



Farm Animal Welfare: Health and Disease

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I have great pleasure in sending you this Report on Farm Animal Welfare: Health and Disease.

British consumers expect animals to be treated with respect; after all, many claim that the standards of farm animal welfare in Great Britain are amongst the highest in the world.

This Report addresses the impact of physical and mental disease on farm animal welfare. There is now a considerable body of scientific evidence that farm animals are sentient and can suffer and therefore the effects of disease on mental wellbeing, e.g. fear, distress, anxiety, do affect their welfare. By focusing on the direct impact of disease, and understanding the interactions (positive and negative) between physical and mental health, the Report seeks to highlight the potential to reduce individual animal suffering.

The prevalence of many endemic diseases in farm animals is too high. Stock-keepers must take appropriate measures to prevent disease affecting their animals. However, when disease does occur, early recognition and rapid, appropriate and effective treatment are important to reduce welfare impact. Industry (and others) in collaboration can reduce the impact of disease at regional, sectoral and national level.

We also emphasise the importance of the farm animal veterinary surgeon, who is second only to the stock-keeper/stockperson in ensuring that farm animals in Great Britain are treated humanely. In FAWC's view, the veterinarian is the pivotal link to continual improvements in farm animal health and welfare. FAWC argues that some veterinarians already operate partnership approaches that demonstrate the potential for the profession to lead improvements in farm animal health and welfare.

The Report addresses some of the critical issues in farm animal disease and welfare; for example, responsibility and cost sharing; public and private surveillance; resistance to antibiotics and anthelmintics; breeding for disease resistance and the veterinarian's trilemma (duty to animal, client or business). It shows how ethical concerns are amongst the most difficult to reconcile: often there is no right or wrong answer and, as understanding and attitudes change, so does the human perspective on humane treatment of farm animals. New partnership approaches have the opportunity to stimulate substantial improvement in farm animal health with economic, environmental and farm animal welfare benefits.

I commend this Report to you and others concerned about the health of farmed animals.

Yours sincerely,



Professor Christopher Wathes
Chairman

EXECUTIVE SUMMARY

PART I – INTRODUCTION

1. In 2009, the Farm Animal Welfare Council established a Working Group to review farm animal disease and welfare. The review was completed by the Farm Animal Welfare Committee.

2. This Report's objectives are:

- To understand the relationship between physical and mental ill-health and farm animal welfare and, by focusing attention on the direct impact of disease on animal welfare, the potential to reduce individual animal suffering.
- To promote improved recognition of disease and appropriate prevention, treatment and control through a better partnership between the keeper with primary responsibility for care of the animals and the team supporting animal health on the farm, i.e. the veterinary advisor, nutritionist, geneticist, etc.
- To identify structures and key stakeholders that can lead to improvements in the prevention, treatment and control of disease and thus improve farm animal welfare, e.g. sector bodies, industry organisations, veterinary profession, Government.

3. The introduction also draws together previous FAWC advice and the current legislative and self-regulatory landscape in the countries of Great Britain; touching on existing health and welfare strategy and the need for a balance between personal commitment, professional ethics, good stockmanship, legislation, self regulation and effective enforcement to ensure improvements in farm animal health and welfare in the context of responsibility and cost sharing.

PART II – IMPACT OF DISEASE ON ANIMAL WELFARE

4. This part defines the range of infectious and non-infectious diseases both exotic and endemic that the Report considers. It flags up the importance of understanding the interactions between mental and physical health in animals in assessing the impact of disease on farm animal welfare. The impact of disease is explored through the framework of the Five Freedoms and also through the balance of the animal, pathogen and environment relationship, including the effect of the farming environment.

5. FAWC concludes that disease has a major detrimental impact on farm animal welfare but that study of the link between physical and mental aspects of animal health needs to be strengthened better to understand impacts on animal welfare. More research is required into measures of mental health in animals. There should also be a transparent assessment of negative animal health effects, and potential for positive animal health effects, that can be attributed to modern livestock farming and concerted efforts to improve awareness of these in the farming community.

PART III –SURVEILLANCE AND MONITORING OF FARM ANIMAL DISEASE

6. This part explores the purpose of animal health and welfare surveillance and the methods by which this purpose is achieved in both the public and private sectors.

7. Governments have a number of reasons for monitoring farm animal disease and welfare, not least of which should be their role as the guardian of farm animal welfare, but these also extend to wider public health, economic and trade issues. Endemic diseases that may not affect society widely but which nevertheless have a major impact on farm animal welfare are identified as a gap in public surveillance.

8. Governments have a number of agents at their disposal for disease surveillance purposes, including the Animal Health and Veterinary Laboratories Agency, Scottish Agriculture College, along with various information management tools, and their relationships with the farming industry and veterinary profession. Best use should be made of limited resources to ensure the best possible coverage of the health and welfare of the Great Britain farm animal population. The private veterinary profession has an increasingly important role to play in both targeted and scanning surveillance.

9. Devolution has had an effect on surveillance in that national Governments have their own priorities based on their geography and the structure of their farming industries, but this should not ignore the fact that Great Britain is effectively one epidemiological unit and co-ordination is needed to ensure that this unit is secure.

10. The farming industry also undertakes surveillance of animal health and welfare as part of its management and quality assurance systems, both on farm and in the abattoir, and this feeds into co-ordinated health improvement programmes in some sectors that could be emulated in others. Information from these extensive monitoring systems could also prove a valuable tool for national policy and decision making if made available. Benchmarking at farm level of animal welfare outcome measures can also reap dividends in improved herd health, welfare and production efficiency.

PART IV – PREVENTION OF DISEASE

11. The prevalence of many endemic diseases in farm animals is too high and shows little sign of reduction over time. This situation must be challenged and not allowed to become normal. Preventive healthcare should aim to minimise the risk of disease on a farm, in a region or within a population. This applies to both exotic and endemic diseases.

12. National bio-security to prevent ingress of exotic disease is the responsibility of Governments and industry. Rapid detection of new or exotic diseases depends on good surveillance at all levels and prompt action to reduce or eliminate the threat. Tensions between restrictions necessary to prevent spread of disease and potential welfare issues on-farm are recognised.

13. Prevention of endemic diseases is considered in the context of elimination through national programmes and consideration is given to the complexity of the task and the effectiveness of these programmes; focusing on the correct targets and ensuring that the necessary will, co-operation and facilities are in place to achieve the objective. In some cases it may be better to control than eliminate.

14. The benefits of farm health planning and production management are explored, i.e. planning for healthier and more productive livestock. It is clear that the process needs to be an active, wide ranging and forward looking programme for improvement with buy-in from the keeper and the ongoing support of veterinary and other expertise on the farm. The stockperson also has a vital role to play in ensuring that a farm health plan is implemented effectively, and a direct impact on the welfare of animals in his/her care. Other elements of farm health planning and production management processes that help to deliver good health and welfare outcomes include on-farm bio-security, vaccination, production of healthy young-stock, good housing and environment, management of parasitic disease and the role of genetics.

PART V – TREATMENT OF DISEASE

15. Early recognition of a disease challenge and correct diagnosis that leads to rapid and effective treatment are key to keeping farm animals healthy and thus protecting their welfare. Stockpeople and keepers need to be able to recognise animals that are diseased and ensure that they are given veterinary attention and treatment. Animals that do not improve should be euthanased promptly. The connection between animal, keeper and veterinarian needs to be strong to ensure proper diagnosis and treatment, and effective review of treatment strategies.

16. The availability of veterinary medicines and the prophylactic and metaphylactic use of antimicrobials are discussed. The prevention and treatment of pain and the correct use of euthanasia are also explored.

PART VI - FUTURE STRATEGIES TO IMPROVE ANIMAL HEALTH AND WELFARE AND THE ROLE OF DIFFERENT STAKEHOLDERS

17. This part opens with an ethical reflection on the issues of farm animal health and welfare. FAWC concludes that those with responsibility for farm animals must always seek to reduce the extent of suffering that results from treatable diseases by preventive healthcare or by rapid and appropriate treatment.

18. Goals to improve the health and welfare of farm animals in Great Britain are set out with specific roles and responsibilities for Governments, livestock keepers and industry representatives, retailers and processors and the veterinary profession, with a focus on the critical role of the farm veterinarian in many aspects of the food supply chain. How responsibilities and costs are shared depends on the benefits of better animal health and welfare, who reaps the benefits and what financial value they have. There should also be appropriate recognition for the considerable environmental bene-

fits delivered through improved health and welfare. Objectives for partnership working are fair sharing of costs, better management of disease risk and maximising opportunities for health improvement.

19. Research and Development is an essential component and there are a number of areas where research and development focus could benefit farm animal health and welfare.

20. Many improvements to farm animal health and welfare at farm level are self-financing. However, the food supply chain should be aware that low or negative margins reduce the capacity for improvement. There is much that could be done to incentivise change.

21. Key themes to improve farm animal welfare through improved health include:

- Greater use of preventive health planning and production management with the veterinarian as a key external advisor;
- Greater involvement of the veterinarian in diagnosis and appropriate treatment of sick animals;
- Continuing professional development of all connected with farmed livestock on health and disease issues;
- Provision of appropriate resources to improve preventive health care;
- Creation of a balance of legislation and self-regulation and effective partnership working that maximises the uptake of opportunities to improve health and welfare;
- An appreciation by all stakeholders that improved welfare through better health also delivers for other policy areas, e.g. productivity, emission reduction, food safety standards and reduction in energy consumption.

PART I – INTRODUCTION

1. The Farm Animal Welfare Committee (FAWC¹) is an expert committee of the Department for Environment, Food and Rural Affairs in England; the Scottish Government's Rural Affairs and Environment Department and the Welsh Government's Departments for Environment and Sustainable Development and Business. It was established in 2011 after a review of public bodies. The Committee publishes its advice independently; see <http://www.defra.gov.uk/fawc>.

2. FAWC's terms of reference are: i) to provide independent, authoritative, impartial and timely advice to Defra and the Devolved Administrations in Scotland and Wales on the welfare of farmed animals, including farmed animals on agricultural land, at market, in transit and at the place of killing; and on any legislative or other changes that might be considered necessary to improve standards of animal welfare; and ii) to provide independent scientific support and advice as required by Article 20 of Council Regulation (EC) No.1099/2009 on the protection of animals at the time of killing.

3. The aim of this Report is to highlight the welfare issues that arise from disease in the major species of farm animals, and to make recommendations to improve animal welfare through improved animal health at an individual, farm, industry and national level.

FAWC's philosophy of approach

4. Animals are kept for various purposes and in return, provision should be made for their needs. Farm animals are recognised as sentient beings within the EU Treaty of Amsterdam 1999. In addition, the Animal Welfare Act 2006 (England and Wales) and the Animal Health and Welfare Act 2006 (Scotland) includes a duty of care to provide for the needs of protected animals for which humans have permanent or temporary responsibility. FAWC believes that our obligations include identifying and ensuring that certain serious harms never occur to farm animals and minimising harms that are currently unavoidable by endeavouring to balance any harms to the animals affected and to other animals against the benefits to humans. At a minimum, each individual farm animal should have a life that is worth living and a growing proportion should have a good life².

5. There have been many attempts to define animal welfare. In our view, welfare encompasses both physical and mental health, and for farm animals is largely determined by the skills of the stockpeople, the system of husbandry and the suitability of the genotype for the environment.

6. There is disagreement about the moral significance of the quantity – i.e. duration – of life for farm animals. Many healthy animals, experiencing a good quality of life,

¹ The Farm Animal Welfare Committee succeeded the Farm Animal Welfare Council; both use the same acronym, FAWC.

² Farm Animal Welfare Council: Report on Farm Animal Welfare in Great Britain: Past, Present and Future (2009).

have their lives prematurely terminated, and this may be morally significant. However, it is unlikely that farm animals can imagine the future to anything like the extent that humans can. In that sense, it is widely held that they lose little if anything by having their lives prematurely terminated if, of course, that is done humanely.

7. In considering what provisions should be made for farm animals to avoid unnecessary suffering and to promote good welfare, the Committee is guided by the Five Freedoms:

Freedom from hunger and thirst, by ready access to fresh water and a diet to maintain full health and vigour.

Freedom from discomfort, by providing an appropriate environment including shelter and a comfortable resting area.

Freedom from pain, injury and disease, by prevention or rapid diagnosis and treatment.

Freedom to express normal behaviour, by providing sufficient space, proper facilities and company of the animal's own kind.

Freedom from fear and distress, by ensuring conditions and treatment which avoid mental suffering.

8. The Five Freedoms are the cornerstone of Government and industry policy and the Codes of Recommendations for the Welfare of Livestock.

9. Some pain and distress is unavoidable in livestock husbandry with current knowledge and farming practice but the goal should be to minimise its occurrence. Difficult ethical and agricultural decisions have to be made when dealing with suffering, sometimes by imposing a lesser act that may still cause short-term pain or distress but provide long-term relief for the individual or group. The long-term goal should be to eliminate the source of the problem through improved disease control, husbandry and breeding to avoid this lesser act.

10. When assessing any welfare problem, it is necessary to consider the extent of poor welfare, the intensity and duration of suffering, the number of animals involved, the alternatives available and the opportunities to promote well-being. Equally important is the ability to improve welfare through existing sound husbandry with good stockmanship. Most problems are avoidable although some may be intrinsic to the production system.

11. To offer appropriate advice about the welfare of farm animals, FAWC takes account of scientific knowledge from scientists, veterinarians and others, and the practical experience of those involved in agriculture. A broad-ranging approach, drawing on relevant views and attempting to take account of human interests with a concern to en-

sure that the animal's interests remain to the fore, is used in FAWC's advice. When such knowledge is inconclusive, the animal should be given the benefit of the doubt.

Scope and structure of this Report

12. In 2009, the Farm Animal Welfare Council established a Working Group to review farm animal disease and welfare. The review has been completed by the Farm Animal Welfare Committee. This Report covers the major species of farm animals, i.e. poultry, cattle, sheep and pigs, but we believe that the broad principles set out in the Report should apply to other species. While its purpose is to offer advice to Government, FAWC also hopes that it will stimulate discussion amongst farmers, the wider food industry, citizens and consumers of the complex issues around health and disease in farm animals and the impact on their welfare.

13. Mindful of the potential scale of this subject, we have prepared this Report focusing on the following objectives:

- To understand the relationship between physical and mental ill-health and farm animal welfare and, by focusing attention on the direct impact of disease on animal welfare, to realise the potential to reduce animal suffering.
- To promote improved recognition of disease and appropriate prevention, treatment and control through a better partnership between the keeper with primary responsibility of care for farm animals and the team supporting animal health on the farm, i.e. the veterinary advisor, nutritionist, geneticist, etc.
- To identify structures and key stakeholders that can lead to improvements in the prevention, treatment and control of disease and thus improve farm animal welfare.

14. A public consultation was carried out in November 2009 and written evidence was received from 21 organisations and individuals. Responses to the consultation were reasonably consistent in naming over 40 important diseases, from a welfare perspective, within species but there were differences of opinion of the incidence or prevalence of diseases. Diseases characterised by behavioural abnormalities and some long standing chronic issues, e.g. osteoporosis in laying hens, were less well recognised. All of the named diseases scored highly for intensity of effect on animal welfare and many scored highly for a long duration of welfare effect, indicating the importance that good health plays in welfare (Appendix D). In addition, oral evidence was taken from the livestock industry, academic and research institutions, veterinary species specialist groups, retailers, consumers and animal protection organisations. We are grateful to all who assisted us; those who gave evidence or assistance are listed in Appendix B.

15. Where we refer in this Report to 'Government' we are addressing ourselves to the Department for Environment, Food and Rural Affairs in England; the Scottish Government's Rural Affairs and Environment Department; the Welsh Government's Departments for Environment and Sustainable Development and Business, Enterprise, Technology and Science; and other responsible Government Departments and Agencies.

Past FAWC advice

16. The Farm Animal Welfare Council has made many recommendations on health and disease in its previous reports, reinforcing the benefit of health planning managed with veterinary input; the importance of preventive measures; and good husbandry. A key document that provides an overview and strategic goals for farm animal welfare for the next 20 years is our report on Farm Animal Welfare in Great Britain: Past, Present and Future (2009)³.

17. Our report on stockmanship⁴ highlighted the important role and responsibility of stockpeople in managing farm animal disease and avoiding suffering. There is increasing awareness of the benefits of training, accreditation and continuing professional development and progress has been made on industry strategies for training and skills development, although much remains to be done.

