

SCIENTIFIC PROGRAMME:

Speaker Abstracts

**Making animal welfare improvements:
Economic and other incentives and constraints**

UFAW International Animal Welfare Symposium
Historic Dockyard, Portsmouth UK 28-29th June 2011



WHAT CAN ECONOMISTS DO FOR ANIMAL WELFARE?

T Christensen¹, A Stott², A Lawrence² and P Sandøe¹

¹Division of Ethics, Food and Consumption, University of Copenhagen, Denmark

²Scottish Agricultural College, Edinburgh, UK

pes@life.ku.dk

Ultimately, we as humans decide what living conditions should be available to farm animals. However, in practice the responsibility is much more opaque than that. Farmers claim that their hands are tied due to price competition; people in their role as consumers claim that they in practice don't have much of a choice; at the same time, limited market shares for most animal welfare friendly products indicate that consumers are not willing to pay the costs of improving animal welfare; and people in their role as citizens claim that decisions concerning animal welfare should not be left to the market place. Economic analyses can play an important role in helping us to get out of this deadlock.

Firstly, economic analyses can be used to identify cost-efficient ways to obtain different levels or different aspects of on-farm welfare, making it possible to highlight obtainable combinations of animal welfare within a limited budget. Economic analyses even provide methods for assessing the value of different improvements of animal welfare in common units (such as utilities, money, etc.) which enable prioritizing resources and suggesting socially optimal levels of animal welfare. Secondly, economic analyses can be used to identify regulatory instruments and economic incentives targeted at different stakeholders by means of which, increased levels of animal welfare can be achieved, and also 'blockages' in supply chains that effectively prevent uptake of initiatives to improve welfare.

However, economic analyses are often applied on the basis that animal welfare is a subset of human welfare i.e. an economic problem. We argue, backed by recent movements in the field, that in decisions concerning socially desired levels of animal welfare, it is possible to a much larger extent than it is practiced today, to involve the animals' needs and wants. In order to determine suitable methods for defining, ranking and comparing different aspects and levels of animal welfare, it is necessary to engage in multi-disciplinary cooperation between ethologists, veterinarians, ethicists, economists, etc. A key issue is to quantify the 'hidden' benefits (both biological and economic) that may accrue through the supply chain from enhancing animal welfare.

At the end of the day, opportunities for improved animal welfare must be provided by human beings; and economics is a key to finding the right goals and incentives for this to happen.

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ANIMAL WELFARE: A COMPLEX INTERNATIONAL PUBLIC POLICY ISSUE: DRIVERS AND CONSTRAINTS: A 20 YEAR INTERNATIONAL PERSPECTIVE

ACD Bayvel

Chair OIE Animal Welfare Working Group, Paris, France

Director Animal Welfare, Ministry of Agriculture and Forestry, Wellington, New Zealand

david.bayvel@maf.govt.nz

The OIE (World Organisation for Animal Health) policy definition that “animal welfare is a complex international public policy issue with scientific, ethical, economic, cultural and religious dimensions, plus important trade policy considerations” clearly demonstrates the multi-faceted nature of the animal welfare debate. Progress made is inevitably incremental and compromises often have to be reached between animal welfare and other important societal values. Recognition of the need for managed change over agreed time frames, and involving full consultation with affected animal user groups, is essential.

In the NZ context, section 73 of the Animal Welfare Act 1999 requires that:

The National Animal Welfare Advisory Committee (NAWAC) may, in exceptional circumstances, recommend minimum standards and recommendations for best practice that do not fully meet a number of obligations enshrined in the Act. In making such recommendations, NAWAC must have regard to:

- a. The feasibility and practicality of effecting a transition from current practices to new practices and any adverse effects that may result from such a transition:
- b. The requirements of religious practices or cultural practices or both:
- c. The economic effects of any transition from current practices to new practices.

This paper will draw on case studies involving intensive livestock agriculture, live animal exports for slaughter, religious slaughter and vertebrate pest control and will refer to both domestic (NZ) experience, gained over the last 20 years, and international (OIE) experience gained over the last 10 years. Case studies will also highlight policy considerations relating to animal health, food safety and environmental impact considerations.

Important drivers of animal welfare change will be discussed and will include the following:

- Understanding of animal sentience and other scientific advances
- Evolving societal values and the influence of civil society
- Differences in gender and inter-generational attitudes
- The influence of the market place and consumers and retailers
- The role of international agencies and international strategic initiatives
- Influence of professional groups, NGOs and industry groups
- Influence of ethical analysis and environmental awareness

Constraints to animal welfare change will be discussed and will include the following:

- Food Security
- World Poverty
- Economic issues
- Religious issues
- Cultural issues
- Legal issues (including international Treaty obligations)

The paper will conclude by commenting on the direction, and rate, of animal welfare change and the impact of animal welfare being addressed at not only the national, and regional, but now also at the international level.

Making animal welfare improvements: Economic and other incentives and constraints



DEVELOPING AN ABATEMENT COST CURVE FOR ANIMAL WELFARE

D Moran¹ and M Haskell²

¹Land Economy Research Group SAC, Edinburgh

²Sustainable Livestock Systems SAC, Penicuik

dominic.moran@sac.ac.uk

This paper considers the development of an abatement cost schedule for improved animal welfare. At any given time the prevalence of a sub optimal or poor welfare provides a baseline against which alternative scenarios of welfare improvement can be implemented at varying cost. In developing a cost curve the stages are:

- a) to use scientific expertise and consensus to identify the variety of welfare improving measures for livestock groups,
- b) to determine the extent (i.e. over how many animals) of their applicability (full technical potential and feasible policy potential) and by when
- c) to consider the relative cost of implementing these and the quantity of the welfare improving potential associated with each measure in isolation and interacted with other measures.

The resulting cost curve offers a basis for policy on cost-effective interventions. The use of an economic framework also provokes social questions related to willing to pay for welfare improvements and other co-benefits can be delivered from welfare interventions.



TESTING THE ANIMAL WELFARE KUZNETS CURVE HYPOTHESIS: METHODOLOGICAL AND DATA AVAILABILITY ISSUES

*AK Kosenius*¹, *S Kulmala*², *M Lindroos*³, *C Lombardini-Riipinen*⁴

^{1,3,4} Department of Economics and Management, Environmental Economics,
Faculty of Agriculture and Forestry, University of Helsinki, Finland

² CSIRO Marine and Atmospheric Research, PO Box 120, Cleveland, Qld, Australia
chiara.lombardini-riipinen@helsinki.fi

Using Finnish data, we explore the theoretical foundations and testability of the Animal Welfare Kuznets Curve hypothesis. According to this hypothesis, animal welfare first deteriorates as per capita GDP increases and then, after per capita GDP has reached a critical level, improves with further economic growth. In this paper, we focus on the welfare of farm animals, with the exclusion of farmed fish.

