sanitary and Phytosanitary Measures.
Ms. Stanton previously also served as Secretary of the International Dairy Agreement of the WTO. She has been the Secretary of a number of GATT and WTO dispute settlement panels. Prior to joining the GATT, she worked for the U.S. Department of Agriculture's Foreign Agriculture Service in Washington, D.C. and in Mexico City. Gretchen, who is originally from Mexico, received a Master's Degree in Agricultural Economics from the University of Arizona.

Paul Johan Strydom was born and schooled in South Africa, but since 1983 employed in Namibia, first as an agricultural researcher with the Ministry of Agriculture, Water and Forestry and thereafter in various positions with the Meat Board of Namibia.
As an agricultural researcher he started and headed the Agricultural Laboratory responsible for feed, soil and meat analysis and adapted research in the fields of ruminant nutrition, meat science and soil science. Mr Strydom holds a M.Sc. (Agric) in Ruminant Nutrition and a MBA from the University of Stellenbosch, South Africa.
He joined the Meat Board of Namibia in January 1995 and was appointed in August 1996 as General Manager. The Meat Board, a statutory body is responsible for assisting the Namibian meat industry's competitiveness and efficiency by rendering services in making Namibian livestock and livestock products the preferred choice in the world, while its mission is to effectively and efficiently manage, promote and represent the interests of the Namibian meat industry. The Meat Board identified the following critical success factors to be addressed during the year: amongst others (1) Maintaining and developing markets & access, (2) Enhancing and maintaining the country's animal health status, (3) Communicating strategic information; and (4) Delivering meat standards.

Henri de Thoré is a graduate in agriculture and ecology from the University of Dijon (1981), also gaining a masters degree in management (university of Rennes 1992). After one year carrying out research on salmon farming (IFREMER, Brest 1980), he began to manage his own cattle farm in Brittany and started pig farming (60 sows) one year later. There are now 700 sows and 6000 pigs on his farm (farmed under *Label Rouge* production until 2008).
He is a member of the board of FNP (the syndicate of French pig farmers) and of the co-operative INITIA (4 million pigs per year) and is a stakeholder representative in the French pig production organizations (syndicates, cooperatives and inter-professional organisations) for welfare issues and is also a member of the board of European Pig Producers (EPP).
He represents pig farmers in the Welfare Quality® Advisory Committee.

Sonja Van Tichelen turned her strong interest in sustainable development and animal welfare into a career when she joined Eurogroup for Animals as a campaign co-ordinator in 1992. She applied the experience gained from her background in marketing, advertising and communication on European advocacy work to protect animals. Her skill at running successful campaigns became apparent and, in 1997, she was promoted to Eurogroup deputy director before becoming director in 2004.
Working closely with animal-welfare experts, legal advisors and politicians, she has planned and implemented lobby strategies involving the creation of effective political coalitions, shaping public opinion and mobilizing grass-roots support.
Under her leadership, Eurogroup embarked on an ambitious expansion programme to represent animal welfare organisations all over the European Union. It is now the first organisation for advising European institutions on a wide variety of animal-welfare issues, from livestock standards to the protection of wildlife and animals used in research. As such, Eurogroup participates in the EU policymaking process and sits on a number of EU Commission stakeholder committees. While Eurogroup continues to encourage the Union to adopt higher legal standards, the group is also increasingly examining the development of voluntary industry standards.

Seventeen years of work in animal-welfare policy have given Sonja Van Tichelen thorough knowledge of European and international animal-protection issues in the areas of farming, laboratory animals, wildlife and related policy issues. Sonja also has been closely involved in EU animal-protection law and legislative procedures as well as international standard setting, established contacts and good working relations with the main civil-society groups, relevant industry stakeholders and academia.
Sonja has also participated in EU-funded projects such as Consumer concerns about animal welfare and its impact on food choice (partner), is a member of the Welfare Quality (Advisory Committee), the European Animal Welfare Platform (Partner and Management Committee).
She was a member of the Dutch Consumer platform (Consumentenplatform 2002-2004) and is a member of Belgian Animal Welfare Council.