18. Our recent report on education, communication and knowledge application⁵ called for Government and industry to overcome barriers to transfer and implement knowledge, by provision of authoritative and accessible advice and supporting commercial initiatives, in this context to ensure recognition of abnormal conditions in animals, diagnosis of causes and correct treatment. It also pressed for continuing professional development (CPD) for those dealing with farm animals so that they had both knowledge and skills to deal rapidly with any disease or injury.

19. Reporting on the impact of economics on farm animal welfare⁶, FAWC also called for information on the benefits of good welfare, which include good health, to be made available to farmers as well as the knowledge derived from publicly funded research programmes. The report also called on Government to establish a Welfare Stewardship Scheme using CAP Pillar II funding to reward improvement in welfare outcome measures, which might well include improved farm health management and status.

20. Recent Opinions by the Farm Animal Welfare Council on the welfare of the dairy cow⁷ and on lameness in sheep⁸ have highlighted the high incidence and prevalence of lameness. The former Opinion also flagged mastitis and bovine TB as diseases of particular concern.

21. The Farm Animal Welfare Committee has recently published an opinion on contingency planning for farm animal welfare in disasters and emergencies⁹. This noted

³ (2) FAWC *op. cit.*

⁴ Farm Animal Welfare Council. Report on Stockmanship and Farm Animal Welfare (2007).

⁵ Farm Animal Welfare Committee. Report on Education, Communication and Knowledge Application (2011).

⁶ Farm Animal Welfare Committee. Report on Economics and Farm Animal Welfare (2011)

⁷ Farm Animal Welfare Council. Opinion on the welfare of the dairy cow (2009).

⁸ Farm Animal Welfare Council. Opinion on lameness in sheep (2011).

⁹ Farm Animal Welfare Committee. Opinion on contingency planning for farm animal welfare in disasters and emergencies (2012).

the various impacts that outbreaks of animal disease can have on farm animal welfare and recognised that there are formal structures and plans in place to respond to outbreaks of exotic diseases. An overarching Great Britain and Northern Ireland Contingency Plan for Exotic Notifiable Diseases of Animals was published recently by all UK administrations¹⁰.

22. In a report prompted by the outbreak of foot and mouth disease in 2001, the Council's principal welfare concerns in the event of an outbreak of a notifiable disease were the effects of disease on the individual animal (as evidenced by clinical signs), the consequences of movement restrictions, the problem of housing livestock which may not normally be housed and the methods employed when emergency slaughter was carried out^{11,12}.

23. The Council also raised concerns about the impact of health on selective breeding for productivity, when the unintended consequences of excessive selection for single traits become an issue¹³.

24. Our strategic report¹⁴ raised the importance of mental health in addition to physical health: "*The system of husbandry and care should provide for the animal's needs and certain wants. These can be either physiological or mental. Mental needs are often treated incorrectly as synonymous with behavioural needs. Their fulfilment contributes to mental health and is part and parcel of many regulations relating to farm animal welfare.*"

Legislation and self-regulation

25. We have documented national regulations relating to farm animal welfare protection¹⁵. The Animal Welfare Act 2006 (England and Wales) and the Animal Health and Welfare Act 2006 (Scotland) impose a duty of care on owners and keepers to ensure that the needs of any animal for which they are responsible are met. Article 9(2)(e) of the Animal Welfare Act 2006 sets out an animal's "*need to be protected from pain, suffering, injury and disease*"; and Article 24(3)(e) of the Animal Health and Welfare (Scotland) Act 2006 sets out an animal's "*need to be protected from suffering, injury and disease.*" Secondary legislation made under the Animal (Health and) Welfare Acts in England, Wales and Scotland (The Welfare of Farmed Animals Regulations) provides detailed provisions concerning the protection of animals kept for farming purposes.

26. National animal health legislation is largely concerned with exotic disease control; increasingly legislation emanates from the European Union in the form of Directives

¹⁰ <http://www.defra.gov.uk/publications/files/pb13714-animal-disease-plan-gbni-120228.pdf>

¹¹ Farm Animal Welfare Council. Foot and Mouth Disease 2001 and Animal Welfare: lessons for the future (2002).

¹² FAWC Reports on the Welfare of Farmed Animals at Slaughter or Killing Parts 1 & 2: Red Meat Animals (2003) and White Meat Animals (2009)

¹³ Farm Animal Welfare Council. Report on the Welfare Implications of Animal Breeding and Breeding Technologies in Commercial Agriculture (2004).

¹⁴ (2) FAWC *op. cit.*

¹⁵ *ibid*

and Regulations. Numerous and significant animal health issues of recent years, culminating in the devastating 2001 foot and mouth disease (FMD) outbreak, have created a critical policy shift from an almost complete reliance on regulation as the most effective mechanism to improve animal welfare, in favour of non-legislative, partnership approaches.

27. The boundary between legislation and self-regulation has recently been challenged by the Farming Regulation Task Force¹⁶, which focused on “*better regulation by reducing or removing the most onerous burdens of legislation*”. Others have argued that in the context of animal welfare, legislation should remain the foundation of attempts to improve welfare¹⁷, that its importance should not be downplayed and that the benefits of voluntary economic and marketing mechanisms should not be overestimated with the many vested interests and powerful economic forces. Existing legislation needs to be effective so proper enforcement is essential.

28. The Animal Health and Welfare Strategy (AHWS) for Great Britain for 2004 to 2013¹⁸ set out the joint vision of Defra and the devolved departments to maintain and improve animal health and welfare standards over this 10 year period. It emphasised partnership working, and a desire for a more proactive strategic approach to animal health and welfare planning, with collaboration between Governments and the farming industry. It was an ambitious programme of strategic outcomes requiring fundamental changes in attitudes and significant investment in time and money by all parties. The effect of recent budgetary cutbacks on programmes established from the AHWS is unclear.

29. Governments in England, Wales and Scotland have diverged somewhat in recent years, with different approaches to animal health issues and different diseases targeted, reflecting a regional focus to establishing priorities within each territory. Where responsibilities are devolved, there needs to be effort to ensure that measures are coordinated and consistent across borders.

30. Implementation of the Animal Health and Welfare Strategy in Scotland was initially overseen by the Scottish Animal Health and Welfare Strategy Advisory Group. This Group established a list of priority diseases to tackle in Scotland: for cattle – BSE, TB, Johnes, BVD, mastitis, liver fluke; for sheep – scrapie, sheep scab, foot rot, liver fluke; for pigs – enzootic pneumonia; and for broilers – dysbacteriosis. The group recognised that different governance structures were required for making progress against different diseases. Policy is developed at general stakeholder quarterly meetings with frequent detailed contact with industry as individual policies develop. Some notifiable diseases have been effectively controlled, whilst industry leads on enzootic pneumonia

¹⁶ The report of the independent Farming Regulation Task Force. Striking a balance: reducing burdens; increasing responsibility; earning recognition – A report on better regulation in farming and food businesses. May 2011.

<http://www.defra.gov.uk/publications/files/pb13527-farm-reg-task-report.pdf>

¹⁷ Keeling, L. J.; Immink, V.; Hubbard, C.; et al. Designing animal welfare policies and monitoring progress Animal Welfare Vol: 21 Supp: 1 pp 95-105 2012

¹⁸ Defra. Animal Health and Welfare Strategy for Great Britain (2004).

<http://archive.defra.gov.uk/foodfarm/policy/animalhealth/strategy/ahws.pdf>

control, and different governance structures have been set up for different diseases, such as the BVD advisory Group and the Sheep Scab Industry Working Group.

31. In keeping with the other devolved administrations, the Welsh Government has statutory responsibility for certain diseases and responsibility to lead on a notifiable exotic disease outbreak in Wales. The Welsh Government facilitates the Animal Health and Welfare Strategy Steering Group, members of which represent the Welsh Government and industry views in Wales. Priority diseases for the Steering Group are: for beef animals - BVD, Johne's disease and liver fluke; for dairy cattle - Johne's disease, lameness, mastitis, VD and liver fluke; and for sheep - sheep scab, liver fluke, lameness and lambing losses. The work of the TB Action Group in Wales has been brought within the Steering Group. A key development flowing from the strategy is the availability of subsidised veterinary mentoring for farmers implementing Animal Health Planning on livestock farms meeting certain criteria. The Steering Group will continue to be the main stakeholder forum in Wales considering issues such as Wales' Animal Health and Welfare Strategy post 2014, Rural Development Plan for Wales 2014-20 and EU Animal Health law.

32. There has been no such list of priority endemic diseases in England and prioritisation of endemic diseases has been left to sectors, where as a legacy of the Animal Health and Welfare Strategy, Cattle, Sheep, Pig and Poultry Health and Welfare Groups exist but have varying outputs. These groups are the intended routes for industry to interact with the recently established Animal Health and Welfare Board for England (see below) and to work with Government and industry to find practical and effective solutions. The groups have no formal remit for structure, representation and role or for their interaction with other related organisations.

33. A Dairy Cow Welfare Strategy was launched in August 2010¹⁹, partly in response to the FAWC Opinion on the welfare of the dairy cow; a revised Pig Health and Welfare Strategy was launched in August 2011²⁰. The Cattle Health and Welfare Group published their first annual report in October 2012²¹. There is currently little published baseline data for the incidence or prevalence of priority diseases or hard targets for disease reduction.

34. The Animal Health and Welfare Board for England was established in 2011 as a result of the responsibility and cost sharing agenda within Defra. It brings together independent people with relevant knowledge and skills, and senior Government officials to make direct recommendations to Defra Ministers on policy affecting the health and welfare of kept animals in England, including farm animals, horses and companion animals. It is developing a new Animal Health and Welfare Strategy for England.

¹⁹ <http://www.nfuonline.com/News/Strategy-puts-cow-welfare-in-spotlight>

²⁰ <http://www.bpex.org.uk/downloads/301566/299810/2020%20Pig%20Health%20and%20Welfare.pdf>

²¹ <http://www.nfuonline.com/article.aspx?id=2147513660&terms=CHAWG>

35. The final report from the England Implementation Group in 2009²² gave an overview of progress and challenges in implementing the Health and Welfare Strategy in England. It highlighted the benefits of clear goals and establishing structures and processes to enable partnership working to flourish. Progress was reported in the control and management of notifiable disease outbreaks, the start of partnership working through sectoral Health and Welfare Councils and, in some areas, improved health planning on farm between veterinarians and farmers, although overall progress had been slow.

36. An Animal Health Strategy for the European Union was launched in 2007 setting out a six year programme for the community. The current programme highlights the principles of partnership and communication with four strategic goals:

- Prioritisation of EU Intervention;
- A modern and appropriate animal health framework;
- Better prevention, surveillance and crisis preparedness; and
- Science, innovation and research.

37. In advance of this, a series of EU initiatives to promote animal disease and welfare research had already been launched. These included an information platform on the protection and welfare of animals, the launch of the European Technology Platform for Global Animal Health (ETPGAH) and the creation of a scheme to improve co-operation and co-ordination of animal disease research programmes between Member States. This culminated in a Collaborative Working Group on Animal Health and Welfare Research and a network and website²³ aimed at Coordination of European Research on Emerging and Major Infectious Diseases of Livestock, led by the UK. Great Britain can benefit from such co-ordination by avoiding duplication of work or funding across countries and sharing results, but some issues are country-specific and more effort is required to address these disease issues.

38. Any British Animal Health and Welfare Strategy has to recognise not just the European Animal Health Strategy but also the challenges of international trade, climate change, global food security and diet related ill-health in humans. Improving animal health and welfare through disease prevention measures is a powerful tool to increase the efficiency of animal farming and so reduce emissions, minimise environmental concerns relating to water use, air and water pollution and biodiversity as well as maximising the use of scarce resources. There are also the intangible benefits of a maintained countryside for recreation and tourism from a healthy livestock population.

39. Recent discussion of 'sustainable intensification' could be worrying for those interested in animal welfare. FAWC has advised Government²⁴ about this, stressing the importance of not repeating past mistakes in pressing for increased food production at any cost, where animal welfare and the environment often suffered as a result of inten-

²² Defra. England Implementation Group – Third and final report on progress and challenges in delivering the Animal Health and Welfare Strategy in England, January 2010.

²³ Collaborative Working Group on Animal Health and Welfare Research. <http://www.scar-cwg-ahw.org/>

²⁴ Farm Animal Welfare Committee. Sustainable intensification (letter). 3 February 2012

sification. Future developments in sustainability should put health and welfare at the centre of their considerations, both for ethical and economic reasons.

Conclusions

40. National and EU strategies for animal health and welfare have been in place for a number of years but as yet there is no conclusive information to indicate whether the prevalence and incidence of animal diseases has got better or worse. There is a complex landscape of policy areas impacting on disease and welfare with increasingly divergent devolved policies.

41. There needs to be a balance of legislation, self regulation and effective enforcement for the Government to fulfil effectively its guardian role to protect farm animals as sentient beings. Where there is no improvement in animal welfare and a key action could be taken, or where welfare is compromised in the absence of effective legislation and enforcement, then new legislation may be needed.

42. Responsibility and cost sharing arrangements are complex but have the potential, through partnership working towards improved animal health and welfare, to find the right balance to ensure an improving quality of life for farm animals that is acceptable to citizens, and a farming industry that is financially viable and environmentally sustainable.

43. Effective leadership and governance are critical to the success of partnership working. There should be external review of the effectiveness of these working arrangements at pre-determined regular intervals.

44. There are many organisations that impact on the health and welfare policy and delivery landscape that could contribute to the responsibility and cost sharing agenda, but there is currently variability of activity and focus, and lack of co-ordination. Increasingly divergent policies by the devolved bodies add to this level of complexity, which is concerning as disease is no respecter of national boundaries. Future Health and Welfare Strategies should treat Great Britain as a single epidemiological unit.

45. Baseline information on the priority diseases for health and welfare is essential if the effectiveness of policy and progress is to be monitored effectively.

PART II - IMPACT OF DISEASE ON ANIMAL WELFARE

Definition

46. The Oxford Dictionary definition of disease is: “*a disorder of structure or function in a human, animal, or plant, especially one that produces specific symptoms or that affects a specific location and is not simply a direct result of physical injury*”.²⁵ However, we include consideration of physical injury in this Report since this is an aspect of overall health, often caused by poor environment or handling and sometimes a consequence of disease, which compromises welfare.

47. This Report focuses primarily on endemic diseases, that is diseases that are present in Great Britain all the time – although not necessarily on all farms. We consider both infectious and non-infectious diseases, as major contributors to animal suffering. The Report also briefly covers the welfare impacts of exotic diseases (diseases which are not normally present in the Great Britain animal population).

48. Infectious diseases are caused by pathogens that might be viruses, bacteria, fungi, protozoa, endoparasites or ectoparasites. They spread directly from animal to animal or indirectly via the environment or contaminated equipment or carriers, such as birds or insects. Pathogens might have reservoirs in other host species or the environment or have part of their life cycle in another species.

49. Non-infectious health problems include injuries such as fractures, abrasions or swellings; tumours and non-malignant growths (e.g. warts), which may or may not cause pain depending on their location on the animal, size, potential for necrosis and secondary infection; lameness due to e.g. bone abnormalities, fractures, joint disease such as osteoarthritis and hoof horn injuries; dental problems inhibiting eating. Nutritional deficiencies, toxicities, imbalances and contaminants also cause clinical disease. In addition, some non-infectious disease arises from poor breeding and management decisions, e.g. a large bull mated to a small cow causing birth problems.

50. Disassembling the word into its components reminds us that ‘dis-ease’ is often associated with discomfort, worry or anxiety. Few would doubt nowadays that to be concerned about an animal’s welfare is to be concerned about its mental state as well as its physical state. The extent of suffering from poor health depends not only upon an animal’s ability to cope with the adverse physiological impact from the disease but also the associated emotional consequences.

51. Good physical health is essential to good welfare, but is not sufficient in itself because it does not necessarily lead to a good mental state. Conversely, poor productivity, e.g. infertility, may be indicative of an underlying disease but may not always be a cause of suffering.

²⁵ <http://oxforddictionaries.com> Oxford University Press, 2011

The importance of mental health

52. Animal sentience (the capacity to experience or feel in a way that is analogous to human experience) has been one of the most controversial aspects of the application of science to animal welfare. However, it is difficult to argue with the current consensus that all vertebrate animals (and some others) are sentient. Sentient animals can suffer and their mental state indicates whether there is suffering.