Our preliminary exploration of Finnish data suggests that per capita income growth in the last 30 years has been most likely associated with a deterioration of the animal welfare of farm animals in Finland. This deterioration is partly driven by dietary changes. Finnish consumption of foods from animal origin, especially meat and dairy products, has grown. Moreover, the partial substitution of beef by poultry meat has increased the number of animals slaughtered. Our preliminary result holds regardless of whether consumption data or production data are examined.

As our analysis shows that the Animal Welfare Kuznets Curve hypothesis suffers from the same kind of shortcomings of the Environmental Kuznets Curve hypothesis, we examine how and whether these shortcomings can be overcome and discuss the choice of appropriate data sets to explore the evolution of animal welfare over time. The possible correlation between the Animal Welfare Kuznets Curve and the Environmental Kuznets Curve is also examined.

We conclude by discussing whether we might expect a mitigation of farm animal welfare deterioration in the future and what the sources of such mitigation may be.

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ECONOMIC EVALUATION OF HIGH WELFARE INDOOR FARROWING SYSTEMS FOR PIGS

JH Guy¹, P Cain¹, E M Baxter², Y Seddon¹ and SA Edwards¹

¹ School of Agriculture, Food and Rural Development, Newcastle University, Newcastle upon Tyne, UK

² Animal Behaviour and Welfare, Sustainable Livestock Systems, Scottish Agricultural College (SAC), West Mains Road, Edinburgh, UK

j.h.guy@ncl.ac.uk

New livestock housing systems designed to improve animal welfare will only see large scale commercial adoption if they improve profitability, or are at least cost neutral to the farm business. Economic evaluation of new system developments is therefore essential to determine their effect on cost of production and hence the extent of any market premium necessary to stimulate adoption. This paper describes such an evaluation in relation to high welfare farrowing systems for pigs. For indoor pig production there is a need to develop an alternative to the farrowing crate which better meets the welfare needs of the sow. However, any potential system will only be accepted by the industry if it can reconcile the behavioural needs of the sow with piglet survivability, acceptable capital and running costs, farm practicality and ease of management for stockpersons. In the Defra-sponsored PigSAFE project, a new farrowing system has been developed, starting from a detailed review of scientific and technical literature and consultation with international experts and stakeholder groups about both the welfare needs of the sow and piglet and the past experience with alternative farrowing systems. The resulting PigSAFE prototype system comprises a loose, straw bedded pen with embedded design features which promote piglet survival. Data on the new farrowing system as well as existing systems were used to populate a model of production cost taking account of both construction (either for a new building or as a refurbishment of existing housing) and running costs (labour requirement for daily and batch husbandry and hygiene tasks; bedding, energy and feed etc). When coupled with physical performance data (number of piglets born and weaned), the model calculates the cost of producing piglets in any defined farrowing system and the sensitivity of this cost to design changes. Data from a commercial-scale evaluation of the PIGSafe system with 300 farrowings across two sites (SAC, Edinburgh and Newcastle University) is being streamed into the model. Whilst physical performance to date indicates that productivity of the PigSAFE pens is comparable to the farrowing crate, early indications are that the higher capital cost (greater space allowance per sow alone) will result in a modest increase in cost of pigmeat production. This economic evaluation along with survey data of current housing systems will be used to determine the likely uptake of the new system by the pig industry in the UK.

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NON-ECONOMIC INCENTIVES TO IMPROVE ANIMAL WELFARE: THE EMERGENCE OF POSITIVE COMPETITION AS A DRIVER FOR CHANGE AMONG OWNERS OF DRAUGHT AND PACK ANIMALS IN INDIA

JC Pritchard^{1,2}, L van Dijk² and SK Pradhan³

¹The Brooke, 30 Farringdon Street, London, EC4A 4HH

²Animals in International Development, 45 The Glebe, Wrington, Bristol, BS40 5LX

³Brooke India, F-86, Preet Vihar, Delhi 110092, India

joy.pritchard@thebrooke.org

Introduction: Since 2005, owners of horses, mules and donkeys in nine districts of Uttar Pradesh, India, have received support from a UK-based charity, the Brooke, to improve the welfare of their draught and pack animals. 1397 village-level groups of animal owners and carers (usually wives and children of owners) were facilitated to develop and implement their own welfare assessment protocols and plans for welfare improvement, using a participatory learning and action process adapted from recognised good practice in human social development.

Methods: Each group devised a list of welfare issues affecting their animals and agreed on a scoring system for direct observations of welfare inputs (resources or provisions and equine husbandry practices) and animal outcomes. Facilitators used novel participatory rural appraisal (PRA) exercises to ensure that both mental and physical aspects of welfare were captured in the assessment protocol and that no major elements had been missed. The group then assessed the welfare of each animal in the village collectively, ensuring agreement amongst themselves on parameters to be observed and scales of measurement. These findings generated action plans to improve animal health, husbandry and working practices. Assessments were repeated at intervals of 1 to 3 months, leading to continuous refinement of both the welfare assessment protocol and the resulting actions to improve welfare.

Results: Initial welfare assessment protocols did not remain static. As groups made welfare improvements and discussed repeated assessment findings, they increased the number of parameters measured. Validity of parameters was addressed through facilitated discussions, including introduction of external expertise. Issues of inter-observer repeatability did not arise due to the collective nature of the process, with scores agreed between all observers at the time of assessment. Competitiveness between participants acted as a driver for increasing sensitivity of rating scales, enabling differentiation of small, incremental improvements in welfare to identify a 'winner' of each welfare assessment. Binary (present-absent) or three-point 'traffic light' (red-amber-green) scales evolved to a range of 5-, 10-, 20-point or continuous scales, with systems for adding and subtracting points for ordinal measures. Over time, multi-level and weighted welfare assessments emerged, with weightings allocated to individual parameters and/or between three categories: (i) resource provision, (ii) owner husbandry or work practices, and (iii) animal outcomes. Efforts to aggregate multi-dimensional measures into a single 'winning' score led to development of indices describing welfare at individual animal level ('welfare index') and population level ('village index').

Discussion: Benefits of competitive, owner-driven welfare assessment include a high level of ownership and interest in the process and strong peer motivation or pressure for change. Welfare monitoring and action to improve welfare are two integral parts of a single competitive process carried out by the same people, in contrast to the separation of evaluation and implementation of welfare improvement seen in inspection or accreditation schemes. Challenges include the issue of aggregating results from a variety of assessment protocols for analysis, reporting or certification.

Making animal welfare improvements: Economic and other incentives and constraints



FOOT DISORDERS IN DAIRY CATTLE: IMPACT ON ECONOMICS AND ANIMAL WELFARE

MRN Bruijnis¹, B Beerda², H Hogeveen³ and EN Stassen¹

¹ Animals and Society, ² Adaptation Physiology Group, Department of Animal Sciences, Wageningen University The Netherlands

³ Business Economics Group, Department of Social Sciences, Wageningen University, The Netherlands

marielle.bruijnis@wur.nl

Foot disorders are an important health problem in dairy cattle, with major implications for economics and animal welfare. In order to improve dairy cow foot health, dairy farmers have to take measures. More insight in the consequences of poor foot health can be a starting point for making improvements. The objective of this study is to estimate economic and welfare impact of different foot disorders, both clinical and subclinical.