Androulla Vassiliou studied Law at Middle Temple Inn of Court, London (1961-1964) and International affairs at the London Institute of World Affairs, (1964-1966). She practiced Law in Cyprus for twenty years (1968-1988). During this period she acted as Legal Advisor to The Standard Chartered Bank and later, to the Bank of Cyprus. She had also been on the Board of many public and private companies.
She gave up her legal practice in 1988, upon her husband's election to the Presidency of the Republic of Cyprus. As First Lady she had been very active in social, cultural and other fields and was for many years actively involved in the work of the United Nations Association of Cyprus and was elected President of the Association for four consecutive terms. As such, she participated in many international and regional conferences especially in the field of Human Rights.
In 1991, she was elected President of the World Federation of United Nations Associations and she was re-elected to this position for two terms. On the occasion of the 50th Anniversary of the U.N. she had been appointed member of the select international group for the world wide celebrations of this important anniversary, by the Secretary General Boutros Boutros Ghali. Upon the expiration of her Presidency of WFUNA she was unanimously elected Honorary President of the Federation. In 1996 she was elected President of the Cyprus Federation of Business and Professional Women and she was re-elected to this position for two terms. In the year 1996 she was elected Member of the Cyprus House of Representatives, representing the Movement of United Democrats, and in 2001 she was re-elected for a second term of five years.
During her parliamentary years she served on the following committees:
Foreign Affairs Committee, Legal Affairs Committee, Committee on Education and Culture, Committee on Environment and the European Affairs Committee. She was also a Permanent Member of the delegation of the Cyprus Parliament to the Inter-Parliamentary Union. As a Member of the European Affairs Committee, she participated very actively in the harmonization process of Cyprus with the Acquis Communautaire. During this period she was also a member of the Joint Parliamentary Committee of Cyprus and the EU. She was an Alternate Representative of the Cyprus Parliament to the Convention for the Future of Europe (2001-2003) and she participated actively in the whole process. She has been Vice President of the European Liberal Democrats and Reform Party (ELDR) (2001-2006) and as such she was the chairperson of the European Liberal Women's Network.
In 2002, the Cyprus Government jointly with the Board of Directors of the Bank of Cyprus appointed Androulla Vassiliou Chairperson of the Board of Trustees of the Cyprus Oncology Centre, a non-profit-making institution offering a wide range of treatment to cancer patients, from which post she resigned upon her nomination as EU Commissioner in February 2008.

Married to Dr. George Vassiliou, former President of the Republic of Cyprus (1988-1993) and Chief Negotiator for Cyprus' accession to the EU, she has three children. In addition to Greek, her mother tongue, she is fluent in English and speaks French, moderately. Her hobbies are: listening to music, walking, swimming and reading.

Isabelle Veissier is a research director at INRA, the French National Institute for Agricultural Research. She has carried out research on cattle behaviour and welfare (social behaviour, weaning, learning, emotions, abnormal behaviours) since 1983. Behaviour is considered an entry to animals' minds and the impact of farming practices on animal behaviour is analysed to understand how animals feel. The ultimate goal is to meet both welfare and production requirements in farming.
Isabelle Veissier has produced 58 original papers and 35 reviews. With three other French scientists from animal or social sciences, she has been in charge of the French scientific network on animal welfare (called AgriBEA) for 10 years (1998-2007).
She represented the International Society for Applied Ethology (ISAE) at the standing committee of the Convention for the protection of farm animals within the Council of Europe from 2000 to 2009.
Currently, she is involved in the European projects WelfareQuality®, ALCASDE (alternatives to piglets castration and cattle dehorning), and ERIN (European Ruminant Infrastructure Network]). She is a member of the steering committee of WelfareQuality® (2004-2009) where she also leads the *Training and Mobility* desk, the demonstration activities, and the construction of the model for overall assessment of animal welfare.