53. Since the publication of Ruth Harrison's *Animal Machines*²⁶ and the report of the Brambell Committee, which clearly emphasised the need to consider the mental state of animals²⁷ (particularly Annex III by WH Thorpe), Government has taken greater notice of the mental health aspects of the welfare of farm animals, arming themselves with the results of scientific research as well as advice from the Farm Animal Welfare Committee and its predecessors. Sentience of animals was enshrined in the 1997 Treaty of Amsterdam, and has now been incorporated in the Treaty of Lisbon (2007), domestic legislation and OIE guidance.

54. A number of approaches have become established in animal welfare science over the intervening years, arising from animal behavioural science, early ethology and exploration of the animal's perspective. Current approaches to evaluation of animal welfare include assessment of how normal a life they lead, their ability to function well, and that they feel well. Experimental approaches to investigate feelings include preference testing to assess animal motivations, and more recent work focusing on attempts to measure experiences that engender positive welfare.

55. There is a growing realisation that the applicability of welfare science research to farming is greatly enhanced if strategic research is carried out on commercial farms in co-operation with farmers and other 'end-users'. This not only gives a much improved understanding of the extent of potential improvement and other intended or unintended implications at farm level but also the effect on other factors, such as practicality and food safety. Large-scale experiments and observational investigations are essential to a fuller practical understanding and uptake of welfare science.

56. The strong links between animal behaviour and welfare have meant that animal welfare science has developed largely outwith veterinary science. As a consequence there has been an apparent separation of the mental and physical aspects of health in animals. Historically, this was probably a separation of convenience so that animal welfare and animal health research budgets and their respective research communities were funded separately. One result is that the impact of disease on an animal's subjective state is little understood. This has also had implications for education of the veterinary profession, which for too long has had little or no training in the sciences behind

²⁶ *Animal Machines: The New Factory Farming Industry*. Ruth Harrison. Published 1964 by Vincent Stuart Ltd

²⁷ Report of the Technical Committee to enquire into the welfare of animals kept under intensive livestock husbandry systems. Chairman: Professor F. W. Rogers Brambell. Cmnd. 2836, December 1965. Her Majesty's Stationery Office, London. Referred to hereafter as the Brambell Report.

understanding of normal and abnormal behaviours and mental welfare of farmed animals. More recently, animal welfare research has been carried out in most veterinary schools, while the science of animal welfare is an increasing part of the undergraduate curriculum. However, there are still many qualified veterinarians with no formal education in animal welfare science. A survey on perceptions of the veterinary professions' role in animal welfare found that 96% of welfare scientists and 63% of veterinarians themselves felt that most veterinarians did not have a complete understanding of animal welfare²⁸.

57. The Non-Governmental Organisations (NGOs) that campaign for improved standards of animal welfare have not always included consideration of all aspects of animal health, possibly because they believe that physical health is outside their remit and skill base.

58. There has been a rapid growth of on-farm animal welfare assessment. This was originally done by focusing on the resources available to the animal but is now increasingly looking at the animal itself, based on both health and behaviour. This has led to a growing link between animal health and welfare. At an EU level, the Welfare Quality^{®29} project has developed standardised animal-based welfare assessment protocols for cattle, pigs and chickens, which encompass signs of both physical and mental ill-health. Although these have been seen by some as unwieldy, work is underway in the UK and elsewhere on a second generation of more practical assessment protocols. The importance of incorporating these '*welfare outcome indicators*' into future legislative approaches has recently been emphasised in both the EU Animal Welfare Action Plan and reports of the European Food Safety Authority's (EFSA) Scientific Committee on Animal Health and Welfare dealing with animal based measures of welfare. The current development of animal welfare standards by the World Organisation for Animal Health (OIE) will further strengthen the link between animal health and animal welfare.

²⁸ Wensley, S (2007): Perceptions of the Veterinary Profession's Role in Animal Welfare. In: Proceedings of the Fourth Pan Commonwealth Veterinary Conference 4th-8th November 2007. Barbados, West Indies, p128

²⁹ <http://www.welfarequality.net/everyone>

The interactions between mental and physical wellbeing and disease

59. There are important relationships between disease, physical health and mental state (Figure 1).

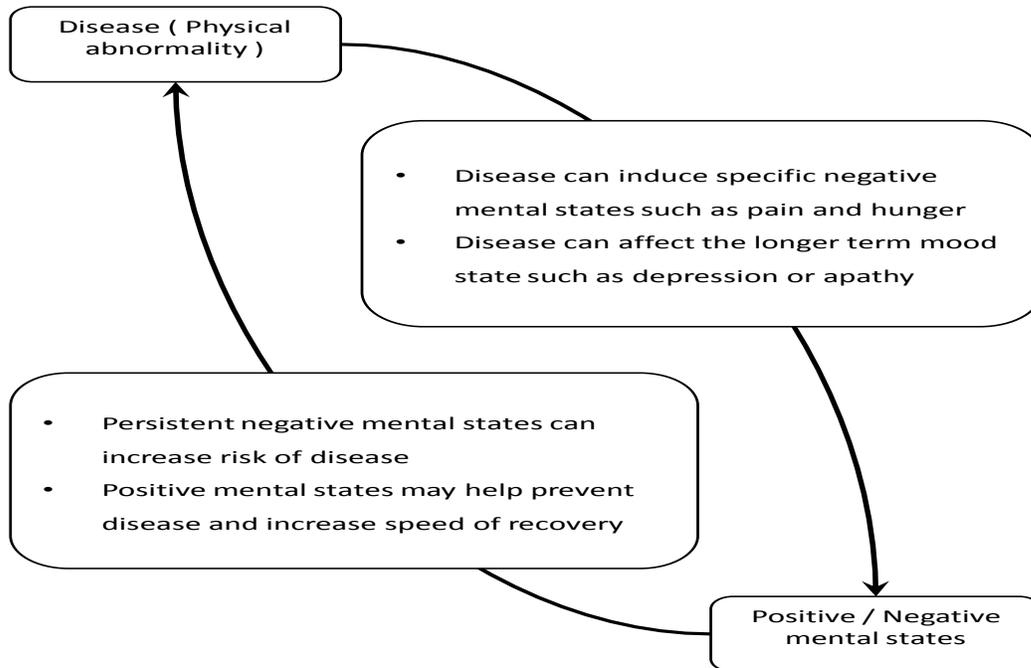


Figure 1. Relationships between disease, physical health and mental state in sentient animals

60. Diseased animals suffer from impaired welfare because of the direct physical (fever, inflammation, respiratory distress) and psychological effects of the disease, (pain, anxiety or fear). There may also be abnormalities that are undetectable such as headache or depression. Animals which are ill show characteristic patterns of behaviour including lack of appetite, isolation from the group, lethargy and increased sensitivity to pain. Some changes may be adaptive responses that help to conserve body resources to aid defence and occur in the early stages of disease. Whilst we currently have limited understanding of the implications of these changes on the mental state of animals, they are associated with unpleasant feelings, e.g. anxiety, in humans. Early recognition of characteristic behavioural changes in diseased animals facilitates rapid treatment.

61. Indirect effects of disease may include reduced physical ability to access feed, water or other resources and reduced motivation to express normal behaviours such as play. There may also be indirect effects of a disease on other animals in a group, such as an inability to suckle and to protect young or a disturbance in the hierarchy leading to negative interactions between group members.

62. Poor welfare can be a primary predisposition to ill-health. Poor environmental conditions, husbandry, housing or stockmanship, which can elicit physiological stress responses in animals, may affect health by altering the animal's susceptibility to pathogens.

63. An animal that is unable to exhibit motivated behaviours, e.g. suckling or rooting or has a physiological need, e.g. hunger, may develop inappropriate behaviours in an attempt to regain homeostasis. Inappropriate behaviours include redirected behaviours, e.g. navel sucking in cattle or belly nosing in pigs, and injurious behaviours, e.g. tail biting in pigs or feather pecking in poultry. These can cause physical damage to the animal or others, and thus cause pain and distress to themselves and to others in the group. The welfare concerns are not only the physical injuries, but also emotional states such as boredom, frustration or distress due to the inability of animals to perform some highly motivated instinctive or learned behaviours.

64. An animal's mental state can also influence disease processes. Extensive work in human medicine has defined the links between psychosocial factors³⁰ and important diseases such as cardiovascular disease³¹. Similar links are present in animals³². Indeed, animals are often used as experimental models to investigate the mechanisms for the effects of chronic stressors on particular diseases.

65. Many scientists have attempted to define an animal's mental state more systematically. Current thinking³³ suggests that it is influenced by both short term discrete emotions and sensations and long term mood states. Long term mood states are likely to be a cumulative function of the short term emotional episodes. Disease can, therefore, influence an animal's emotional state by inducing specific negative mental states such as pain or hunger. However, the disease may also induce persistent negative emotional states directly, which in turn influence the response of the animal to other stressors.

66. We have previously suggested that consideration of opportunities to promote good welfare to help provide a good life (e.g. environmental enrichment and complex environments) is also relevant³⁴. There have been few scientific investigations into the influence of positive emotional states on disease. Studies in diseased humans have demonstrated that positive emotional well-being is a significant predictor of a better physical outcome after addressing physical treatments. The influence of positive emotional well-being on recovery of diseased animals might be important, for example, better wound healing has been shown in pigs given positive mental enrichment. Further

³⁰ AL Marsland, EA Bachen, S Cohen, B Rabin, SB Manuck. Stress, immune reactivity and susceptibility to infectious disease. *Physiol Behav.* 2002 Dec; 77 (4-5): 711-6.

³¹ SJ Bunker, AM Tonkin, DM Colquhoun, MD Esler, IB Hickie, D Hunt, VM Jelinek, BF Oldenburg, HG Peach, DR and CC Tennant. "Stress" and coronary heart disease: psychosocial risk factors. *Med J Aust* 2003; 178 (6): 272-276.

³² MD Walker, G Duggan, N Roulston, A Van Slack, G Mason. Negative affective states and their effects on morbidity, mortality and longevity. *Anim. Welf.* 2012; 21: 497-509.

³³ M Mendl OHP Burman and ES Paul et al. (2010) An integrative and functional framework for the study of animal emotion and mood, *Proc. R. Soc. B* 7 October 2010 vol. 277 no. 1696 2895-2904
<http://rspb.royalsocietypublishing.org/content/277/1696/2895.short>

³⁴ (2) FAWC *op.cit.*

research is needed in this area but, giving animals the benefit of the doubt, putting diseased animals in an environment likely to induce a positive emotional state could be important. Best practice standards for the nursing of sick animals may already address this to some extent, for example, by provision of preferred foods and a comfortable environment but it is likely that these do not fully address an animal's emotional needs.

The impact of disease on the Five Freedoms

67. Pain is an aversive, sensory experience that alerts the animal to damage, or threat of damage, to the integrity of its tissues. Pain elicits protective actions, and results in learned avoidance. It is a complex experience, dependent not only on the severity of the insult and the degree of tissue or nerve damage, but also on previous pain experiences and current mental state.

68. Pain may be acute or chronic, localised or generalised, adaptive or maladaptive, physical or emotional and an individual may experience more than one of these types of pain simultaneously. The occurrence of pain can generally be more reliably identified than its intensity. Pain may also involve fear and lead to the anticipation of more pain, causing anxiety; e.g. from use of electric goads during handling or loading.

69. Pain is typically assessed by changes in behaviour, such as reduced food intake, physiological responses (e.g. plasma cortisol, heart rate), reduced use of the affected part, and behavioural signs, which vary between species but include:

- Dullness, depression, lethargy
- Grunting, teeth grinding
- Inappetence, decreased rumination rate
- Increased respiratory rate
- Increased/reduced vocalisation
- Increased sensitivity (hyperalgesia)
- Attention to site of pain (e.g. licking).

Clinical response to analgesia can be a useful way to assess pain if animal behaviour changes after an analgesic is given.

70. Inflammatory diseases are a major source of pain in animals. From a veterinary standpoint, inflammation can readily be identified as localized heat and swelling, sensitivity to palpation and loss of function. The pain component of inflammation arises from activation and sensitisation of sensory nerve fibres to the actions of substances released from a variety of sources. Inflammation induces alterations in pain processing, which may have serious long-term consequences for the animal. Long term pain causes a hyperalgesic state, in which animals become more sensitive to painful stimuli and are adversely affected by stimuli that would be innocuous to normal individuals (allodynia).

71. As many farmed species have descended from prey species in the wild (e.g. sheep), they have naturally adapted to minimise visible signs of pain which might increase their attractiveness to predators. This means they often show few external

signs, even when in severe pain. Detection of problems therefore requires trained and vigilant stockmanship.

72. Good stockmanship prevents side effects of disease that can be direct causes of suffering, e.g. hunger and thirst because an animal cannot reach or compete for food or water or hypothermia because an animal with fever or inappetence cannot find thermal comfort.

73. With disease or injury animals which might otherwise adapt to their environment might be less able to adapt e.g. with a slatted concrete floor lame animals that cannot bear weight on all four feet, or animals with low body condition might be more prone to soft tissue trauma leading to pain and discomfort.

74. Disease-induced fever or associated depression frequently results in animals failing to maintain normal grooming behaviour. This leaves their skin or coat dull and sometimes foetid. The same animal may also become victim to bullying by pen-mates as it slips down the social hierarchy.

75. A diseased or injured animal may separate from the herd or flock and be/feel vulnerable to predators, particularly in extensive farming conditions. Animals might show that they are frightened by frequent urination or defaecation, trembling, avoidance behaviours, squealing and flight or fight behaviours. Fear is most commonly observed when animals are handled or isolated and so is also a common side effect of treating a diseased animal.

Determinants of health status

76. The health of an individual animal depends on a fine balance between the host characteristics of the animal itself, pathogens and environmental determinants, all of which form the so-called epidemiological triad (Figure 2). These determinants do not exert their effects in isolation, but are in constant interaction; any consideration of animal health status must take them all into account. A causal web establishes the linkages between all of the determinants that can result in disease. Usually, there is more than one cause of disease and a common mistake is to focus on only one aspect of the triad for control or prevention of disease and to overlook the remaining two determinants.

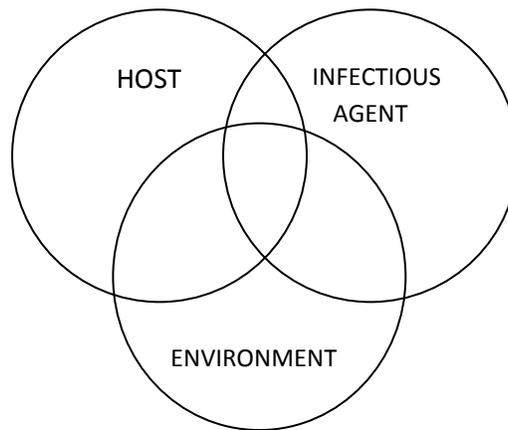


Figure 2. The host – agent – environment interaction in determination of disease

The host

77. Host factors that influence the occurrence of disease include age, sex, genotype, physiological state and immune status. For instance, the risk of many diseases varies over an animal's lifespan due to underlying physiological changes, e.g. neonates are more susceptible to many enteric and respiratory infections but resistance increases as animals grow older.

78. Host immunity plays a crucial role in keeping an animal healthy. Immunity can be either passive or active; passive immunity is passed from parent to offspring, whereas active immunity results from the production of antibodies after exposure to an infectious agent or as a result of vaccination.

79. The impact of a challenge on an individual's health status depends on its ability to respond and adapt. Challenges or 'stressors' may be physical or psychological and elicit behavioural and physiological responses that affect welfare to a greater or lesser degree. Some adaptation may require little effort or change and has little or no observable effect on welfare if the challenge is rapidly removed.

80. However, sustained challenge requires the animal to adapt with increasing physiological cost. The difficulty that the animal has in adapting to this challenge increasingly impacts on its welfare through a complex interaction of coping mechanisms. The cost of adaptation is measured in terms of direct costs to the animal such as increased energy requirements and reduced performance/growth, or indirectly through increased susceptibility to disease as a result of suppression of the immune system.

81. At the extreme, the animal can fail to cope with the continuing challenge (e.g. a poor environment) because the challenge is too severe or complex, it is prevented from making an appropriate response (for example, due to restricted access to an alternative environment) or it is overwhelmed by a new challenge such as infection.

The pathogen

82. Pathogens mutate, which may enable them to evade their host's immune response. The ability of the pathogen to survive in the environment (or host) as well as its pathogenicity will have a bearing on its capacity to cause disease. Animals infected with a pathogen are not always diseased and so apparently healthy infected animals can be bought and sold, spreading infection between farms.