A dynamic stochastic model is built to simulate foot disorders and to estimate the effects on economics and animal welfare, containing two parts. First, simulation of the occurrences of different foot disorders per cow per month, giving the incidence and duration of foot disorders. Second, estimation of economic consequences and welfare impact. Input has been derived from literature and experts and applies to a standard Dutch situation.

When a cow has a foot disorder, economic consequences and welfare impact are estimated. Economic consequences are calculated using the following cost factors: milk production losses, prolonged calving interval, premature culling, labour of dairy farmer, foot trimmer and veterinarian, and treatment costs (e.g. antibiotics). The welfare impact is assessed using the estimated pain of each foot disorder.

On average, foot disorders cost €53 per cow per year, with milk production losses and premature culling being the most important cost factors. Subclinical cases make up 32% of all costs and approximately 50% of the welfare impact. Digital dermatitis, relatively high clinical incidence and long duration, has highest impact: almost 1/3 of total impact for both economics and welfare. Sole haemorrhage and interdigital dermatitis/heel erosion, mainly subclinical and high prevalence, have a substantial impact on costs due to foot disorders (20% and 17% respectively) and on welfare (27% and 22% respectively). Interdigital phlegmon, most painful foot disorder but with low incidence and short duration, is not very costly (10% of total costs) and has lowest welfare impact (0.5%). Next to these estimations on herd level, consequences for the individual cow have been included in the study. Relatively painful foot disorders become more important then, acknowledging individual suffering.

A next step is to assess the effects of different measures (such as softer flooring and improved lying surface) on incidence, duration and severity of foot disorders. Insight into economic and welfare consequences of the different foot disorders, on herd and cow level, can help dairy farmers with making choices for measures to improve dairy cow foot health.

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CULLED EARLY OR CULLED LATE: ECONOMIC DECISIONS AND RISKS TO WELFARE IN DAIRY COWS

FM Langford¹ and AW Stott²

¹ Animal Behaviour and Welfare, Sustainable Livestock Systems, SAC, Edinburgh, UK

² Land Economy and Environment, SAC, Edinburgh, UK

fritba.langford@sac.ac.uk

Involuntary culling (IC), where a cow is disposed of due to injury, poor health or infertility, has become more prevalent over recent years. The three main reasons for IC are infertility, mastitis and lameness. Cows culled for infertility may have reduced fertility related to lameness, mastitis or other health problems. IC therefore has welfare implications for the cow and represents an economic loss for the farmer. The age profiles of the three main culling reasons are different from one another: infertility can be a problem throughout a cow's productive life regardless of age; mastitis has an increased incidence as the cow ages and lameness a marked increase as the cow ages. These factors influence the economically optimum cow replacement decision, which must balance these risks of future loss from the current cow against the net costs of a replacement and its future prospects. So the farmer's economic decision as to when to cull a cow may not occur at the same time as the 'cow's welfare-based decision' on when to be culled.

In order to explore this dilemma, we have developed a dynamic program (DP) model to assess the optimum replacement policies for each possible cow state (parity and milk yield) under a simplified set of alternative systems and remedial practices, e.g. high input system, high infertility or low input system, high mastitis. The DP can be used to explore the relationships between profit, investment in remedial practices, expected lifespan and IC in dairy systems.

The concept of 'a life worth living' expresses that an animal should be protected from suffering, but also must be able to have positive life experiences. This implies a trade-off between lifespan and risk of suffering over which farmers have some control by the replacement and investment decisions they make. Here we discuss the potential for conflict in this trade-off between farm profits and cow welfare.

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INTERACTIONS BETWEEN PROFIT AND WELFARE ON EXTENSIVE SHEEP FARMS

AW Stott¹, B Vousough-Ahmadi¹, CM Dwyer¹, B Kupiec¹, C Morgan-Davies¹, CE Milne¹, S Ringrose¹, P Goddard², K Phillips³ and A Waterhouse¹

¹SAC, SAC Research, West Mains Road, Edinburgh, Scotland, UK

²Macaulay Land Use Research Institute, Craigiebuckler, Aberdeen, Scotland, UK

³ADAS, Animal Health and Welfare, Woodthorne, Wergs Road, Wolverhampton, UK
alistair.stott@sac.ac.uk

Extensive sheep farming systems make an important contribution to the socio-economic and ecosystem services that flow from large areas of the UK and elsewhere. They are therefore subject to much policy intervention. However, the animal welfare implications of such interventions and their economic drivers are rarely considered. Under Defra project AW1024 (A further study to assess the interaction between economics, husbandry and animal welfare in large, extensively managed sheep flocks) we therefore assessed the interaction between profit and animal welfare on extensive sheep farms. A detailed inventory of resources, resource deployment and technical performances was constructed for 20 commercial extensive sheep farms in Great Britain (equal numbers from the Scottish Highlands, Cumbria, Peak District and Mid-Wales). Farms were drawn from focus groups in these regions where participative research with farmers added further information. These data were summarised and presented to a panel of 12 experts for welfare assessment. We used two welfare assessment methods one drawn from animal welfare science ('needs' based) the other from management science (Service Quality Modelling). The methods gave complementary results. The inventory data were also used to build a linear programme (LP) model of sheep, labour and feed resource management month by month on each farm throughout the farming year. By setting the LP to adjust farm management to maximise gross margin under each farm's circumstances we had an objective way to explore resource allocations, their constraints and welfare implications under alternative policy response scenarios. Regression of indicators of extensification (labour/ewe, inbye land/ewe, hill/ewe and lambs weaned/ewe) on overall welfare score explained 0.66 of variation with labour and lambs weaned per ewe both positive coefficients ($p < 0.04$). Neither gross margin nor flock size were correlated with welfare score. Gross margin was also uncorrelated with these indicators of extensification with the exception of labour/ewe, which was negatively correlated with flock size and hence with gross margin ($p < 0.05$). These results suggest animal welfare is best served by reduced extensification while greater profits are found in flock expansion with reduced labour input per ewe and no increase in other inputs or in productivity. Such potential conflicts should be considered as policy adjusts to meet the requirements for sustainable land use in the hills and uplands.