Welfare Quality® partners	Country
ID-Lelystad, Instituut voor dierhouderij en diergezondheid, Lelystad	The Netherlands
Institut Technique du Porc, Rennes	France
Cardiff University (formerly known as UWC: University of Wales, Cardiff), Cardiff	United Kingdom
Coopérative Interdépartementale Aube, Loiret, Yvonne, Nièvre	France
Aarhus University (formerly known as DIAS: Danish Institute of Agricultural Sciences), Aarhus	Denmark
University of Natural Resources and Applied Life Sciences, Vienna	Austria
University of Kassel, Kassel	Germany
Institut National de la Recherche Agronomique, Paris	France
Institut de l'Elevage, Paris	France
Institut de Recerca i Tecnologia Agroalimentàries, Girona	Spain
Institut Supérieur d'Agriculture Lille, Lille	France
Veterinärmedizinische Universität Wien,Vienna	Austria
Katholieke Universiteit Leuven, Leuven	Belgium
University of Copenhagen (formerly known as KVL: The Royal Veterinary and Agricultural University), Copenhagen	Denmark
UPRA France Limousin Selection, Boisseuil	France
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National Institute for Consumer Research, Oslo	Norway
Norwegian Agricultural Economics Research Institute, Oslo	Norway
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Insituut voor Landbouw- en Visserijonderzoek, Merelbeke	Belgium
Universidad de la República, Montevideo	Uruguay
Faculty of Veterinary Medicine, Mexico City	Mexico
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Colophon

This conference is jointly organised by the Swedish Government as President of the EU and the Welfare Quality® project (see website http://www.se2009.eu).

The Welfare Quality® project is a European research project about integration of animal welfare in the food quality chain: from public concern to improved welfare and transparent quality.

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Welfare Quality®
Science and society improving animal welfare

Annex to proceedings

On farm economic impact of and farmers' view on selected welfare improvement strategies

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Introduction

This paper addresses the on-farm economic and chain marketing aspects of welfare strategies on cattle, pig and poultry farms. Insight in the economic impact of compliance with higher animal welfare standards will contribute to a more transparent debate on the distribution of costs of benefits among the actors of the supply chains.

Objectives

The objectives of the present research have been:

1. To assess economic consequences of improving animal welfare at farm level by means of selected strategies
2. To evaluate farmers' willingness to implement welfare strategies
3. To explore the marketing of commodities produced under the WQ assessment scheme

In the project five key welfare problems have been addressed for dairy cattle, pigs and laying hens:

1. lameness in dairy cows
2. handling stress in dairy cows and sows
3. aggressive behaviour in pregnant gilts and sows
4. tail biting among fattening pigs
5. feather pecking among laying hens

For each of the above mentioned welfare problems a series of farm strategies have been selected able to reduce the problem based on the results of the previous subprojects of the Welfare Quality project.

Methodology

In the three participating countries, Italy, the Netherlands and Sweden, nine reference farms have been defined for dairy cattle, sows and fattening pigs and laying hens. The reference farms contain representative data concerning the production techniques, animal housing systems, technical efficiency and costs and returns of the farm business. The results of WQ subprojects and other research projects have been screened on the impact each single welfare strategy may have on the productive performance of the animals. The reference farms have been used to model the economic impact of the implementation of the selected welfare strategies.
To evaluate the willingness of farmers to implement the selected strategies a telephone survey has been carried out among 471 dairy, 470 pig and 150 laying hen farms in Italy, the Netherlands and Sweden.

A common questionnaire has been designed focusing on the actual farm techniques in the three countries and on the attitude farmers have towards practices aiming to achieve higher animal welfare.
To explore the marketing conditions of commodities produced under the WQ assessment scheme opinions have been collected of a series of relevant multiple retailers and processing industries in Italy, the Netherlands, Sweden, Norway, Denmark and the UK. In particular the view of industry has been asked on the feasibility to introduce the WQ assessment scheme and the willingness of consumers to pay for products produced under higher animal welfare conditions.

Results

Training course to reduce stress and fear in dairy cows

Cognitive behavioural training programs for farmers have proven to produce substantial improvements in the attitude and behaviour of stock people and a marked reduction in the level of fear of pigs and cattle towards humans. Improved handling may lead to an increase in milk yield and milk quality per cow (Waiblinger, 2002) and to a reduction of lameness as less fearful cows show a lower risk of claw injuries due to slipping (Mulleder et.al., 2009). Assuming an increase of milk production and milk quality of 3% and a reduction of 12% of lameness due to a handling stress course, labour income may increase on dairy farms by 7% in the Netherlands, 7.6% in Italy and 9.5% in Sweden.
However, a majority of dairy farmers in all three countries (63%) is convinced that a training course would not help to reduce stress and fear among dairy cows and states that their way of handling is primarily conditioned by their own work experience.