The environment

83. Changes in the animal's environment (e.g. husbandry, stocking density, ventilation rates, bio-security management, etc.) may have a direct, so-called "stressor" effect on both the host and the pathogen and can be either adverse or beneficial for one or the other. When the exposure to a stressor is sufficient to cause changes in biological function of the host, the balance can be altered and disease may arise if the pathogen is present. For example, increased stocking density may lead to an increased load of pathogens in the environment, poor ventilation may increase air humidity in an animal facility, which in turn could increase environmental survival of the pathogen and consequently increase the exposure dose and result in more infected animals.

Impact of the livestock industry on disease and welfare

84. The British livestock industry continues to change rapidly in terms of its size, the types of production systems and the average number of animals per holding (Appendix C). A succession of economic changes and health crises, increasing sophistication of the supply chain and a major transfer of economic power within the food supply chain from the supply side to the demand side have led to considerable structural change. These changes have long-term implications for the management of health and welfare and the development and ownership of public and private policies aimed at improving animal health and welfare.

85. All farm animals have been subject, in varying degrees, to intensification over the past 50 years or so. Adoption of new technology has facilitated increases in scale and increasing farm specialisation. The associated increase in output per livestock unit has

had positive and negative effects but has generally delivered considerable benefits for the consumer in the form of cheap food. Intensification has been particularly marked in the pig, poultry and dairy industries. Some of the major changes include:

- a) increased productivity that can create demands on the physiology of the animal;
- b) targeted breeding programmes modifying the animal to increase productivity, which can adversely affect health and welfare (e.g. selecting for high milk production increases lameness in dairy cows);
- c) introduction or continuation of mutilations to manage behaviour (e.g. tail docking in piglets, castration in lambs);
- d) introduction of environments to reduce labour (e.g. slatted flooring, automated feeding systems) but which can lead to physical discomfort and less control for an animal over its environment, e.g. thermal comfort, hunger;
- e) increased size of herds/flocks requiring better husbandry and management skills and greater hygiene and bio-security to control a potentially greater impact of disease on the larger population;
- f) increased size of holdings and geographical clustering that may increase impact of disease within a holding and the risk of transfer of disease between holdings;
- g) growing international trade, both intra-European Community and global, in live animals, semen and embryos, feed and meat products, which may increase the risk of introduction of infectious diseases;
- h) increased risk of disease spread to and from wildlife (e.g. badgers, deer, wild boar);
- i) climate change and the potential for new disease challenges not seen previously (e.g. blue tongue disease); and
- j) an increase in systems with a more natural element providing more opportunity for disease challenge and the re-emergence of diseases that had been eliminated in more bio-secure indoor systems.

86. Set against these challenges there have also been positive steps taken by Government and industry including:

- a) elimination of disease through national programmes (e.g. Aujeszky's in pigs, *Brucella abortus* in cattle);
- b) maintenance of freedom from disease via national and international disease surveillance schemes/requirements (e.g. domestic surveillance checks for *Brucella abortus* or EBL milk testing, classical swine fever and foot and mouth disease);
- c) changes in herd management practices and industry collaboration, including new vaccines, that have resolved some endemic and emerging health problems (e.g. erysipelas and progressive atrophic rhinitis in pigs, bluetongue in sheep and cattle);
- d) changes in technology contributing to altered on-farm environmental conditions for animals (e.g. ventilation and cooling systems, monitoring systems giving early warnings);
- e) group housing of sows, which has made them fitter in terms of reduced urinary tract infections and reduced farrowing problems (but potentially with more injuries during mixing);
- f) a national database for cattle location and movements;

- g) new approaches to manage endemic diseases supported by sector bodies, e.g. lameness in sheep and mastitis in cows;
- h) new abattoir data capture, recording and feedback for broiler chickens under the Meat Chicken Directive;
- i) dedicated supply chains where the food chain members have worked together to improve health and welfare on farm; and
- j) introduction of farm assurance schemes leading to higher levels of legislative compliance.

87. Disease can have a major impact on productivity and profitability. Our recent report on economics³⁵ described the relationship between welfare and performance and the extent to which welfare improvements can be incentivised on farms by increasing profitability or improvements in management and workload. This concept was first proposed by the agricultural economist, John McNerney, now Emeritus Professor at Exeter University. He suggests that there is a curvi-linear relationship between welfare and productivity: welfare is increasingly impaired by metabolic demands on the animal and by environmental constraints. The hypothetical relationship indicates an area where increasing production benefits are still possible but welfare starts to decline. By adopting strategies which reduce the occurrence or risk of disease, and the associated physical ill-health and adverse mental states, the shape of this relationship might be changed in such a way that higher levels of production could be achieved without welfare impairment. Changes in husbandry and management whether designed to deliver increased levels of productivity or to reduce cost should not be made without consideration of potential welfare impairment and action taken to mitigate any negative welfare outcomes.

Conclusions

88. Disease can have either an infectious or non-infectious aetiology; it often has significant detrimental effect on the Five Freedoms and animal welfare, both physical and mental. When caring for animals the positive and negative effects of physical and mental health need to be considered. For example, a better understanding of illness and coping strategies could lead to better nursing of sick animals through the use of management practices such as improved hospital facilities that provide appropriate temperature, comfort, and isolation/group housing, according to the species.

89. There is much published research on the physiological basis of disease. There is relatively little published research on how disease affects welfare and even less mental health. Behavioural changes are rarely assessed in conjunction with clinical diagnostics in more than a qualitative manner and there is little quantitative information of the effects of disease on welfare.

90. The development of animal welfare science largely outwith the veterinary schools has led to a separation of consideration of the physical and mental aspects of health in animals by veterinarians and animal welfare scientists. Many Non-Governmental Or-

³⁵ (6) FAWC *op. cit.*

ganisations that have a remit to improve animal welfare tend to concentrate on the mental rather than physical aspects of welfare.

91. The health of animals depends on a dynamic balance between host characteristics, pathogen characteristics and environmental circumstances. Disease occurs when the balance between any of these three determinants is disrupted; causing an effect on the individual that is harmful to its normal function. A holistic analysis of all direct and indirect causal factors is necessary as part of the process to prevent or remedy disease situations.

92. Changes in the livestock industry have had both positive and negative consequences on disease risk.

93. Disease has significant consequences for the efficiency and profitability of livestock production.

Recommendations

94. *Government and industry should ensure that emphasis on links between mental and physical aspects of animal health is strengthened in both strategy and policy areas of decision making.*

95. *Government and industry should develop interdisciplinary research and knowledge exchange initiatives to strengthen the link between consideration of the mental and physical aspects of health in animals. Fundamental research is needed to measure and validate measures of mental state in animals. The applicability of welfare science research needs to be enhanced through the use of farm-level experiments and observational studies.*

96. *A transparent discussion should be held, that includes all parties (e.g. sector bodies, farmers, stockpeople, veterinarians, animal health and welfare researchers, geneticists, food production companies, retailers, Government), about the likely causes of negative animal health effects from modern livestock farming, with the welfare of the farmed animal at the heart of the discussions.*

97. *The farming industry and the veterinary profession should ensure that livestock keepers and stockpeople are aware of stresses on the animal, exposure to pathogens and poor environmental factors that can lead to disease and how to prevent these wherever possible.*

98. *The farming industry should ensure that stockpeople are trained to recognise, understand and respond rapidly and appropriately to the signs of illness in animals and to provide good nursing care in an appropriate environment.*

99. *Further research on the costs of welfare impact of disease should be carried out by Government and industry to encourage a greater focus on improved welfare through prevention of disease.*

PART III – SURVEILLANCE AND MONITORING OF FARM ANIMAL DISEASE

Definitions and purpose

100. Surveillance comprises monitoring the whole population (national, sector specific or herd/flock), or a representative sample, to identify the occurrence, incidence and prevalence of disease. When assessing the level of disease in a population, prevalence describes the number of animals affected with a disease at any one time, while incidence is the number of new cases which occur in a given time period. These two measures are linked by the duration of the disease event.

101. Surveillance for disease in farm animals can be targeted (active), where animals are actively sought out and examined. For example, many dairy farmers screen the somatic cell count of milk of all dairy cows in their herd each month to monitor levels of infection in the udder; the pig industry monitors lungs as part of abattoir inspections to provide information on respiratory diseases; each year a random sample of sheep in Great Britain is tested for *Brucella melitensis* (an exotic disease which can cause meningitis in humans) as part of our demonstration that Great Britain is free from this organism.

102. Surveillance can also be scanning (passive), where a farmer or veterinarian requests examination of a live or dead animal or sample from an animal rather than monitoring a whole group. For example, when an animal dies unexpectedly or has a disease that needs confirmation with laboratory tests, the farmer's veterinarian will submit a whole carcass or samples for diagnosis.

103. The purpose of surveillance of diseases is to detect the emergence of new diseases, to monitor the prevalence and incidence of endemic diseases and to facilitate evidence-based decisions by Government, industry and farmers. Government (public) surveillance focuses on detection of new and re-emerging diseases, or zoonotic diseases, whereas private surveillance by industry often has greater emphasis on obtaining farm prevalence figures for endemic diseases. There are currently no published baseline data for the regional or national prevalence or incidence of many endemic diseases despite their importance.

Government role in surveillance of farm animal disease and welfare

104. Governments require information on disease prevalence to support national and international policy. Their reasons for intervention in animal health matters are defined in the Great Britain Animal Health and Welfare Strategy (2004) as: to protect public health, to protect the interests of the wider economy and society, to secure opportunities for trade and to protect and promote animal health and welfare. Government surveillance currently comprises a mixture of scanning (passive) surveillance to detect new and emerging diseases through the regional network of veterinary laboratories, and tar-

geted (active) surveillance for certain diseases with relevance for human health such as bovine tuberculosis, and various other zoonotic pathogens like campylobacter and salmonella for which there is mandatory reporting. There is minimal input from Government into surveillance for the many endemic diseases that cause the majority of clinical illnesses in farm animals such as diarrhoea, pneumonia, lameness or mastitis.

105. Scanning surveillance data come from a variety of sources. Both the Animal Health Veterinary Laboratory Agency (AHVLA) in England and Wales, and the Scottish Agricultural College (SAC) in Scotland, operate a pathology service to which whole carcasses and samples can be submitted by veterinary practitioners to aid disease diagnosis. In addition, a farmer or veterinarian can request support for a disease 'situation' on a farm where the cause is unknown. This service is increasingly steered by AHVLA towards submission of more targeted samples. Submissions (and site visits) are used to detect new and emerging diseases, which are of public concern because of their potential impact on the economy, society and public health.

106. In recent years, in a drive for efficiency, laboratories have become more specialised. Gross post mortem inspection is done at most AHVLA and SAC laboratories but samples are sent to specific laboratories for further investigation. The number of laboratories has been reduced and surveillance is going through a period of managed change to achieve savings by 2015, which will inevitably further reduce the number of local laboratories. The impact of this on the value of scanning surveillance is concerning, and it will need careful decisions to prevent a loss in the skill base of veterinarians with field epidemiology and pathology expertise to diagnose new and emerging diseases.

107. Devolution has changed the way that animal health and welfare issues are addressed. Disease surveillance in Scotland has recently been reviewed³⁶. The Scottish Government has established a Strategic Management Board for veterinary surveillance which has farmer, veterinary and public health members.

108. The Surveillance Advisory Group has recently recommended a future delivery model for veterinary surveillance in England and Wales³⁷. The group recommended an ambitious but essential core target of 95% of holdings and animals having access to a post-mortem facility or collection point within an hour of travel (from a current position of only 50%) with the service providing a surveillance network structure of species based centres of expertise staffed with a tiered level of skills and knowledge. The advisory group did not make specific welfare surveillance recommendations but the establishment of a representative and cost-effective surveillance network provides opportunities to collect, evaluate and disseminate species specific welfare data.

109. Veterinarians and farmers have a legal requirement to notify Government if they suspect a notifiable disease (e.g. the 2001 foot and mouth disease outbreak was identified after a veterinarian suspected the disease from lesions on sows sent for slaughter).

³⁶ <http://scotland.gov.uk/Resource/Doc/362344/0122619.pdf>

³⁷ http://vla.defra.gov.uk/science/docs/sci_sag_final_report.pdf

The benefits of a disease being notifiable are that there is an awareness of the location of the reported disease, and an opportunity to restrict its spread.

110. Several diseases were made notifiable when first detected in Great Britain, e.g. porcine reproductive and respiratory syndrome (PRRS) in pigs and caseous lymphadenitis (CLA) in sheep. Ultimately the notifiable status was removed because the diseases could not be diagnosed, treated or contained, herds/flocks under restriction were disadvantaged and there was no risk to human health. Consequently, no national surveillance mechanism for such diseases is now in place.

111. The ingress of new and emerging diseases into Great Britain will remain a threat with the increase in global trade and changing pattern of disease through climate change. Indeed, there have been over 14 exotic disease outbreaks in the last 10 years including foot and mouth disease, avian influenza and bluetongue. Improved systems of international surveillance to raise awareness of potential threats have helped with recent outbreaks but the robustness of national bio-security remains a concern.

112. Defra share surveillance information through a data management information system (RADAR - Rapid Analysis and Detection of Animal-related Risks). Data from many sources are gathered under RADAR (e.g. from Defra, the Food Standards Agency (FSA) and local authorities) and can be accessed by authorised parties. The data can also be used by researchers and practitioners on request. The current system is complex with many interested parties involved and it is not clear how well all parties communicate. It appears that different stakeholders provide data to greater and lesser degrees, and work on adding new data appears to have stalled at the time of writing in 2012.

113. RADAR was recognised in a recent review³⁸ as providing accessible, quality-assured population data. Accurate data on location and past and current movements of farm animals play an important role in disease control, both when managing notifiable diseases and for decision making to control endemic diseases. However, some sectors are reluctant to use electronic records of populations and movements and not all animal locations and movements are recorded electronically by RADAR.

114. There is a number of areas where health surveillance data could be cost effectively collected. All animals for human consumption are inspected ante mortem for health and welfare purposes and carcasses are inspected post mortem to identify gross abnormalities. These inspections are primarily targeted at fitness for consumption rather than pathology and welfare. Until recently data were not returned to farms but the FSA aims to produce better feedback for farmers in future. Many animals which die on farms are removed by a collection team. Together this means that surveillance data could be collected from nearly all animals.

115. Local authorities, official veterinarians and meat inspectors are also involved in assessment of animal welfare at markets and abattoirs. Previously we recommended

³⁸ Defra. A Review of the implementation of the Veterinary Surveillance Strategy (VSS). June 2011

that local authority inspectors should be trained and qualified to a common standard which would enable data to be used from these sources as surveillance for animal welfare, which could include signs of disease³⁹.

116. There are currently separate research and policy groups for animal welfare and animal disease within Defra. It is important that planning relating to surveillance for animal disease should also consider how surveillance could benefit animal welfare.

117. The Animal Health Veterinary Laboratory Agency visits approximately 1% of live-stock holdings per annum in Great Britain each year for random and targeted welfare inspections. Cross compliance with national and EU animal welfare legislation is assessed at these inspections. When animals are in unnecessary pain or distress farmers fail such inspections. In approximately 50% of failures animals have not been inspected by keepers, have not received appropriate treatment for disease or appropriate records have not been kept. Recently we concluded that, although these inspections are substantial and valuable, *'their collected findings are not published regularly in a convenient form and it is therefore difficult to identify trends and draw general conclusions'*⁴⁰.

118. One argument for on-going public surveillance and recording of endemic diseases is that it provides society with knowledge of the number of animals affected and their level of suffering, and would support targeted approaches to reduce the prevalence of such diseases. What is less clear is who should fund or co-ordinate such surveillance; costs may be high as there would need to be a targeted surveillance programme for each disease of interest.

119. The Defra prioritisation tool D2R2 (Decision briefing, Decision support, Risk analysis and Ranking)⁴¹ could be used to aid the decision on the value of surveillance for any given disease. This currently contains a list of approximately 80 animal diseases, each with a profile drafted by experts and peer-reviewed. The diseases are weighted in the context of the four Government Reasons for Intervention (paragraph 104) including welfare. The animal welfare weightings include the number of animals at risk, degree (or intensity) and duration of the welfare impact, impact on the Five Freedoms and impact of control measures. The current relative weightings have been decided by an expert group but the programme is flexible and the weightings could be changed.

120. Currently, profiled diseases do not include many common endemic diseases of farmed animals that affect their welfare, e.g. mastitis, lameness, respiratory disease, endoparasites and ectoparasites. FAWC believes that D2R2 should include these. The disease profiles are not currently available outwith Defra, although their availability would be useful to many stakeholders.