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IMPACT OF RAPID TREATMENT OF SHEEP LAME WITH FOOTROT ON WELFARE AND ECONOMICS AND FARMER ATTITUDES TO LAMENESS IN SHEEP

LE Green¹, EM King¹, GJ Wassink¹, J Kaler¹³, R Grogono Thomas²

¹ School of Life Sciences, University of Warwick, Coventry CV4 7AL, UK

² Department of Clinical Veterinary Science, University of Bristol, Langford House, Langford, Bristol BS40 7DU, UK

³ School of Veterinary Medicine and Science, University of Nottingham, Sutton Bonington Campus, Sutton Bonington, Leicestershire LE12 5RD, UK

laura.green@warwick.ac.uk

Approximately 700 ewes from one flock were allocated to one of two treatments for footrot. One treatment was parenteral antibacterials at a dose of 1ml per 10kg and topical foot spray given within three days of a sheep becoming lame and the other was a conventional treatment of trimming hoof horn and topical spray given when the farm shepherd considered sheep lame. The treatments were given for two lambing seasons to the sheep which were kept in four groups. The differences between the two treatments were that sheep in the group with prompt treatment with injectable antibiotics were lame for fewer days and also less severely lame; the prevalence and incidence of lameness decreased. These sheep also had a higher body condition, produced more lambs from which fewer died and those that survived grew faster. The net economic benefit was estimated to be £6 per ewe put to the ram.

In a separate study farmers were shown video clips of sheep with varying degrees of lameness and asked whether the sheep were lame and whether they would catch the sheep. Farmers ranged in their responses with those who would catch one mildly lame sheep reporting a median lameness of 5% and those who reported never catching individual lame sheep reporting a median lameness of 15%. In a follow up study farmers were visited; they could identify lame sheep and were able to estimate the percentage lame, with modest under estimation. One reason for not catching individual lame sheep was identification from a distance and a second was inability to catch individual sheep in a field. When a group of 210 farmers were contacted by post and asked which methods they felt were most effective to treat footrot they identified injectable antibiotics as effective and footbathing and vaccination as ineffective. However, their preferred choices of management of lameness were footbathing and vaccination. This could be farmers expressing a wish for better vaccines and footbaths or it could be an example of cognitive dissonance, where subjects adopt a belief because it is their current practice despite evidence that it is not effective.

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GETTING OUR PRIORITIES STRAIGHT: HOW FAR CAN WE TRUST WELFARE RISK ASSESSMENT TO GET IT RIGHT?

LM Collins

School of Biological Sciences, Queen's University Belfast, Belfast
l.collins@qub.ac.uk

Risk is defined as a situation involving exposure to danger. Risk assessment by nature characterises the probability of a negative event occurring and quantifies the consequences of such an event. Risk assessment is increasingly being used in the field of animal welfare as a means of drawing comparisons between multiple welfare problems within and between species and identifying those that should be prioritised by policy-makers, either because they affect a large proportion of the population or because they have particularly severe consequences for those affected. The assessment of risk is typically based on three fundamental factors: intensity of consequences, duration affected by consequences and prevalence. However, it has been recognised that these factors alone do not give a complete picture of a hazard and its associated consequences. Rather, to get a complete picture, it is important to also consider information about the hazard itself: duration, and probability of exposure to the hazard. The method has been applied to a variety of farmed species (e.g. poultry, dairy cows, farmed fish), investigating housing, husbandry and slaughter procedures, as well as companion animals, where it has been used to compare inherited defects in pedigree dogs.

To what extent can we trust current risk assessment methods to get the priorities straight? How should we interpret the results produced by such assessments? Here, the potential difficulties and pitfalls of the welfare risk assessment method will be discussed: (i) the assumption that welfare hazards are independent; (ii) the problem of quantifying the model parameters; (iii) assessing and incorporating variability; (iv) the use of expert opinion versus a wholly data-based approach.

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PRELIMINARY INDICATIONS OF A LACK OF OWNER RECOGNITION OF CLINICAL SIGNS RELATED TO A CONFORMATIONAL INHERITED DISORDER - A POTENTIAL CONSTRAINT TO IMPROVING BREEDING PRACTICES IN PEDIGREE DOGS

RMA Packer, A Hendricks, JL Axe, CC Burn

Royal Veterinary College, Hawkshead Lane, North Mymms, Hertfordshire, UK

rpacker@rvc.ac.uk

Selection for the brachycephalic (short-muzzled) phenotype in dogs is a major risk factor for brachycephalic obstructive airway syndrome (BOAS) (Njikam *et al* 2009), with crumpling of excess soft tissue in the pharynx leading to increased airway resistance. Clinical signs of BOAS include respiratory distress, exercise intolerance, upper respiratory noise and collapse. However, due to the chronic nature of BOAS and its potentially high prevalence in certain breeds, efforts to combat this problem may be constrained by a perception that it is 'normal' in brachycephalic dogs. Clinical signs of BOAS have been anecdotally reported to induce varying responses from owners, with collapse considered 'alarming', but respiratory distress merely an 'inconvenience' (Singleton 1962), and snoring and respiratory noise perceived as 'cute' (Milne 2007). The aim of this study is to quantify owner recognition of the clinical signs of BOAS as a problem requiring veterinary attention.

A questionnaire based study was carried out over five months on the owners of dogs referred to the Queen Mother Hospital for Animals. Owners were asked to report the frequency of respiratory difficulty, and characteristics of respiratory noise in their dogs while at rest, walking, exercising and asleep. At the end of the questionnaire, owners were asked to report whether their dog currently has, or has a history of, 'breathing problems'. A total of 285 dogs, representing 76 breeds were included, with craniofacial ratios from 0.03 to 0.93 (extremely brachycephalic to doliocephalic). Seventeen dogs (5.9%) of 6 breeds, and a cross of one of these breeds (mean craniofacial index 0.18 +/- 0.02), received a formal BOAS diagnosis, with a median owner-reported respiratory difficulty score of 10/20 (2-20), and respiratory noise score 13/20 (5-18). Of these dogs, 41.2% of owners reported that their dog did *not* have breathing problems, despite having described high frequencies of clinical signs earlier in the questionnaire. A further 26 dogs (mean craniofacial index 0.19 +/- 0.02), referred for problems other than BOAS (thus receiving no formal BOAS diagnosis), had owner-reported respiratory noise and difficulty scores within the range of formally diagnosed dogs. Of these dogs, 84.6% of owners also reported that their dog did *not* have a breathing problem.

Additional spontaneous comments provided by owners, such as "no to breathing problem – other than being a Bulldog" and "[No,] but he is a Pug!" may indicate that some owners see clinical signs as 'normal' or 'breed typical'. The marked disparity between owners' reports of frequent, severe clinical signs, and their perceived lack of a breathing 'problem', is of great concern, and potentially represents cognitive dissonance. Owners of brachycephalic dogs may be more tolerant of BOAS clinical signs than other owners, and therefore may tolerate a greater degree of respiratory compromise in their dogs before seeking veterinary help (Torrez and Hunt 2006). Without recognition, and serious appreciation of the welfare implications of BOAS, clinically affected but undiagnosed dogs will be negatively affected indefinitely through lack of treatment. Affected dogs may also continue to be selected for breeding, hindering attempts to eradicate conformation related disorders in pedigree dogs.

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DESIGNING ANIMAL WELFARE POLICIES AND MONITORING PROGRESS

LJ Keeling¹, C Hubbard², V Immink³, G Garrod² and P Ingenbleek³

¹Department of Animal Environment and Health, Swedish University of Agricultural Sciences, Sweden.