High fibre diet in pregnant gilts and sows

Several studies demonstrate the effectiveness of a high fibre diet to alleviate social stress due to competition and hunger in feed restricted pregnant sows (Brouns et.al, 1994; Danielsen abd Vestergaard, 2001). Diets should contain at least 30% NDF containing high levels of fermentable fibre and pregnant sows should be fed at levels to ensure nutrient requirements for reproduction (Meunier-Salaun et.al, 2001). A high fibre diet containing beet pulp has a lower energy content and a lower market price, but as higher quantities need to be fed in order satisfy total energy requirements feed ration costs will rise. Veterinary and medicine costs will decline. As a result production costs per piglet will rise by 0.6%.
A majority of farmers (56%) is backing the view that a higher fibre content in the diet reduces aggressive behaviour of pregnant sows. Their preference goes to cereal bran, but also beet pulp finds a sufficient consensus among the interviewed pig farmers.

Straw provision for fattening pigs

Providing straw among fattening pigs is a strategy to reduce the problem of tail biting. From the economic analysis Sweden has been excluded as Swedish pig farmers already use straw normally on their farms.
The provision of straw will reduce mortality among fattening pigs by 0.044%. Providing 0.35 kg straw per pig per week increases the labour input on the pig farms with 0.09 hour per pig, which implies a 10.8% increase on the Dutch farms and a 6.7% increase in the Italian farms. The total production cost increase which can be attributed to straw provision is 0.8% and 0.6% in the Dutch and Italian farms respectively.
Among farmers the use of straw to reduce tail biting is controversial. Only a minority of Italian (32%) and Dutch (45%) pig farmers think that the provision of straw can reduce the tail biting problem.

Instead the Swedish farmers, who already use straw anyhow, are convinced (77%) that the presence of straw has a positive impact on the tail biting problem and that in order to be effective the straw should be provided every day.

Lower stocking density and elevated perches

Feather pecking among laying hens can be reduced when pullets are reared in a better way. A lower stocking density and elevated perches in the pullet rearing farm may contribute significantly to the reduction of the feather pecking in the laying hen farm.

To produce feather pecking free pullets a 20% lower density with the installation of elevated perches has been simulated. Building costs will increase significantly and the production costs of pullets will rise proportionally. In existing buildings in the Dutch pullet farms a 7% production cost increase is calculated, against 5% in the Italian farms and 9% in Swedish farms. In new buildings the production cost increase can be limited to 3.5% in the Netherlands, 4% in Italy and 6% in Sweden. The differences in production cost increase can be attributed to a more efficient lay out which can be obtained in new buildings with respect to existing buildings.

The willingness of hen farmers to pay more for feather pecking free pullets is proportional to the degree this problem is perceived by the farmers. Dutch farmers consider feather pecking as a very serious problem (88%) and a large majority of these farmers (72%) is prepared to pay for feather pecking free pullets. In Sweden and Italy the problem is perceived of minor importance and correspondingly their willingness to pay is more limited with 52% and 48% of respondents respectively.

Marketing conditions for WQ assessed commodities

According to the first results of a survey carried out among large multiple retailers and processing industries in Italy, the Netherlands, Sweden, Norway, Denmark and the UK the willingness to pay by consumers for products having a higher animal welfare content is very limited. These companies do accept only a very limited cost increase due to the adoption of the WQ system. Retailers retain that the upstream actors in the supply chains will have to sustain the costs of upgraded animal welfare. Processing industries are claiming a higher price paid by the retailers.

The chance of introduction of the WQ assessment scheme heavily depends on its practicality and the costs of its implementation. Most of the retailers will have their own certification schemes and several companies are interested to integrate the WQ assessment system in the existing schemes.