³⁹ (2) FAWC *op.cit.*

⁴⁰ *ibid*

⁴¹ Animal Health Veterinary Laboratories Agency, Annual Report and Accounts 2011-2012, pg 13

Conclusions

121. The benefits of disease surveillance for Government include food security; economic benefits of better management of disease outbreaks of reduced disruption to trade; and compliance with EU requirements. However, whilst animal disease and welfare are listed on the Defra priorities for intervention, most currently surveyed diseases are either exotic or zoonotic.

122. Given the high level of animal welfare demanded through legislation and codes of practice and the concern of citizens for high standards, the lack of surveillance of endemic diseases that do not affect society (other than as a public good) but that affect the welfare of farm animals is a major gap in public surveillance.

123. A key requirement for effective surveillance is to engage with data providers and beneficiaries of the information to ensure that data capture is efficient with clear objectives and outcomes. Data management, analysis and interpretation with reporting and feedback are vital to provide maximum use and continuance. Systems need to be standardised so that data can be shared.

124. Whilst RADAR has made progress in bringing together livestock databases under its care, there are many databases that could contribute to surveillance of the country for both denominator (animal) data, disease and welfare data. For example, welfare data from AHVLA, local authorities and the FSA could be combined. Momentum needs to be maintained with involvement of industry to maximise the potential outputs.

125. With limited resources, prioritisation of health and welfare objectives is essential. The Government's prioritisation tool, D2R2 has the potential to play a pivotal role.

Recommendations

126. FAWC encourages an actively co-ordinated approach for both exotic and endemic disease and animal health and welfare amongst Governments in Great Britain.

127. Support for disease surveillance and monitoring should be increased by demonstrating how these drivers and goals are shared by multiple stakeholders. Government and the livestock sectors should consider the data that are currently collected on animal health and welfare and discuss what are most effective for national, sectoral and herd health management and how this can effectively be shared to the benefit of all. Resources should be allocated to explore the possibilities of co-ordinated use of private and public surveillance data to satisfy Government and industry objectives.

128. The new Animal Health and Welfare Board for England (AHWBE) should become the key player for co-ordinated action in surveillance and control of endemic diseases in England. Defra, through the AHWBE, should maximize the opportunity for partnership working on endemic diseases as well as diseases that are notifiable and of concern for food safety. The AHWBE should maintain sufficient expertise and sector

representation of the major livestock species to ensure that effective dialogue is maintained to deliver the health and welfare strategic goals.

129. *The information management system RADAR (Rapid Analysis and Detection of Animal-related Risks) should be further developed to bring together existing databases and, where new databases are established, links should be established early on.*

130. *The Defra prioritisation tool D2R2 (Decision briefing, Decision support, Risk analysis and Ranking) should include profiles of the endemic diseases with the greatest welfare impact. It should be available on the Internet and ideally should be flexible so that stakeholders can adjust the weightings to prioritise important endemic diseases in a variety of situations. The benefits of the tool and opportunities for co-operative activity should be communicated to the industry.*

Industry role in surveillance of farm animal disease and welfare

131. The benefits to the industry of monitoring health and disease include an awareness of the important health and disease issues, to facilitate co-ordinated effort to minimise the impact of disease and stimulate prioritisation of research. Whilst this will incur costs, the benefits include a positive industry image (e.g. for marketing) and improved efficiency. Where the benefits are for the industry, the cost of such surveillance should be borne by that industry.

132. There are many industry players in each sector including levy bodies, political associations, farm assurance schemes, veterinarians and commercial companies. These have different priorities but all could contribute to sector-level surveillance and supporting farmers in their activities to monitor health and disease. Such activity requires central co-ordination, which is most appropriately led by the individual sector levy boards (where present), sector representative bodies and co-operations of commercial companies supported by corresponding professional veterinary societies.

133. The minimum requirements for effective industry surveillance are agreement on the key disease and welfare priorities, knowledge of active holdings, standardised assessment parameters, co-ordination of funding and mechanisms for collection, analysis and communication of the data to those that can effectively use it. Data capture should cover patterns of infection and clinical and performance outcomes as well as diagnosis of the presence of a pathogen.

134. One barrier to surveillance is the cost of collating information that might be collected from farmers to make industry-wide estimates. Limited industry resources need to be appropriately balanced between surveillance, research and knowledge transfer, and a clear cost/benefit case needs to be made. One example where national surveillance could improve a welfare problem is in the dairy sector where DairyCo pays for continued genetic development of dairy cows. The greater the industry participation in the recording of lameness in dairy cattle, the faster genetic selection and other control measures can be used to help reduce its incidence.

135. A good example of partnership working in collating national data has been the development of the eAML2, Electronic Animal Movement Licensing 2 (2=pig), system in the UK, where Government funded the development with industry co-operation to deliver and operate the system. Mutual benefits have been achieved with savings to Government from the costs of monitoring livestock movements through the paper based Trading Standards system, real-time location of holdings in the event of managing a disease outbreak and knowledge to facilitate industry-based health and welfare improvement schemes.

136. Livestock sectors are moving forward in co-ordinating disease information to greater and lesser extents and with different priorities. Sector bodies vary in their within-sector co-ordination, which tends to increase as the number of primary producers decreases. The sector-specific political bodies vary in the degree of dialogue and agreement that they have with their sector levy body. Any disagreement potentially slows progress on animal health improvement; this is evident from recent discussions on, for example, electronic ear tagging of sheep, which could have positive impacts on health and welfare.

137. The commercial poultry industry is dominated by a few large companies. All non-statutory disease and welfare issues are managed in-house. The industry is self-contained and publishes little information on disease incidence or performance because these are commercially sensitive. There is however a good network between the UK and EU poultry specialist veterinarians who act as effective co-ordinators of information across the industry. For broiler chickens there is a statutory requirement to monitor welfare indicators at abattoirs; this information feeds back to influence the permitted stocking density at individual farms. Such data have the potential to be combined with other farm specific information to permit epidemiological analysis of risk factors and disease patterns.

138. The pig industry is also vertically integrated and is increasingly co-ordinated. The levy paid is managed by the British Pig Executive (BPEX), the levy body for English pig farmers, Quality Meat Scotland (QMS) and Hybu Cig Cymru Meat Promotion Wales. There is a close working relationship between BPEX and the National Pig Association (the political body for English pig farmers). BPEX encourages dialogue between farmers in its voluntary pig health scheme and farmers state publicly when any of four targeted diseases is present. BPEX has managed a compulsory check for antibodies to salmonella in an attempt to reduce zoonotic transmission, and also launched the British Pig Health Scheme (an abattoir-based health surveillance scheme) in 2005, with results disseminated back to farmers who are part of the Pig Health Improvement Programme. QMS operates similar schemes in Scotland. A farm-based disease Information collection and reporting scheme under NADIS (National Animal Disease Information Service) was originally jointly funded for the pig sector by Government and pharmaceutical companies. BPEX assumed responsibility for the scheme when public funding terminated, but deficiencies in methodology and consequent lack of support led to its demise in

2011, although an on-line pig health information resource is still available. There is currently a gap in collection and sharing of farm-derived data.

139. The degree of co-ordination in the dairy industry is growing, with DairyCo taking an increasingly active role in surveillance of diseases. DairyCo promotes a national programme to monitor lameness and control mastitis⁴². The Red Tractor Assurance Dairy Scheme, covering 95% of dairy cows in Great Britain, requires the recording and collation of the priority criteria (mastitis, lameness and reasons for culling) identified by the industry in their 2010 Dairy Cow Welfare strategy.

140. Industry co-ordination on health surveillance is less in the sheep and beef sectors, and varies between the devolved bodies. These sectors comprise many primary producers, who have been supported by subsidy for many years. The farm based information and collection service, NADIS⁴³, has provided monitoring of cattle and sheep disease trends, and continues to provide a monthly parasite forecast which is widely distributed throughout the industry, and monthly disease alerts highlighting diseases that are prevalent for that time of year.

141. In addition to the levy bodies, farm assurance and retailer schemes are highly influential in steering standards for health and welfare and are a huge potential resource for surveillance data, although this is currently not publicly available. All scheme members are visited and inspected at 12 – 18 month intervals.

142. More recently, industry interest has moved towards incorporating animal-based as well as resource-based measures of health and welfare into farm assurance schemes. Industry has a key role to play in standardising these welfare outcome measures, many of which relate to health. They allow surveillance of iceberg indicators of the state of welfare at one time and provide a rolling average through different seasons and challenges to the farm management. The measures can provide direct or indirect surveillance of stockmanship.

143. Unfortunately, very few industry data are currently published. This makes benchmarking of levels of disease and identification of trends impossible. It is also not possible to judge the quantity or quality of the data collected. Where data are used and published, this motivates better quality data collection. Overall, greater awareness of disease levels would change the accepted norms and move all flocks and herds to better welfare standards, and a virtuous circle of improvements through the process of ongoing surveillance through regular review could occur.

144. Herd and flock health monitoring is usually facilitated by an external expert who visits the farm and inspects animals regularly. Typically, this is a veterinarian who can diagnose disease and who should also have the necessary skills to monitor health and advise on husbandry. By monitoring and recording diseases on the farm, the veterinar-

⁴² <http://www.dairyco.org.uk/technical-services/healthy-feet-programme/>

<http://www.dairyco.org.uk/technical-services/mastitis-control-plan/>

⁴³ <http://www.nadis.org.uk/>

ian can advise on disease avoidance and also train stockpeople on correct and rapid treatment should disease occur (see Part V). These disease records, when pooled over many farms, could be the basis of sector level surveillance. In some sectors, veterinarians also perform an important role at abattoirs in carcase examination to provide information back to farms and this could also be used by industry.

145. Correct identification of a disease is an important part of any surveillance programme. For example, lameness in cattle has many causes; to have an effective system to reduce lameness, the cause as well as the clinical signs must be recorded. This is a key role for the veterinarian that is often omitted, partly because the ready availability of drugs on farms permits farmers to treat sick animals without knowing the cause of disease.

146. Where mutilations, such as tail docking in pigs and in sheep or beak trimming in poultry, are carried out on farm, surveillance of the prevalence of welfare problems that they are intended to prevent is required. This must be able to demonstrate that these procedures are necessary.

147. Future developments in farm surveillance of disease might include the use of automated technology. For example, it has recently been reported⁴⁴ that the optical flow patterns of the collective movement of broiler chickens were significantly correlated with key welfare measures such as mortality, numbers of birds with hockburn (damaged leg skin) and abnormal walking (poor gait). Further developments are occurring in the use of automated registration of coughing in pigs by sound analysis, lameness in cattle and pigs using force plates, acidosis and body temperature in cattle using rumen boluses, etc.

Conclusions

148. The degree of co-ordinated action to monitor endemic diseases varies by livestock sector and is linked in part to the number of primary producers, dialogue between the within-sector players, and sector-specific priorities.

149. There are several farm assurance schemes and many retailer-led quality assurance schemes that collect a wealth of data but vary in transparency. Routine data collected could benefit the industry if made available in a strategic way, e.g. locomotion scoring of cattle could assist in genetic selection against lameness.

150. Farm assurance schemes use both resource-based (space, bedding, etc.) and animal-based measures (lameness, injury, behaviour) to assess animal health and welfare, but are often confidential and limited in application. They have the potential to facilitate significant progress in surveillance and improvement of animal health and welfare by allowing integrated analysis of data collected. Animal-based measures also

⁴⁴ MS Dawkins, R Cain, SJ Roberts. Optical flow, flock behaviour and chicken welfare. *Animal Behaviour* 2012 in press 1-5

provide a valuable tool for surveillance of stockmanship and for surveillance of welfare through iceberg indicators of physical and mental ill-health.

151. The ideal welfare situation is where all herds and flocks are monitored for all health and disease issues and the results of monitoring are acted upon; the challenge is the time and cost of the monitoring process itself.

152. Surveillance and monitoring take much time and effort and require skilled expertise for diagnosis. The level of diagnosis might vary with the purpose of monitoring, e.g. prevalence of lameness is sufficient to identify whether there is a high level of lameness in a herd or flock, but knowledge of the true causes of lameness is required if prevalence is to be reduced.

Recommendations

153. All livestock sectors should determine those infectious and non-infectious diseases of importance within or across sectors that could benefit from co-ordinated surveillance and consider whether industry could usefully co-ordinate such programmes. This should preferably be done at a Great Britain level, possibly with different countries assuming the lead for different diseases.

154. Assurance and retailer scheme data should be shared at a national level, with appropriate safeguards on confidentiality of source, to enable their use in more strategic disease management initiatives. In addition, these data provide the possibility to benchmark industries and so set targets for improvement and assess their success.

155. All assurance schemes should consider using both resource- and animal-based inspection criteria. Animal-based criteria should incentivise improved health and welfare through fewer inspections resulting from earned recognition or premium payments.

156. Sector bodies working with specialist veterinary groups should ensure that the value of effective surveillance and monitoring is fully communicated to industry, and work to co-ordinate data where appropriate. Data capture outwith the Government agencies should be incorporated and costed into the surveillance network.

157. Government and industry need to facilitate standardisation of appropriate surveillance and diagnostic tools to enable veterinary advisors to establish an accurate diagnosis of a farm's health that can be benchmarked. Those recording data for disease surveillance must have sufficient skills for the level of diagnosis required.

PART IV - PREVENTION OF DISEASE

Introduction

158. FAWC recognises that complete absence of disease in farm animals is rarely, if ever, achieved. Disease management is subject in part to the economics and practicalities of livestock farming. However, every farm should aim for continuous reduction of disease in its livestock. There are currently many endemic diseases where there has been no reduction in prevalence for a number of years, e.g. lameness (and mastitis) in dairy cows, sheep and pigs.

159. Preventive healthcare should aim to minimise the risk of disease on a farm, in a region or within a population. When disease is present, the keeper's aim should be to minimise its impact and in conjunction with the farm health advisor to evaluate future plans to minimise the possibility of re-occurrence. There are farms with very low levels of disease and the aspiration should be to move all animal keepers towards the health status of the best practice farmers.

160. Where the husbandry system is such that the animal cannot exert sufficient control over its environment for itself, a greater level of care needs to be provided by the keeper. Similarly, where animals are producing close to their physiological limit, a greater level of management input is required to ensure that health risks are minimised.

161. FAWC stresses that management of herds and flocks should be focused on providing husbandry that is appropriate for the needs of all individuals or groups rather than the average level of performance in the flock or herd: if different animals have different needs, they should receive different care which should be provided by the management system, e.g. feeding ewes carrying twins.

162. The impact of subclinical disease is not outwardly visible, e.g. reproductive issues that impact on later productivity and the health of offspring; some pneumonias in pigs that do not present visible signs; and some parasitic disease in sheep and cattle that can only be detected by monitoring growth. Management action is needed to detect subclinical disease and make improvements. FAWC has concerns about the long term impacts of chronic or subclinical disease on animal health and welfare.

163. Animals can carry some zoonoses without significant welfare impact on themselves. However, animals with poor welfare often have higher levels of diseases that are of food safety concern. This highlights that good animal health and welfare in livestock production can have wider affects of relevance to food safety and other areas.

Bio-security and prevention of spread of disease

164. National bio-security is the responsibility of Government and industry; it cannot be effective without industry participation. Rapid detection of new or exotic diseases is important to limit the welfare impact of a new disease on a naive population. It depends

on maintaining good surveillance at all levels and prompt action is required to establish the significance of the threat, reduce or eliminate the threat as appropriate and minimise the impact on health and welfare when disease occurs.

165. Quarantine and movement regulations within a country are key to minimising the impact of a new or exotic disease threat (and controlling endemic disease), particularly in the case of diseases with long incubation periods or with clinical signs which may be unfamiliar. There are currently mandatory standstill times after movements of new stock onto a farm before further movements are allowed, other than direct to slaughter. Attempts to reduce the statutory livestock standstill times after regular stock movements from the current minima should be resisted because of the risk of increasing rate of disease spread. FAWC recognises the challenge that this creates to some livestock sectors where markets are more heavily dependent on live animal trade. However, whilst limiting free movement of animals can be seen as a disbenefit there is a great deal of sense in detecting and slowing the spread of disease for animal health and welfare and the viability of the industry as a whole.