²School of Agriculture, Food and Rural Development, Newcastle University, UK

³Social Sciences Group of Wageningen University and Research Centre, The Netherlands
linda.keeling@bmb.slu.se

EconWelfare is a European research project aiming to provide suggestions for national and European policy makers to further improve farm animal welfare. This paper focuses on the part of the project that aims to design policy instruments to support implementation of the Community Action Plan and identify indicators to document the relative effectiveness of these instruments. The word 'policy instrument' is used in the broadest sense to mean instruments used by government departments or agencies, private enterprises, academic bodies or other non-governmental organizations who formulate standards for animal welfare (AW). 'Indicators' means any quantitative or qualitative measure that can be used to monitor progress at the level of the animal, the food chain and society.

As a first step towards identifying potential policy instruments, an assessment of strategic AW issues at country level was made. Analyses included stakeholder consultations to validate the findings. Although there are similarities between countries it is unlikely that a single solution to promote AW could be implemented across the whole EU due to regional differences. A decision framework, based on a SWOT analysis, was therefore formulated highlighting which potential policy instruments and combinations of instruments may be most appropriate in which country. In the second step, a Delphi Policy exercise was carried out with approximately 200 experts from eight European countries. It aimed to evaluate the importance of a selection of policy objectives, policy instruments and indicators that can assess the relative effectiveness of these instruments in delivering farm animal welfare objectives. The exercise allowed for cultural, socio-economic and structural differences between countries as well as between different categories of experts.

Preliminary results show that the most effective policy instruments identified by experts include Government regulation (especially monitoring how well chain actors comply with regulations, transparency and consistency of the regulations), education initiatives (especially better education and information to chain actors) and labelling (using officially recognised terms in voluntary assurance schemes with third party inspection) and incentive-based mechanisms facilitating new markets and innovations. The effectiveness of the policy instruments is likely to depend on the specific country conditions. Animal-based indicators are preferred by all categories of experts. Farm level indicators are also ranked highly, particularly those related to space, housing design and health care. At the chain and society levels, preferred indicators relate to adoption of labelling. However, there are country and stakeholder differences on how these rank in effectiveness for specific policy instruments.

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CAN ASSURANCE SCHEMES IMPROVE WELFARE USING WELFARE OUTCOMES?

DCJ Main and S Mullan

University of Bristol Veterinary School, Langford House,
Langford, Bristol, UK
d.c.j.main@bristol.ac.uk

Farm assurance schemes are voluntary certification schemes that aim to provide consumers and retailers with assurances on a farm's compliance with animal welfare, environment and food safety standards. These schemes can promote welfare improvement by implementing resource-based standards, encouraging best practice management regimes (such as health planning) and promoting uptake of advice provided by others. Current schemes do include informal assessments of welfare outcomes such as verifying the appropriate treatment of sick animals. The UK pig industry is introducing an on-farm welfare assessment as part of the quarterly veterinary visits that are required by the pig farm assurance schemes.

There has been a recognition that a formal assessment of welfare outcomes within schemes may also be a useful tool to improve welfare on those farms that have not responded positively to other approaches. For example, dairy cattle lameness is a significant welfare concern in the UK dairy industry that is likely to require a range of intervention strategies. Social marketing and facilitation initiatives, such as those used in the Healthy Feet Project, can promote uptake of advice. However, out of the 54 farms that had a lameness prevalence greater than 35% at the start of the study, 4 farms did not reduce lameness at all and a further 8 farms reduced lameness by less than 10% even though they had received intensive support over a three year period. Provided these poorly responding farms can be reliably identified farm assurance schemes have greater leverage to ensure appropriate corrective action for lameness is instigated. Schemes can act at an individual level by ensuring that any severely lame cow observed during an assessment is appropriately managed or at a herd level by monitoring the response to previously identified higher levels lameness.

The inclusion of welfare outcomes in certification schemes as a tool to improve welfare is a key goal of the AssureWel project. This recently announced project is a collaboration with the RSPCA and Soil Association and supported by Tubney Charitable Trust. Starting with measures such as feather loss in laying hens, the project has developed an approach that promotes the management and assurance benefits of welfare outcomes.

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ETHICS OF LAMB MEAT SUPPLY CHAIN: A CHAIN IS AS STRONG AS ITS WEAKEST LINK

D Blache¹, J Sneddon² and E van Lier³

¹School of Animal Biology, University of Western Australia, Western Australia

²Business School, University of Western Australia, Western Australia

³Faculty of Agriculture, Universidad de la República, Uruguay

dominique.blache@uwa.edu.au

The meat supply chain consists of an aggregate of individuals and autonomous businesses that connects primary producers at one end of the chain to consumers at the other. Traditionally, the performance and the behaviour of participants at each step of the meat supply chain have been driven mainly by economic imperatives and more recently by animal welfare. However, the ethics of meat production, considered within the utilitarian ethical framework, depends on other values, such as sustainability, and is limited to the lowest ethical standard encountered along the supply chain. In the present study we undertake a case analysis of the Australian lamb meat supply chain in order to investigate methods to assess and improve the ethics of meat supply chain.

The ethical standing of the different stakeholders in the meat supply chain (i.e., producers, transporters, processors, distributors, retailers, stock agents and consumers) was evaluated by conducting in-depth interviews with participants and analysing published materials, such as industry websites, factsheets and code of practices. Along the lamb meat supply chain, ethical conduct was encouraged mainly through food safety, product quality and sustainability requirements. Traceability was perceived to be a key component of achieving these objectives but not yet achievable at individual animal level. Animal welfare at the farm level, during transport and at slaughter was mentioned at all levels of the supply chain but deficiencies in its evaluation and marketing were mentioned consistently. Each group of supply chain participants had limited interactions with others participants in the chain to whom they were not directly transacting with. The fragmentation of the lamb meat supply chain may be attributed to a lack of information sharing, limited knowledge of stakeholder practices along the supply chain and lack of trust between stakeholders. Trust issues seem particularly pertinent for consumers. Interviewed consumers, producers and small retailers largely perceived the increased power of large retailers, distributors and processors as a potential threat to ethical behaviours and standards along the supply chain. The findings from our case study suggest that an integrated strategy is required to improve the ethics of the lamb meat supply chain. Such a strategy will rely on the development of 1) a clear labelling system that reflects the level of ethical standards of each stakeholder, 2) tools to evaluate adherence to ethical standards along the supply chain, 3) ethics education targeted at stakeholders in the supply chain and 4) the establishment of an independent body to develop, implement and evaluate of the ethical standards across meat and other animal product supply chains.