166. Some diseases are notifiable (reportable to the authorities by law and subject to specific control strategies). The actions required in respect of exotic notifiable disease are set at EU level, in order to demonstrate disease freedom, both at EU and international level, so that trade can resume. Inevitably, movement restrictions on animals are applied where disease is confirmed to be present. Control strategies depend on the severity of the disease, how it is spread and best controlled. For example, when blue-tongue virus was first diagnosed in Great Britain in 2008, it was a notifiable disease under EU regulation. Positive flocks and herds were identified and awareness of the location of the disease was high. Vaccination was then used as a control and farmers could make an informed choice whether to vaccinate. The impacts are the cost to Government to manage a notifiable disease and a cost to farmers during the blue tongue outbreak through inability to move and sell livestock. Schmallenberg disease is not notifiable as imposing movement or other controls was unlikely to have any impact on disease occurrence or spread since infection occurs several months before the disease is seen.

167. FAWC recognises a tension between measures necessary to control disease spread and the welfare of uninfected animals. The longer unexpected movement restrictions are in place, the greater the risk to welfare from overcrowding, increased aggression, inappropriate housing, increases in other diseases, lack of feed and a breakdown in management routines. The farm work-force may find it difficult to respond to the disease either because of increased numbers of animals on farm, pressure on other resources or zoonotic risks. The responsibility for the welfare of animals under movement restriction lies with the keeper who needs to have a contingency plan in place for the care of animals. However, notifiable disease outbreaks can last for extended periods exceeding the reasonable capacity of the keeper to care adequately for their livestock. During the classical swine fever outbreak in 2000 and foot and mouth disease outbreak in 2001, the welfare implications for healthy animals led to the introduction of a welfare disposal scheme.

168. The roles and responsibilities for management of the welfare of farmed animals in disease outbreaks where long term movement restrictions are in place and when additional support is justified, for example through a welfare disposal scheme, are best clarified in advance of disease outbreak. In addition, strategies to minimise the extent and duration of potential movement restrictions should be considered. For example, organizations within the poultry industry have successfully adopted a process of 'compartmentalisation', a procedure where animal subpopulations of distinct health status and management practices can continue movements independent of location or national borders, by agreement with the Government.

169. It is not always necessary to make a disease notifiable in order to take concerted action to deal with an emerging threat. For example, H1N1 influenza in pigs and poultry was dealt with through EU level codes of practice.

170. At farm level, bio-security starts with the identification and assessment of hazards, including the risk of incursion of disease, and of the impact and cost of disease versus the cost of control. This approach should be a key element of the farm health planning process.

171. Some risks, including contact with animals and animal materials, people and other resources entering the farm, can be minimised effectively. Other risks such as local spread by vermin, insects, aerosol or birds, particularly in areas of dense location of livestock premises, are difficult to control but nevertheless necessary for bio-security. Marketing and movements of animals increase disease spread and consideration should be given to a whole chain approach to bio-security including the transport and end customer, whether another farm, market or abattoir.

172. Adoption of good bio-security principles has partly been driven by increased risk through intensification and high density of production, but also through necessity for economic survival. Hence, they are most developed in the poultry sector (where the more integrated supply chains are increasingly adopting bio-security principles, that also provide reassurance on freedom from zoonoses). In the pig sector, the industry is familiar with the principles but commitment to implementation varies considerably. We were told that bio-security in the cattle and sheep sectors varies from reasonable to poor quality.

173. Changing structures in livestock industries have tended to increase risk through larger herds and flocks, ongoing replenishment of the population with susceptible animals keeping the disease recycling and movements which introduce new pathogens and strains into flocks and herds where there is compromised resistance and immunity. The reversion in some sectors to systems with a more natural element, such as outdoor pigs and free range egg and broiler production, has seen the re-emergence of diseases that had been eliminated in more bio-secure indoor systems, e.g. blackhead in turkeys and ascarids and clostridial disease in outdoor pigs.

174. Farming sectors tend to cluster where the environment and resources suit them increasing the risk of closely linked populations sharing disease risks. Wherever possible, farmers should minimise contact with neighbouring herds/flocks with robust and effective fencing, local management of movements and grazing management.

175. These greater risks have not always been mitigated by recognition of the consequences and implementation of effective preventive healthcare, despite the availability of information on preventive medicine and known costs of disease. Greater appreciation of the bio-security costs and benefits of different production systems could encourage moves to systems that reduce the risk of disease and provide positive health benefits (e.g. all-in all-out systems, closed breeding flocks and herds and pre-movement testing), and veterinarians have a clear role in advising their clients⁴⁵.

176. Working with industry and the relevant veterinary societies, the Government could increase the focus and encourage greater investment in bio-security through funding under a (Health and) Welfare Stewardship Scheme as recommended recently⁴⁶. For example, The Pig Health Improvement Scheme, funded by the Rural Development Programme for England (RDPE) introduced a bio-security audit conducted by the farm veterinary advisor as a condition of Scheme membership, which highlights an individual farm's strengths and weakness to the keeper and his veterinary advisor. The scheme also encourages collaborative activity between farms to improve bio-security regionally.

177. One of the major threats to a livestock enterprise is the health status of incoming livestock, but in many cases sufficient information is either not available or not considered, and basic quarantine and management procedures are not practiced. Disease testing and quarantine should be tailored to the specific circumstances of the farm and the origin of the animals brought in. The farmer should seek advice from his veterinarian, who should have access to information and be able to provide advice about the pertinent diseases dependent on the area animals are coming from. One alternative is to operate a closed herd/flock but with a focus on genetic fitness. Another is to have an all-in all-out system with disinfection between batches.

Conclusions

178. Minimising the spread of a new, exotic or endemic disease is a critical component of any health and welfare strategy, be it internationally, nationally or on a specific farm.

179. Implementation of good bio-security is a basic principle of preventive healthcare. There is room for considerable improvement in current industry practices. Government should support improved bio-security practices through funding programmes until the principles are embedded as a routine established part of farm health planning.

⁴⁵ GJ Gunn et al. Measuring and comparing constraints to improved bio-security amongst farmers, veterinarians and the auxiliary industries in Great Britain. *Preventive Veterinary Medicine* 84 (2008) 310-323.

⁴⁶ (6)FAWC *op. cit.*

180. A risk for importation of exotic or new diseases or new strains of disease is the open movement of farm animals and germplasm within the EU and elsewhere and the inability of the Government to enforce testing of animals before entry (other than for agreed notifiable diseases).

181. There is a high risk of disease transmission with shared grazing and buildings, and with contracting out rearing of young stock and other work. All farms using an area of common grazing without separation of animals might be considered a single epidemiological unit for the purpose of disease control. Keepers also need to cooperate in detecting and treating disease that might occur.

Recommendations

182. Livestock sectors should work with Government to formulate movement restriction policies that balance the needs of livestock sectors to function effectively with the requirement for disease control.

183. Government should clarify the roles and responsibilities for management of the welfare of farmed animals in disease outbreaks where extended movement restrictions are in place, and work with industry to develop strategies to minimise the extent and duration of movement restrictions in the event of a notifiable disease outbreak.

184. Industry bodies should set up a voluntary code to promote disease testing before importing livestock and germplasm, and to ensure special precautions if importing from areas with known disease. Development of decision support tools by industry, which provide a common basis for introduction of new stock (from Great Britain or abroad), would quantify and reduce risk.

185. Farmers and all other stock-keepers should minimise contact with neighbouring herds/flocks with robust and effective fencing, local management of movements and grazing management.

186. Government, working with industry, could encourage improved bio-security practices through incentivising individual and collaborative actions, and making effective bio-security a key requirement for access to a (Health and) Welfare Stewardship Scheme.

Prevention of disease by elimination

187. Elimination of a disease can be done by individual farmers, sectors or Government, or a collaboration of these. Individual farmers can take the economic decision to upgrade their flock or herd health and welfare status. Industry often decides to remove economically damaging disease, to facilitate trade or gain a marketing niche. Government takes action for international obligations, facilitation of trade, economic impact and zoonotic disease control reasons.

188. Elimination of specific pathogens from a farm or region makes animals susceptible to re-infection and careful assessment of the quality of bio-security and subsequent risk of re-infection is needed before a decision to eliminate is made. Evaluation of control measures other than elimination should also be made. For example, the opportunity to improve health and welfare through farm improvement and recent developments in preventive health care such as respiratory vaccines for pigs together with housing with better environmental control have provided levels of control of enzootic pneumonia in pigs that have made elimination less urgent. Attempts to eliminate diseases have had variable success depending on the specific pathogen and the approaches taken.

189. As a positive example, the Pig Health Programme, co-funded by the British Pig Executive and the Rural Development Programme for England (RDPE) with support from the Pig Veterinary Society, convinced farmers that individual farm elimination of swine dysentery is worthwhile. Infected farms in a region are identified and they are collectively encouraged to take action to eliminate the disease. Risks from re-infection are tackled regionally and collaboratively and the veterinary input is key to successful management of the programme.

190. In the cattle industry, health schemes, under the Cattle Health Certification Standards, provide voluntary programmes for monitoring, control and ultimately elimination of non-notifiable disease at individual farm level, providing certification to a common standard based on an on-going testing programme. The number of schemes and membership has increased, encouraged by Government pump priming funds, but remains at a low level adding to the costs and challenges to scheme members of maintaining high health status through difficulties in sourcing replacement breeding stock, and the additional costs of perimeter fencing and disease surveillance. Lack of uptake of these voluntary schemes has been attributed to the lack of understanding of the costs of chronic infection, and the individualistic and competitive nature of the industry. There is a role for the sector bodies and specialist veterinary services to promote the benefits of a higher health status to individual farms, where appropriate.

191. Achieving elimination at a national level requires a high level of co-operation and allocation of significant resource. Feasibility depends on the individual circumstances of cost and difficulty versus likely success and alternative control options. The pig industry successfully eradicated Aujeszky's disease in the 1980s, with all farmers contributing to an elimination fund by collection of a headage payment at the abattoir. The administration of the scheme was facilitated by primary legislation after an industry ballot in favour of elimination, and was successful because of strong industry commitment to the policy through the funding of compensation under the compulsory slaughter scheme.

192. Bluetongue in cattle and sheep was successfully eliminated with a Government-underwritten vaccine encouraging uptake, high awareness of the campaign and levels of co-operation within the industry, and possibly good luck with the weather following introduction.

193. The integrated nature of the poultry industry assisted in the successful elimination of avian lymphoid leucosis, a viral disease causing tumour related mortality in broiler breeders. By development of diagnostics for the different virus subgroups, elimination of infected birds and selection of resistant lines, combined with increased bio-security measures to prevent re-infection, companies in the UK and USA have eliminated what was once a global endemic problem.

194. Continued freedom once elimination is complete depends on rapid detection of re-infected animals. For example, brucellosis was eradicated from cattle in Great Britain in 1979, but has been reintroduced on several occasions through importing cattle. Since brucellosis of cattle is still present in many European countries, its prevention in Great Britain relies on thorough checks of imported cattle and continuing surveillance based on monthly testing of bulk milk samples from dairy herds, blood testing of beef breeding herds every two years, post import checks, post calving checks of imported cattle and investigation of cattle abortions for those cattle not tested through milk bulk tank samples.

195. Some elimination schemes, for example Sheep Scab, have been less effective despite a series of different policies over a number of years, including notification, compulsory treatment or slaughter, use of ministry-approved dips, isolation and treatment, and movement controls. Currently, in Scotland, the Sheep Scab (Scotland) Order 2010 provides for compulsory notification by keepers of sheep infested (or suspected of being infested) with sheep scab. Past surveys suggest that Scotland might expect 15% of sheep holdings to be affected annually, around 2,000 cases, but in 2011 only 144 notifications were made. If 90% of expected cases are undetected and/or unreported (but not necessarily untreated), it would suggest that there needs to be either greater incentive to report the disease or greater enforcement of the compulsory requirement for notification. Except for compulsory notification, similar requirements and controls exist in Wales and England; analysis of sheep scab surveys suggest prevalence of scab in sheep flocks in Wales is stable at approximately 15% per year with some geographical variation. If the current policy is to be more successful than previous attempts at elimination, successful identification, effective treatments (both in efficacy and application) and responsible movement of sheep with effective bio-security measures are essential, with co-operation between the devolved bodies.

196. It is now widely accepted that the policy of testing and culling cattle herds to eliminate bovine tuberculosis (bTB) has failed either to control or to eliminate the disease. The area affected has spread from a few isolated pockets in the late 1980s to cover large areas of England and Wales today, with 34,250 cattle involuntarily culled from the national herd in 2011. In 2012, Jan to July, the number has risen compared to Jan to July 2011. The policy was a reactive one in that it did nothing to pre-empt spread to new areas by preventing movement of undetected infected cattle. In addition, from the mid 1980s, with the exception of farmed deer, there was no attempt to tackle infection in non-bovine species, regardless of whether they were farmed or wild.

197. Many claim that bTB is not a welfare issue for infected cattle. Early diagnosis has largely removed clinical disease and the potential for long term suffering of infected individuals, while modern culling methods provide a humane death for infected animals. The welfare implications of this disease affect the animals testing negative, especially in high risk areas where testing frequency and the resultant stress of handling and testing procedures and herd disruption is high. Herd movement restrictions may also have welfare implications due to increased stocking density. Isolation of cattle which test inconclusive, pending re-testing, may be stressful for individual cattle separated from the herd for more than 60 days.

198. The management of bTB, including the controversy of the role of badgers in transmission, has led to farmers viewing Government as responsible for control of this disease and some farmers have not taken action to limit spread of disease between cattle, e.g. through good bio-security, viewing the disease as wholly outside their control. This highlights that responsibility and cost sharing are an important balance and that farmers need to remain responsible for disease control with Government support for concerted action.

199. It should remain a constantly tested policy that politics remains a proportionate influence within any endemic disease control debate. Apart from the loss of cattle, the control strategy for the disease has held the English and Welsh livestock industry back in terms of farm investment, disease management, and breeding improvements. The amount of Government budget that is spent on bTB each year has reduced the opportunity to fund improved control of other endemic diseases of livestock.

200. Killing of large numbers of animals in short time frames as part of exotic disease control has obvious welfare and ethical implications. FAWC reports on foot and mouth disease 2001: lessons for the future (2002); on the Welfare of Farmed Animals at Slaughter or Killing Red Meat Animals (2003) and White Meat Animals (2009); and advice on mass killing of poultry given during outbreaks of avian influenza have covered these issues.

Conclusions

201. Elimination of specific infective diseases is usually complex and difficult and requires a high level of co-operation and allocation of significant resources, but can make a major contribution to animal welfare.

202. Only certain pathogens can be eliminated and there is ongoing risk and cost to avoid reintroduction of the pathogen. For many diseases good control might be a better option.

203. There should be an open discussion between Government and industry about elimination and other disease prevention and control programmes. This should include whether it is possible/logical to eliminate a disease, whether there are other methods of prevention, whether there is industry will to improve the situation and what, if any, Gov-

ernment input may be required, e.g. legislation and enforcement of the conditions required for elimination. Recent history of successful eliminations would suggest that provision of incentives to farms to engage in collaborative action is essential, whether funded by Government or industry, with a mechanism for enforcement in place to manage the tail-end of non-conformers.

204. Government and industry bodies need to make a detailed analysis of the costs, benefits and feasibility before adopting such measures. Elimination of a disease at farm level requires a similar detailed analysis, taking account of the regional situation and the risk of re-infection.

205. Across the sectors, there is variable development of industry-agreed, standardised health declarations that are essential for informed decisions on livestock purchases.

Recommendations

206. Government and industry bodies should work together to identify and prioritise potential diseases for national elimination, and to implement the necessary actions when justified. The free movement of livestock between the devolved bodies means that any national elimination policy in the absence of similar schemes throughout Great Britain is unlikely to be successful or sustainable.

207. Industry should evaluate the opportunities for voluntary elimination schemes and Government could facilitate such projects through access to Rural Development Programme funding for collaborative activity.

208. Declaration of the health status of an individual farm to an agreed standard should be encouraged by industry.

Preventive health and welfare measures on farms

209. An individual's management of infectious diseases has an effect on their own animals and also on those owned by others. Individual farmers are responsible for protecting their own livestock's health and welfare and minimising the impact of disease within their own herd/flock but also taking responsibility for ensuring that their actions do not spread disease to other farms. In contrast, an animal's risk of non-infectious disease is totally dependent on the farm environment and genotype.

210. There are many opportunities in correctly planned health and welfare programmes to reduce the impact of endemic disease through control or elimination, and reduce or eliminate the need for treatment. Farm management and treatment regimes also need to take into account that mental health is integral to animal health as a whole.

211. There are strong financial drivers to reward good health and welfare on farm. However, on many farms there remains an emphasis on treatment rather than preventive healthcare.

212. There have been significant periods since about 1987 of low or negative profitability in the livestock sectors. Although there is no clear relationship between farm profitability per se and animal welfare, ongoing poor profitability and volatility in product farm gate prices and input costs may constrain welfare improvements and reduce investment⁴⁷.

The benefits of farm health planning and production management

213. Farm health planning and production management comprises the ongoing monitoring and implementation of improvements to manage farm animal health and disease. The process involves a written plan with actions to improve health and profitability, continual implementation, monitoring of implementation and updating of the plan. Planning should contain the elements Plan, Do, Review, Act; which form a virtuous cycle when done effectively. A successful farm health plan is a team effort between the farm health planning advisor, usually a veterinarian, who is central to the quality of the plan and the animal keeper, who is responsible for implementation of the plan.

214. There is evidence from research and practitioners' experiences that farmers who use farm health planning efficiently have healthier and more productive stock⁴⁸. They spend less on drugs and veterinary attendance for diseased individuals/groups because there are fewer emergencies, e.g. fewer outbreaks of infectious and metabolic diseases, fewer Caesarean sections and reduced drug use for diseased animals.

215. Farm health planning was a key initiative resulting from the Animal Health and Welfare Strategy 2004 principles of 'prevention is better than cure' and 'understanding roles and responsibilities'. Between 2006 and 2008, Defra spent £2.8 million on 'pump-priming' projects, including building the evidence base for farm health planning; tackling the barriers to implementation; and piloting different methods of promoting farm health planning uptake⁴⁹. The Welsh Government provided for veterinary support and mentoring in Animal Health planning through its Farming Connect programme with modest uptake and Welsh Lamb and Beef producers rolled out a health planning programme for members in Wales over a three year period from 2007. The Scottish Government offered funding under CAP Pillar II for veterinary involvement in farm health planning through the Animal Welfare Management Programme (AWMP), developed from an earlier scheme, but up-take was disappointing (less than 10% of holdings in 2011⁵⁰). Elements of the AWMP were regarded as over-complicated and inflexible to fit individual

⁴⁷ Farm Animal Welfare Committee. Report on Economics and Farm Animal Welfare (2011)

⁴⁸ S Ivmeyer, G Smolders, J Brinkmann, E Gratzler, B Hansen, BIF Henriksen, J Huber, C Leeb, C Mejdell, P Nicholas, S Roderick, E Stoger, M Vaarst, LK Whistance, C Winckler, M Walkenhorst. Impact of animal health and welfare planning on medicine use, herd health and production in European organic dairy farms. *Livestock Science* Vol 145 Iss 1-3 pps 63-72 May 2012

⁴⁹ J Osmond. Defra Farm Health Planning Initiative Review of Pump-Priming Expenditure. September 2009

⁵⁰ www.scotland.gov.uk/Resource/0039/00392342.doc

and regional variations in farming practices which reduced both uptake and effectiveness. However, the continued support of the health planning process in the scheme was believed to have successfully embedded farm health planning as an established concept with some farms.

216. Farm health planning is a requirement of assurance schemes on dairy, beef, sheep, poultry and pig farms. However, whilst many farms have a written herd/flock health plan to meet this requirement, some are 'generic', lacking customisation to the particular circumstances of the farm and not regularly updated.

217. Success of farm health planning and monitoring depends on both the external advisor and farmer valuing the ongoing benefits to animal health and welfare. Advisors must understand behavioural drivers (i.e. economic, social, lifestyle and stewardship) to enable any change in management to be effectively delivered. Recent work has highlighted that the farmer's and veterinarian's personalities play a role in effective communication and development of a trusting relationship, and the right fit of personalities in the advisory team is essential to optimise herd health management. Veterinary practices may find that certain vets work better with certain farmers than others⁵¹.

218. Plans should be wide ranging, including nutrition, housing, management as well as health and welfare issues. The role of the external advisor is to help the farmer identify the critical control points that will provide the greatest health and welfare improvement, and to prioritise solutions that will have the greatest impact. Even in complex systems there are fewer critical control points than might be thought but they may have many effects, e.g. appropriate volume and quality of water availability at all times.

219. There is an industry role in influencing behaviour by highlighting good and bad practice, changing the 'norm' of what is acceptable within an industry and providing the research and development work to provide the underpinning knowledge to support a change.

220. DairyCo, EBLEX and the Welsh Animal Health and Welfare Strategy Steering Group have identified veterinarians as having a pivotal role in herd health management on farms; although further training may be useful for some. DairyCo has established a training programme whereby veterinarians have to take a specific training course to be recognised as consultants who can advise on mastitis. Those who have received this training are listed on the DairyCo web pages. Each year they have to attend further training to remain listed, submit data on farms that they have visited and indicate how they improved the management of mastitis. EBLEX are offering days of further education for veterinarians about nutrition, genetics and sheep flock management after sheep farmers highlighted that they would value veterinarians with these skills.

221. The Royal College of Veterinary Surgeons places a responsibility on all registered veterinarians to maintain their knowledge and skill set through continuing professional development (CPD). Currently no action can be taken against individuals if the

⁵¹ Dairy Herd Health, CABI in press 2012 Ed M Green

required numbers of hours are not completed, although a lack of CPD can be used in evidence against vets in disciplinary procedures. The development of farm health plans and the ability to influence farm management activities are core competences for farm animal practitioners, which require ongoing CPD.

222. There are considerable differences between the sectors in relation to farm health planning, in part related to the value of the animal and level of profitability, that will affect interest in investing in preventive health care, and in part related to farm size.

223. Those keeping animals on a small scale, and who are new to the challenges this poses, need the same ability to prevent, recognise and treat diseased animals as commercial keepers and they also need to know how to avoid spreading disease. The possibility of zoonoses and the potential negative effects on collaborative efforts at disease prevention by others could justify Government intervention.

Conclusions

224. Farm health planning and production management is an important activity to promote prevention and control of disease and thus improve welfare. It is most effective when the keeper and veterinary team review and endorse the process and have an appreciation of the wider benefits to the farm business and the health and welfare of the animals. The effectiveness of farm health planning and production management is improved with regular visits with clear economic benefits to most farms. The optimal number of visits for economic and welfare benefit is unknown, but will vary with circumstances.

225. The veterinarian is best placed to lead a team to deliver effective farm health planning and production management but there remain many veterinary practices where there needs to be substantial improvement in the knowledge base and business model of veterinary services⁵². There are excellent examples of the livestock industry and veterinarians working together closely on a long term basis.

226. There should be clearer cost-benefit analysis of many aspects of farm health planning, including the lifetime implications of poor animal health. Data should have industry-wide acceptability in a format that can evaluate rapidly changing economic parameters and also incorporate welfare parameters.

227. Better economic returns to livestock keepers would greatly improve the capacity for improvement in health and welfare.

Recommendations

228. *All farms should be involved in farm health and production management in collaboration with their veterinary advisor and management team. This should be the daily*

⁵² P. Lowe. Unlocking potential – a report on veterinary expertise in food animal production. 2009
<http://archive.defra.gov.uk/foodfarm/policy/animalhealth/vservices/pdf/lowe-vets090806.pdf>

basis by which the flock/herd is managed and the management evolves as health and production demands change.

229. Veterinary advisors should be required to receive the necessary training and specialisation and business and management skills to facilitate herd health monitoring and management to implement change successfully.

230. A proactive model of preventive care should include a minimum number of visits to a farm per year depending on the complexity and number of critical control points in the farming system, an assessment of bio-security and the incidence and prevalence of disease.

231. Further research and knowledge exchange is required to demonstrate the value of farm health planning and production management for individual herd/flock owners. Research can help demonstrate the optimal number of visits for delivery of economic and welfare benefits by species and size of operation. Where veterinary input is apparently uneconomic, studies should test whether this is true and if so, novel methods to access veterinary expertise should be considered, e.g. consideration of supported veterinary led training initiatives for groups linked to farm access.

232. Supply chain initiatives are required to provide a more consistent return and to incentivise health and welfare improvements.

The role of the stockperson in disease prevention and positive promotion of health

233. Our report on stockmanship set out the three essential components of stockmanship: knowledge of animal husbandry, skills in animal husbandry and personal qualities (attitude and behaviour)⁵³. Good stockmanship is critical to understanding and implementing preventive healthcare and for rapid diagnosis and treatment. The report emphasised the importance of stockman training and CPD, in this instance in recognising signs of health and ill-health, and recognition of the benefits of physical and mental well-being to health and welfare.

234. There is evidence that negative human-animal interactions (i.e. tactile, visual and auditory) limit productivity of farmed animals. This raises a number of welfare concerns, since animals that are fearful may experience acute or chronic stress with the potential to increase disease susceptibility through immuno-suppression. Fearful animals may also sustain injuries in trying to avoid humans during routine inspections and handling; they may be more difficult to handle, which may affect the stockperson's commitment to observation and attendance to welfare and production problems. There may be long-term consequences; for example, stress in pregnant sows, through poor handling or other challenges affecting the behaviour and welfare of subsequent litters. Conversely, there is evidence supporting the benefits of positive human-animal interactions for both animals and their carers. The trend in modern agriculture has led to an increase in the

⁵³ (4) FAWC *op.cit.*

numbers of animals under the care of one person providing a challenge to maintain these positive human-animal interactions.

235. The relationship between the attitude and behaviour of the stockperson towards an animal and the fear or behavioural response of the animal to the stockperson has been described as iterative with stockpeople who interact negatively with animals creating a negative response from the animal which creates a negative response from the stockman⁵⁴, and so on.

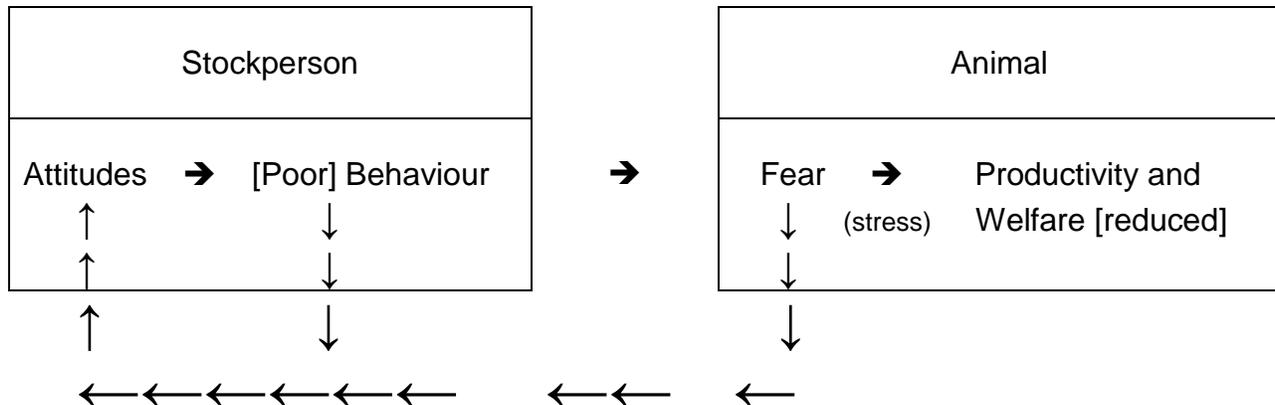


Fig. 3 Model of human-animal interactions (after Coleman, Hemsworth and Hay1998⁵⁵)

236. Successful handling depends on an understanding of the animal's normal behaviour, planning and provision of appropriate equipment to facilitate handling and the attitude and behaviour of the handler towards animals through staff selection and training. Positive reward training of animals in the handling process can also improve welfare.

237. Targeting human characteristics that encourage positive interactions with animals could assist in recruitment as well as identifying staff that require training.

Conclusions

238. The stockperson has a significant impact on animal health and welfare which is often under-estimated. Handling equipment must be fit for purpose and stockpeople trained to operate the system correctly. Training stockpeople in animal welfare can promote productivity and animal welfare.

239. Stockpeople should have sufficient time to care adequately for the health and welfare of the livestock under their care. The number of animals that a stockperson is able to care for, to provide adequately for their health and welfare, is a critical question.

⁵⁴ PH Hemsworth. Human-animal interactions in livestock production. Applied Animal Behaviour Science Vol 81 (2003) 185-198

⁵⁵ GJ Coleman, PH Hemsworth, M Hay. Predicting stockperson behaviour towards pigs from attitudinal and job-related variables and empathy. Applied Animal Behaviour Science (1998) Vol 58 Iss 1-2 63-75

240. There is currently no direct surveillance of stockmanship, although farm assurance may record training. The development of animal welfare based outcome measures is a valuable tool for on-going stockmanship surveillance, in addition to allowing demonstration of competency in key tasks.

Recommendations

241. *The development of cognitive-behavioural training programmes for stockpeople by the livestock industries could assist in the recruitment and training of stockpeople to improve animal welfare.*

242. *More research is required into the full range of stockperson interactions that have implications for farm animal health and welfare to identify both positive and negative benefits, and to focus on the time required by the stockperson to promote these positive benefits.*

The benefits of good housing and environment

243. Investment in new design and technology can benefit animal health and welfare in a number of ways. For example, new materials can improve hygiene by enabling easier cleaning, improved flooring can prevent injury and increase comfort, more sophisticated ventilation systems and environmental controls in pigs and poultry housing can improve thermal comfort and improve respiratory health by reducing dust and ammonia concentrations. Whilst stockmanship can go some way to overcoming out-of-date and inefficient buildings, inefficient designs increase workloads and may eventually prove unfit for modern genotypes or systems of production. For example, many dairy housing systems were installed in the 1970s and 1980s before the Holstein-Friesian breed became predominant in the dairy herd in Great Britain. In many cases the modern cow has simply outgrown her cubicle.

244. There are additional environmental benefits of reduced energy consumption and lower environmental emissions as well as the major improvements in health and welfare when purpose-built buildings are erected. For example, use of ground source heating in poultry broiler sheds in place of gas-fired heaters reduces energy costs and also improves welfare by reducing wet litter.

245. With the exception of the poultry sector, farm animal housing is in relatively poor condition in Great Britain. For example, a recent survey of pig housing in the UK found that the average age of pig housing is 22 years while many dairy housing systems were installed in the 1970s and 1980s.

246. There are several reasons for the lack of investment. Poor returns in livestock farming over the past few decades, the lack of confidence to invest because of the volatile nature of returns, planning barriers and specific issues with the taxation system which have encouraged repairs rather than new building have all contributed to a lack of investment.

Conclusion

247. The current poor standard of housing in some sectors, notably dairy and pigs, poses a significant risk to health and welfare. A series of measures is required to make a significant impact on this problem.

Recommendation

248. *Government and industry should send a clear message on the environmental, production and welfare benefits of new housing. Potential options to encourage uptake of new housing which will improve health and welfare include the introduction of a welfare stewardship scheme, other financial incentives such as reintroduction of capital allowances for new housing, preferential loan rates and better guidance to planners.*

The benefits of vaccination

249. Used in conjunction with herd health planning, vaccination supports an approach which prioritises prevention over treatment/cure. Key issues when considering the use of vaccines are efficacy, availability, benefit:cost and local or national disease prevention priorities. Whilst significant advances have been made in the development of both the range and quality of animal vaccines, uptake rates of some useful vaccines remain disappointingly low in some sectors, for example respiratory disease vaccines in cattle and abortion vaccines in sheep. The reasons for this need to be better understood so that the relevant constraints can be addressed. Health experts need to educate and sell the benefits of vaccination to industry.

250. A wider range of products, formulations and administration methods has recently reached the pig market and this trend is expected to continue. Unfortunately in other sectors, veterinary pharmaceutical companies have decided that the markets are too small for vaccine development to be cost effective. This dichotomy highlights a fundamental issue i.e. a consolidating animal health pharmaceutical industry which, in the quest for best shareholder value, prioritises R&D spend based on global market perspectives. This increasingly leaves some sectors (e.g. sheep), minor species (e.g. turkeys, ducks, geese and gamebirds) and some less prominent diseases (e.g. neosporosis in cattle or footrot in sheep) deemed less lucrative and thus without the prospect of vaccine innovation.

251. The availability of a wider range of vaccines brings with it another welfare dilemma – that of the separate administration of several vaccines to young animals. Although some combined vaccine products are available, more work is needed to broaden the range of such multivalent vaccines. The welfare benefit of fewer injections would reduce stress through multiple handling, and encourage a wider uptake of vaccination as a preventive health tool. Consideration of multivalent vaccines needs to take into account the biological limit on how well the body's immune system can respond to multiple simultaneous vaccines.