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THE GLOBAL ANIMAL PARTNERSHIP 5-STEP ANIMAL WELFARE STANDARDS: A WELFARE LABELLING SCHEME THAT ALLOWS FOR CONTINUOUS IMPROVEMENT

IJH Duncan¹, M Park² and AE Malleau³

¹ Campbell Centre for the Study of Animal Welfare, University of Guelph, Guelph, Canada

² Global Animal Partnership, PO Box 21484, Washington, DC, US

³ Wholefoods Market Inc, 550 Bowie Street, Austin, Texas, US

iduncan@uoguelph.ca

One of the problems with animal welfare standards is that standards which make a real difference to welfare can be very hard for producers to reach. The Global Animal Partnership (GAP) 5-Step Animal Welfare Standards are unique in that they are designed as a multi-tiered rating system which encourages continuous welfare improvement. The GAP Standards allow producers fairly easy access at Step 1. They also allow producers to move up the steps as they choose, with each additional step giving the producer greater rewards, the animals improved welfare, and the consumer a guarantee of ever-increasing, welfare-friendly product. The very structure of the 5-Step program encourages higher welfare practices and systems to the benefit of farmers, animals and consumers. To date, GAP has comprehensive welfare standards for meat chickens, pigs and beef cattle. These standards have been in operation for 2½ years with one very large retail outlet, Whole Foods Market (WFM). The diversity of farms and ranches supplying WFM provided a thorough testing ground for the program. Step rated chicken (Steps 2-5), pork (Steps 1-4), and beef (Steps 1, 2 and 4) are regionally available throughout WFM stores in the USA. Having successfully completed this pilot phase with WFM, GAP is now negotiating with other retailers. The essence of the steps is captured by the following phrases: Step 1: No crowding, cages or crates; Step 2: An enriched environment; Step 3: Enhanced outdoor access; Step 4: Pasture centered; Step 5: Animal centered: Bred for the outdoors; Step 5+: Animal Centered: Entire life on the same farm. An example of the GAP Standards is weaning age for piglets. For Step 1 the minimum weaning age is 28 days, for Step 2 it is 35 days, for Steps 3-4 it is 42 days, and for Steps 5-5+ it is 56 days. Another example is transport time to processing plant for meat chickens. For Steps 1-3 maximum transport time is 8 hours, for Steps 4-5 it is 4 hours and for Step 5+ it is 2 hours. To date, third-party audited and certified farms and ranches are raising more than 100 million animals annually according to the GAP 5-Step Animal Welfare Standards.

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CRITICAL CONTROL POINTS IN THE DELIVERY OF IMPROVED ANIMAL WELFARE

AJF Webster

Emeritus Professor, Department of Clinical Veterinary Science, University of Bristol, Bristol, UK
john.webster@bristol.ac.uk

Increasing public demand for quality assurance (QA) in matters of farm animal welfare has stimulated the development of a number of QA schemes that are based on independent audit of farm standards and increasingly well founded in science and humanity – at least in theory. In practice however QA is not yet a guarantee of superior standards of welfare, which is disappointing for consumers, farmers and the animals themselves. Current complaints (from all sides) include “too much inspection, too little action, too little reward, too few signs of improvement”. We know what needs to be done but we are not yet achieving it. This paper will present two protocols for effective action:

- A protocol for the parallel delivery of improved welfare for farm animals and increased demand for high welfare food from farm animals.
- A protocol based on the principles of hazard analysis and critical control points (HACCP) designed to establish efficient and effective strategies to improve animal welfare at the individual farm level.

My protocol for the parallel development and promotion of improved standards of farm animal welfare is described by the “Virtuous Bicycle”; linked cycles of effective action within and without the farm gate. The “farm” cycle is based on self-assessment, independent audit, action plan and review. The “food” cycle sets standards, guarantees them through effective surveillance and promotes them on the basis of these sound guarantees.

The primary purpose of the farm cycle is not to establish compliance with a particular QA scheme on the basis of an annual routine inspection. It is to establish and monitor prioritised action plans for improved animal welfare, tailored to individual farm circumstances and based on classic HACCP principles. The HACCP approach is well established as a basis for Herd Health designed to achieve effective control of (e.g.) infertility, a problem likely to cause more distress to the farmer than to the animals. This paper will explore the application of HACCP principles to problems in animal welfare, with emphasis on the control of lameness in dairy cattle.

The first two spokes in the first “farm cycle” of welfare quality control, self-evaluation of “inputs” (husbandry) and independent audit of animal-based welfare outcomes, identify where action *is* and *is not* required. Where action is not required these issues can be given less emphasis at subsequent inspections. When inspection reveals a problem that calls for action, the HACCP approach can be used to assess the relative risks from potential hazards and, from this risk analysis, identify priorities for action at critical control points. The main selling point of this approach to the farmer, to the monitoring body and to the animals themselves is that it improves the probability of an effective outcome by concentrating on the things that matter most.

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VALUATION OF ANIMAL WELFARE IMPROVEMENTS

RM Bennett, A Kehlbacher and K Balcombe

Reading University, School of Agriculture, Policy and Development, Reading, UK

r.m.bennett@reading.ac.uk

A method for estimating society's valuation of farm animal welfare improvements is presented together with the findings of a trial of the method on a random sample of citizens in Great Britain. The trial found that the valuation method appeared to work well and enabled estimation of people's marginal willingness to pay to improve the welfare of farm animals, differentiated according to farmed species. People were found to have a higher willingness to pay to improve the welfare of cattle compared to pigs or chickens. However, the method presented to participants as to how the welfare of farm animals might be measured on a single continuous 100 point scale is not entirely compatible with current scientific thinking concerning welfare assessment. Moreover, the results found that people's willingness to pay for animal welfare is conflated with their beliefs that higher animal welfare is associated with other product quality attributes such as taste, nutritional value, the healthiness of food and benefits to the environment. Individuals' beliefs that we have a moral obligation to safeguard the welfare of animals had a particularly strong influence on their stated willingness to pay. A major question for policy makers is whether estimates of willingness to pay for animal welfare improvements derived from this approach are sufficiently robust and reliable to be used to inform animal welfare policy decisions within a cost-benefit assessment framework.

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CO-MODIFYING ANIMAL WELFARE

H Buller¹ and E Roe²

¹ College of Life and Environmental Sciences, University of Exeter

² School of Geography, University of Southampton

h.buller@exeter.ac.uk

As the profile of farm animal welfare rises within food production chains, in response both to consumer demand and greater ethical engagement with the lives of animals, animal welfare is increasingly being commodified by various food chain actors. That is to say that, over and above regulatory or assurance scheme compliance, welfare conditions and criteria are being used as a 'value-added' component or distinctive selling point for food products, brands or even particular manufacturers and retailers. We argue in this paper that such a commodification process has major implications both for the way in which farm animal welfare is defined and assessed (with greater emphasis being placed either on those welfare elements that lend themselves to commodification processes or on those that respond to consumer interpretations of what 'good' welfare might be at a particular time) and for the ways in which farm animal welfare is articulated and presented to food consumers as a component of product value or quality. Drawing upon recent empirical research on retailer strategies regarding the place of farm animal welfare in the marketing and branding of food products and brands, we show that while the growing commodification of welfare through market-based instruments is, it is widely acknowledged, having a positive impact in driving up certain welfare standards and practices through competitive brand or retailer strategies, it also risks shifting the emphasis on welfare definition and assessment to those criteria likely to have a more direct market, or marketable, impact. This, we maintain has significant implications for the nature and communication of welfare 'evidence' and the manner in which it is articulated within an increasingly market oriented delivery framework.

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WHEN MONEY IS NOT THE MATTER: ATTITUDES TO AND APPLICATION OF ANIMAL WELFARE MEASURES IN BIOMEDICAL RESEARCH

NHF Franco^{1,2} and *IAS Olsson*¹

¹ Laboratory Animal Science, Instituto de Biologia Molecular e Celular, Porto, Portugal

² Institute of Biomedical Sciences, University of Porto, Porto, Portugal

olsson@ibmc.up.pt

Economical considerations are often a major limiting factor in promoting good animal welfare, but in biomedical research it is typically the scientific use of animals that presents the most challenging hurdles. Even under present extensive regulation and supervision, in most countries severely distressful experiments can be legally approved if scientifically justified. Therefore, researchers' individual attitude and knowledge is decisive for implementing measures to improve animal welfare. Here we report a combination of literature review, bibliometrics and surveys providing data on how researchers exercise this responsibility.

In two case studies of published research we show that scientists fail to report measures to minimize animal welfare problems even in severe studies where animals reach moribund stages. In mouse studies of a neurodegenerative disease, out of a total of 51 references in peer-reviewed international journals 2003-04 to experiments in which animals were expected to develop so severe motor deficits that they would have difficulties in eating and drinking normally, only 3 references were found to housing adaptation to facilitate food and water intake. In 14 references to experiments including end stages of disease, only 6 referred to the euthanasia (humane endpoints). In studies of lethal experimental tuberculosis in mice, between 68% (2007) and 87.5% (1997) of papers made no reference to humane endpoints. Over the time period 1997-2007, the percentage of murine tuberculosis papers reporting legal approval/compliance increased from 5.9 to 59.6%. However, this is not reflected in the severity of the procedures, which remained unchanged with between 40 and 50% of papers reporting experiments in which animals reach moribund or otherwise severe stages.

In contrast, when surveyed about their attitudes to the 3Rs, 65% of researchers (previous participants in laboratory animal science training courses in Portugal) reported to apply such measures in their own research. When undergoing actual training, researchers are also highly critical of published research with insufficient implementation of the 3Rs.

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BETTER RODENT CONTROL BY BETTER REGULATION: REGULATORY INCENTIVES TO IMPROVE THE HUMANENESS OF RODENT CONTROL

K Littin

Ministry of Agriculture and Forestry, PO Box 2526, Wellington 6140, New Zealand
kate.littin@maf.govt.nz

Regulation by government can act as a constraint to improving the humaneness of rodent control, or it can be used to support improvements. How do we make sure it does one and not the other?

Societal support and understanding, economic impacts and current knowledge can all ‘make or break’ progress towards improved rodent control. This is also true in the development of regulations to support this improvement. Moreover, the development of regulations can itself slow progress towards better rodent control.

A lack of understanding or support from society is not an easy barrier to overcome. While there seems to be growing support for the use of humane pest controls, this support does not necessarily extend to rodent control. There are likely many reasons for this and a better understanding of them will help turn society’s attitudes in favour of rats as much as wolves or foxes or other unwanted wildlife. So too will educational campaigns.

In food animal contexts, economic impacts on producers are modified over time as consumers begin buying products to support their animal welfare beliefs. There’s no reason why this shouldn’t apply in the context of rodent control. Some manufacturers have absorbed the costs of developing and registering more humane rodent control methods themselves, with a view to seizing a market niche opportunity in advance of competitors. There can also be a role for government support in this area, for instance through targeted research funding and support for development and humaneness testing new methods.

In general, governments are moving towards a stronger science base to regulation. While this makes for robust regulation, gaps in knowledge can slow down the process. On the other hand, it means that governments are more likely to support research, albeit in areas that are directly applicable to the regulation. There are some concerted efforts by governments around the world to fund research towards humane wildlife management and pest control (including rodent control).

Regulation can also support improved humaneness in other ways. Some ways are obvious – for instance the outlawing of inhumane traps. Others are less obvious – such as the development of nationally-applied codes of practice and standard operating procedures for humane vertebrate pest control.

It is clear that there are many ways that governments in their regulatory role can support a move towards improved rodent control. Progress will depend on finding ways that are acceptable to citizens and budgets.

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MINIMISING THE NUMBER OF INDIVIDUALS KILLED IN LONG-TERM VERTEBRATE PEST MANAGEMENT PROGRAMMES, AND THE ECONOMIC INCENTIVES TO DO SO

B Warburton and P Cowan

Landcare Research, Lincoln, New Zealand

warburtonb@landcareresearch.co.nz

Many countries have invasive mammal pests that pose a threat to biodiversity, production and human health values. Control programmes to mitigate these threats often rely heavily on the use of lethal methods such as trapping, poisoning, or shooting. Research and policy has focussed on minimising welfare impacts on individual animals through improvement in the control tools used, but there has been little attempt to optimise control programmes to minimise the number of individuals that need to be killed to achieve management outcomes. Using an approach similar to sustained yield harvesting, we have developed optimal control strategies focussed on minimising the numbers of individuals killed for three representative mammal pests (Brush-tail possums as a slow reproducer), ship rats (as a fast reproducer), and wallabies as a production pest. This approach includes the costs of selected strategies and therefore can determine how economic incentives can contribute to achieving the best welfare outcomes.

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DEVELOPMENT OF MINIMAL IMPACT TAGS FOR TRACKING REHABILITATED SEABIRDS

SP Vandenabeele¹, RP Wilson¹ and A Grogan²

¹Institute of Environmental Sustainability, Swansea University, Wales, UK

²Royal Society for the Prevention of Cruelty to Animals, Horsham, UK

574139@swansea.ac.uk

Enormous economic and ecological damages result from oil spills. Among the costly actions taken in order to minimize the impact of oil spills is the rescue and rehabilitation of wildlife. A huge controversy surrounds wildlife rehabilitation measures mostly because of the fact that very little is known about the efficacy of these actions. This is paramount for assessing the viability of rehabilitation methods and can only be done by following the fate of rehabilitated animals. In the case of seabirds, the post-release survival rate of the rehabilitated birds has been declared to be low in such an extent that no actions should be taken. Determination of the fate and movements of rehabilitated oiled seabirds is therefore one of the most pressing issues facing oiled wildlife care organisations. Although satellite tracking technology would make this technically possible, potential tag-induced deleterious effects make this approach equivocal. Indeed, despite an apparent wealth of disparate information on device effects on seabirds, there has been no systematic study of how best to attach and deploy such tags. Our project, builds on recent successful work using innovative attachment methods and new accelerometer-based loggers, is aimed to lead to the development of a suitable method of tracking of rehabilitated oiled seabirds.

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MAKING ANIMAL WELFARE IMPROVEMENTS: ECONOMIC AND OTHER INCENTIVES AND CONSTRAINTS; THE “STICK”, THE “CARROT” OR THE “LICENCE” ?

S Hepple

DEFRA, Area 8B, 9 Millbank, London

sophia.hepple@defra.gsi.gov.uk

In recent years there have been changes to legislation relating to animal welfare, including how it is monitored, enforced and reported. This presentation attempts to explain whether improvements can be made and measured, even in the current economic climate.

For farmed animals there has been a shift to risk based inspections, a focus on outcome based animal measures, compulsory training and the arrival of payment reductions to subsidy claims for farmers who are not complying with basic minimum welfare standards. Meanwhile there has been greater emphasis for major retailers to take more responsibility and accountability on provenance and assurance, whilst independent welfare groups such as the Farm Animal Welfare Council are seeking to take farm animals one step further from a “life worth living” to a “good life”.

One example is the shift in demand and consumption of free range eggs, which has been reflected in the increased numbers of free range laying hens, in a number of countries. It has been heralded as a “win” for the welfare of the laying hen and certainly it can be argued that freedom of movement and access to an enriched environment has improved aspects of a laying hen’s behavioural needs. But have we really improved welfare or has a change in rearing system only resulted in a public perception of improved animal welfare, whilst shifting the welfare compromise to factors that are less obvious to the concerned observer?

It is not just in the farmed animal sector that changes have been made, in the UK there is now a requirement not just to prevent suffering, but a duty of care to meet the basic needs of all animals for which we have responsibility. It has been recognised that “pets as prizes” do not encourage responsible ownership and that the “dangerous dog” is not a genetically selected monster but is a victim of poor welfare through misguided rearing practices. Education is now a key factor in attempting to influence attitudes, at farm level, at consumer level and at pet ownership level.

Public research funding has thus been more recently directed to look at how we can try to improve animal welfare through education, through exposure to positive experiences from before birth and throughout life, and to question current practices which have been accepted as “the norm”. We can continue to try and improve welfare, however whether we will have the resources to measure change and improvement is another matter.

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DOGS WITH DEFECTS: LEGISLATION AND LAWSUITS

I Boissevain

Department of Animals in Science and Society, Faculty of Veterinary Medicine,
Utrecht University, the Netherlands
i.e.boissevain@uu.nl

The recent BBC-documentary has made clear that pedigree dogs have serious health problems. The documentary caused a shock in many people that watched it. How and why can we affect our dog's health and welfare to this extent, and avoid legal measures for years? The topic in itself is not really new. Pedigree dogs have been exposed to an increasing number of hereditary diseases for decades.

Since the dramatic pictures of dogs in pain and distress however, there has been a call for better legislation to prevent this. This mirror of legislation has two sides: the side where the owner can file a civil complaint about the breeder, and require compensation for diseases and 'malfunctioning' in the dog. Consumer's law is based on EU standards, and does give the owner some opportunities to start a lawsuit. Civil lawsuits know many constraints, and can only be filed on an individual basis. The study explains the EU legislation, and gives us an overview of the opinion of (Dutch) judges when cases with animals with 'defects' are at stake. Legal knowledge and veterinary knowledge do not always connect in a satisfying manner. The study shows us where legislation helps us in fighting this, but also shows us the impossibilities.

The other side of the mirror is public legislation to prevent breeders and kennels to breed dogs with diseases. What kind of legislation is necessary, on which levels do we need rules and regulations and will that really help to ban this problem? Evaluation of the rules that were installed the last 25 years, shows us that these rules aren't what we need. Steps taken by the government require some guarantees, and with every possible step, we should ask the question whether this is a step forward in the breeding of healthy dogs or may have another unwanted effect.

The study shows the various possibilities to decrease the breeding of dogs with serious health trouble, but also leaves room for discussion.

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ECONOMICS AND ANIMAL WELFARE IN VETERINARY PRACTICE: THE CASE OF GENETIC WELFARE PROBLEMS

JW Yeates

Department of Clinical Veterinary Science, University of Bristol, Bristol, UK
james.yeates@bristol.ac.uk

Unlike farm and pest control contexts, companion animal owners may have unlimited concern for their pets and greater available resources, but pets may still suffer imperfect welfare.

This may be due to economic barriers to “ideal” treatment. For owners, fees constitute opportunity costs by using up owners’ resources or insurance limits. Paradoxically, other owners’ may pay for inappropriate treatment to avoid self-accusations of selfishness. Veterinary surgeons aiming for profit may be biased towards increasing turnover and improving efficiency. Competition between practices may limit each surgeon’s ability to maintain their moral integrity.

Genetic disease is an important case. Animals may not be neutered due to owners’ concerns over costs, or perhaps by veterinarians’ motivation to ensure future patients and future conditions. Specifically, veterinary surgeons may need to keep breeders in business and loyal to their practice, in order to keep them as clients.

These economic drives may lead to three potential problems. The first is “under-treatment”, e.g. where animals do not get necessary treatment due to the costs. The second is “over-treatment”, e.g. where animals get unnecessary treatment in order to raise veterinary profits. The third is “mis-treatment”, e.g. where economic drives to efficiency make consultation times too short for accurate diagnosis or communication or when animals are euthanased unsuitably by the owners or lay-persons (as reported for small rodents and greyhounds). Economic drives can also have wider effects, e.g. excessive profiteering can decrease the willingness of owners to present their animals to veterinary practices or can raise insurance premiums, thereby reducing take-up.

These issues could be left to market forces. However, market imperfections in the veterinary industry (limited consumer knowledge, monopolies and oligopolies etc) limit the effectiveness of laissez-faire capitalism to ensure patients’ welfare. This paper therefore considers other economic interventions to improve welfare in veterinary practice. Identifying key determinants of owners’ willingness to pay for treatment allows veterinary surgeons to help clients to make welfare-focused decisions. Identifying key veterinary drivers helps practices to ensure they reduce under, over and mistreatment. The paper also considers the responsibility of corporate veterinary practices and insurance companies, e.g. insurance companies could refuse to fund caesarean or treatment for genetic disorders without neutering, and of professional veterinary bodies and breeding clubs, e.g. by limiting or imposing monopolies for certain interventions.

This analysis provides both useful insights into veterinary practice and addressing genetic disorders, but also provides an informative parallel to issues in other contexts.

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THE OTHER 3 RS: RESEARCH, RESPONSIBILITY AND REGULATION (OR HOW WE GOT TO WHERE WE ARE, AND WHY WE MUST CONTINUE TO MAKE PROGRESS)

M Radford

School of Law, University of Aberdeen, Aberdeen

mike.radford@aberdeen.ac.uk

This paper will provide an overview of the impact of animal welfare science during the past half century, taking account of the political, economic and social context. It will argue that, in the face of our growing understanding of the capacities and needs of other species and the impact of human treatment upon them, society has a moral duty to have regard to animal welfare, which must be reflected in public regulation. The paper will conclude with consideration of the threats to the status quo and problems confronting reformers in the face of globalisation and recession.

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