252. From the stockperson's perspective, vaccine availability provides greater opportunity to improve animal health at the individual farm level. Industry can act regionally or nationally on vaccination to mutual benefit, e.g. the pig industry encouraged the uptake of vaccination against post-weaning multi-systemic wasting disease (PMWS) in pigs.

253. The challenge to industry leaders is how to get the best use of vaccines in conjunction with other disease management tools. Vaccines can be used to control disease on farms but they can also be used as part of an elimination programme. The bovine viral diarrhoea (BVD) elimination scheme in Scotland is an example of such a co-ordinated regional programme. Supported by Scottish Government funding, this industry-led scheme sets out a structured screening programme. Various measures including culling, vaccination and improved bio-security may then be used to reduce infection and control spread.

254. The Government acted quickly in 2008 in response to incursion of bluetongue virus by commissioning vaccine from the pharmaceutical industry at subsidised prices to farmers as part of a voluntary vaccination programme in England (compulsory in Scotland). Further vaccination in 2009 prevented further disease and the UK has now been declared free of bluetongue virus.

Conclusions

255. Vaccines are an integral part of veterinary flock/herd health planning and production management for endemic diseases to improve health and welfare and reduce antimicrobial use on farm. There remains significant opportunity for better targeted and increased use. The development of more technologically sophisticated vaccines (e.g. multivalent products) offers the opportunity for wider uptake and greater benefit.

256. More information is required to enable assessment of the benefit:cost relationship for vaccines on a wider range of farm enterprises.

257. There are various diseases for which Government has provided support where vaccine development was clearly uneconomic. Government support through subsidised vaccination was critical to the bluetongue vaccine development and uptake.

Recommendations

258. *The veterinarian is an essential link to advice on appropriate use of vaccines, which should be a regularly reviewed part of the farm health and production management planning process.*

259. *Government should work in partnership with industry for most effective utilisation of vaccines in control and elimination programmes.*

260. Vaccine development that is clearly uneconomic for pharmaceutical companies but could make a significant improvement to animal health and welfare could be supported by Government either through subsidising vaccine development or uptake, or by aiding the regulatory framework to encourage companies to develop such vaccines.

Management of parasitic disease and use of anthelmintics

261. The main production problem of most grazing ruminants are internal parasites (parasitic gastroenteritis (PGE), lungworm and liver fluke), which are estimated to cost more than £80M per annum to the sheep industry alone. Animals expend considerable energy combating endo- and ecto-parasites to the detriment of growth, reproductive performance and immunity, which compromises health and welfare. However, there are well-documented strategies using 'rotational' and 'safe' grazing to help break the parasite lifecycle, together with the strategic use of various classes of anthelmintics to reduce internal parasites. There are no anthelmintics for some minor species, e.g. goats, where the larger milking units practice zero grazing to prevent infection with internal parasites.

262. Parasite burdens are often accompanied by faecal soiling of the perineum which attracts egg-laying flies (fly strike by *Lucilia serricata*). Larvae hatch in the moist conditions and, if left untreated, the larval stages (maggots) cause severe damage to the skin and feed on the underlying muscle tissue.

263. Some parasites have become more problematic in recent years, e.g. liver fluke, with some abattoirs rejecting a high percentage of livers from sheep due to infestation. Liver fluke cannot be controlled through the same grazing strategies as described above for PGE, but can be avoided by not grazing wet areas. Routine flukicide treatments are the main method to control fluke although there is a major concern over the development of resistance to triclabendazole.

264. Industry initiatives 'Sustainable Control Of Parasites' (SCOPS)⁵⁶ and 'Control of Worms Sustainably' (COWS)⁵⁷ recognise that resistance by parasites to anthelmintics is one of the greatest challenges to sheep and cattle health and profitability in the future. By providing advice on correct administration and rotation of existing and new anthelmintics of the different groups, their guidance will help farmers better manage parasitic disease in their flocks. As such, this will slow down the rate at which parasites become resistant to anthelmintics.

265. A Veterinary Medicinal Product (VMP) that has been classified as a POM-V (Prescription Only Medicine – Veterinarian) may only be supplied to the client once it has been prescribed by a veterinary surgeon following a clinical assessment of an animal, or group of animals, under the veterinary surgeon's care. Some new anthelmintics have POM-V status and this should remain the case to aid their managed use.

⁵⁶ <http://www.scops.org.uk>

⁵⁷ <http://www.nfuonline.com/article.aspx?id=2147489230&terms=control+of+worms+sustainably>

266. Successful breeding of sheep genotypes more resistant to the endoparasite *Haemonchus contortus* in Australia has led to cessation of anthelmintic treatments altogether for the selected population. This has demonstrated that it is technically feasible to reduce reliance on anthelmintic usage whilst maintaining high health status in the flock. Vaccine development also shows promise to control haemonchosis. Ongoing research at SAC in Scotland is undertaking similar genetic studies for *Teladorsagia circumcincta*.

267. There are a number of ectoparasites that are widespread despite the availability of effective treatments for disease outbreaks, and the potential to prevent spread through bio-security and quarantine treatments, e.g. sheep scab, lice infestation in both cattle and sheep, and sarcoptic mange in pigs. These can cause substantial welfare issues due to the skin irritation, scratching and subsequent inflammatory responses and tissue damage.

Conclusion

268. Management of parasites is complex as evidenced by the increasing prevalence of resistance to groups 1, 2 and 3 anthelmintics.

Recommendations

269. *Any new anthelmintics, including Groups 4 (monepantel) and 5 (derquantel/abamectin), introduced in the last 2 years should retain their POM-V classification (Prescription Only Medicine – Veterinarian) to ensure proper advice on use to minimise risk of development of resistance.*

270. *Farmers and veterinarians should be informed of parasite control programmes, e.g. Sustainable Control Of Parasites (SCOPS) and Control of Worms Sustainably (COWS), and incorporate them in health planning.*

271. *Better tools including the use of molecular genetics for identifying more resilient strains of livestock need to be developed to breed livestock that are more robust with reduced dependency on anthelmintics.*

272. *More effort is needed to develop new medicines for treatment of internal parasites.*

The role of genetics in disease prevention

273. In some livestock species, genetic change for production traits has accelerated considerably in the last 60 years due to the application of quantitative genetics and selective breeding, taking advantage of computer technology and software developments. This has helped to deliver large increases in the rates of productive output, mainly for species that have undergone relatively more generations of selection compared with others (pigs and poultry).

274. Some problems have arisen largely as a consequence of too narrow a focus on production traits in the past. For example, infectious diseases such as necrotic enteritis in poultry have been associated with rapid growth; cows with high milk yields are more prone to clinical mastitis and have high somatic cell counts; and in laying hens, increased aggression and propensity to osteoporosis are attributed to selection for early sexual maturity and high egg production⁵⁸.

275. There is considerable potential to improve welfare, as well as to make economic gains, from selecting for resistance to disease or for more general robustness in livestock selection programmes. FAWC is aware that this is happening in some breeding companies⁵⁹. For example, bone and joint health have been major foci of attention by some pig and poultry breeding companies to alleviate bone (and joint) problems including tibial dyschondroplasia. These benefits should persuade the industry to continue to invest in these elements of selection programmes.

276. Matching the animal to its environment is critical, especially when high-performing animals are kept in low-level management systems. This mis-match can lead to major problems for animal health and welfare. In contrast, high levels of livestock management can 'mask' deteriorating trends in animal robustness. For example, managing mastitis in high-yielding dairy cows has become a fine art and getting it wrong has clear cow welfare penalties. The Welfare of Farmed Animals (England) Regulations 2007 (as amended) (and similar legislation in Scotland and Wales) requires that the genotype and phenotype of an animal is consistent with the system in which it is kept.

277. Inbreeding occurs when animals that are closely related to each other are mated. If practiced frequently and repeatedly, it leads to an increase in homozygosity, whereby animals carry two copies of identical genes, and the group becomes more 'uniform' over time. Some of the known genetic 'disorders' (e.g. eye problems such as entropion) are due to deleterious genes that exist in closely-bred (line-bred, inbred) populations, where the chances that offspring carry two copies of the deleterious genes are increased, resulting in the expression of the defect(s).

278. Molecular screening for diseases and unwanted defects affecting livestock is available for several known conditions. These include screening for bloat and bovine leukocyte adhesion deficiency (BLAD) in cattle, scrapie in sheep and infectious pancreatic necrosis (IPN) in salmon. A summary of major genes in livestock has been documented⁶⁰. Screening for the halothane mutation in pigs has now almost completely eradicated porcine stress syndrome in commercial pig populations. Genotype testing for the PrP locus conferring susceptibility to scrapie is probably the best known geno-

⁵⁸ Farm Animal Welfare Committee. Opinion on the welfare implications of breeding and breeding technologies in commercial livestock agriculture. 2012

⁵⁹ *ibid*

⁶⁰ Online Mendelian Inheritance in Animals, OMIA. Reprogen, Faculty of Veterinary Science, University of Sydney and Australian National Genomic Information Service (ANGIS), University of Sydney, {25/02/2010}. URL: <http://omia.angis.org.au/>

type test in sheep. A Knowledge Transfer Network (KTN) Industry Club initiative was instigated in 2009 with the aim of developing further new genetic tests for health conditions and other defects in UK livestock. The results are still to be published.

279. New whole-genome screening technology (Single Nucleotide Polymorphism, SNP) is now being used to select dairy bulls at birth, making the selection process much more efficient. However, unless SNPs for the functional fitness and health traits are selected for in the same way, progress in production may again accelerate at the expense of health and welfare.

Conclusions

280. Intensive genetic selection for production traits can result in detrimental consequences for health and welfare.

281. Inclusion of traits beneficial for health and welfare in breeding programmes is increasing, and needs to be sustained in balance with production considerations.

282. New molecular technologies have given the potential for screening and eradication of individuals at risk of certain diseases.

Recommendations

283. *Broader breeding goals (incorporating greater emphasis on functional fitness and health) should be an integral part of breeding programmes and selection strategy, e.g. udder health, teat placement, somatic cell count, calving ease, mobility scores.*

284. *Better communication and demonstration by researchers and breeding companies on how to select for disease-resistant livestock is needed.*

285. *Information on health and fitness, from relatives of breeding populations that are managed on commercial farms, should be passed back to breeding companies so that the evidence base on which they make their selection decisions includes such information.*

286. *Simpler scoring systems of health status (e.g. faecal egg counts, hoof condition), routinely collected on breeding animals, should be used to predict estimated breeding values (EBVs) for susceptibility to endemic diseases, to breed animals that are more resistant to disease.*

287. *Farmers should have better opportunity to select breeding stock that match their rearing conditions. Breeding companies should ensure that breeding animals with high genetic merit for functional fitness are available.*

288. *Inbreeding (and other similar strategies) in animal breeding programmes should be avoided to reduce the prevalence of inherited disorders.*

289. *Further work to identify deleterious lethal recessive genes and others having large effects, through molecular genomic screening of breeding populations, should be carried out to alleviate the proliferation of such genetic defects.*

290. *Greater research funding is needed from Government and industry urgently to identify SNPs (Single Nucleotide Polymorphisms) for functional fitness and health, and their incorporation into livestock breeding programmes.*

291. *Greater research effort is required to harness the potential benefits to animal health and welfare of the use of new genomic technologies, such as genome-wide association studies.*

PART V – TREATMENT OF DISEASE

292. Untreated diseased animals and inadequate recording currently make up the highest failure rate in Government animal welfare inspections⁶¹. Some diseased animals are undiagnosed and therefore untreated and some may be incorrectly treated.

293. FAWC has concerns over the welfare impact of untreated or ineffectively treated diseased animals that suffer in the short term or have long term chronic disease, e.g. the finishing pig or lamb that does not grow at a similar rate to the cohort.

294. In addition, there is a food safety issue that animals can carry zoonoses without significant disease impact on themselves. However, animals with poor welfare often have higher levels of carriage of zoonotic organisms, e.g. stressed chickens carry more *Campylobacter*; *Salmonella* are more numerous in pigs with disease caused by other bacteria.

Recognition, diagnosis and treatment

295. There is a concern that farmers and stockpeople become accustomed to the level of endemic disease present in their animals, e.g. lameness of cattle and sheep, coughing in pigs.

296. Early detection and appropriate treatment of sick animals is important to reduce the welfare impact to an individual and to reduce the risk of infectious disease spreading to the rest of the herd/flock.

297. Good stockpeople can recognise animals that are diseased, can understand the way diseases affect animals and make closer inspections immediately they see disease. The aspiration is that no disease should go unrecognised and thus untreated. Animal keepers must have the practical skills to treat sick animals (perform injections and other procedures) and to assess the success of treatment.

298. Reducing endemic disease to the low levels achieved on the best of farms and maintaining low levels requires constant management by the farmer, stockman and veterinarian. Sick animals should not be left until the flock/herd is gathered before intervention. Animals that do not respond effectively to treatment should be humanely killed.

299. It is important that the correct treatment is given to diseased animals and that a diseased animal's health improves. Farmers and stockpeople are not trained diagnosticians and often can only identify a syndrome or clinical sign that could be caused by a single pathogen. Ideally, every diseased animal should be examined, diagnosed and treated by a veterinarian. This is costly, and in the UK it is legal for farmers to treat sick animals with drugs supplied by their veterinarian if these animals are under the care of a

⁶¹ A. L. KilBride, S. A. Mason, P. C. Honeyman, D. G. Pritchard, S. Hepple, L. E. Green. Associations between membership of farm assurance and organic certification schemes and compliance with animal welfare legislation. *Veterinary Record* 2012;170:6 152

veterinary surgeon. Consequently, animal keepers often decide the appropriate treatment because their veterinarian has given advice on how to treat earlier cases. If a farmer is not sure of the cause of disease they should seek veterinary advice and a veterinarian should attend the animal rather than give advice by telephone. There are some farms where the routine veterinary link has broken down and it might take a serious health and welfare problem to prompt a call out; the veterinarian has a role in these cases to insist on inspecting the animals. A veterinarian should be involved in a disease as soon as possible when the day-to-day carer is unable to diagnose and treat a condition effectively.

300. Certain groups of animal medicines, anthelmintics, ectoparasite controls and some vaccines (classified as POM-VPS) are sold by qualified animal medicine advisors (Suitably Qualified People - SQPs). These advisors would normally be involved in providing nutrition, supplementation, equipment and flock/herd management advice along with a broad advice package and worm egg laboratory results analysis. In some cases vets refer POM-VPS orders to animal medicine advisors and in return they provide the veterinarian with referrals when a customer needs diagnosis and medicines outwith POM-VPS classification. The success, or otherwise, of this arrangement depends on a team approach to farm health planning and production management.

301. Continuing assessment of the efficacy of a treatment is essential to ensure that a more specific diagnosis is requested if treatment is ineffective or an increasing number of animals become diseased. In addition to the benefits to the animals' welfare, correct diagnosis ultimately reduces the cost of infectious disease by implementation of control measures and reduces the cost of non-infectious diseases because faster recovery reduces the likelihood of lost production. It is also essential that the disease is recorded and, if a substantial issue, factored into the health planning for the farm. The availability of faster diagnosis through use of pen-side diagnostic tools could help stockpeople to provide quicker and more accurate treatments.

302. Treatment can be significantly improved with good handling facilities and hospital pens. Good facilities can reduce some of the negative impacts of handling sick animals for treatment. Habituation of stock to handling systems and positive training e.g. putting stock through a race and feeding them, reduces the fear of such systems. The Farming and Forestry Improvement Scheme⁶² funding currently available to support investment in handling systems is a welcome incentive to encourage good practice.

303. Current legislation requires that treatments are recorded in a medicine book with animal identification, treatment type and duration. There is no requirement for recording effectiveness of treatment. Ineffective treatment might indicate misdiagnosis, inadequate dosing, drug resistance or an emerging new disease. The usefulness of the medicine book could be improved by including information about efficacy of treatment as well as medicine use. Electronic recording of this information could facilitate better data analysis and trend monitoring at local or wider level.

⁶² <http://rdpenetwork.defra.gov.uk/funding-sources/farm-and-forestry-improvement-scheme>

Conclusions

304. Correct diagnosis followed by appropriate treatment or prompt humane killing are essential for the best welfare of farmed animals and critical for minimising disease and maximising health. Frequent veterinary visits, training and assessment, sector support and flock/herd health planning with veterinary and other expert advice are also good sources of knowledge exchange. Co-operation between local Animal Health businesses and veterinary practices is essential to provide the most appropriate and joined-up advice to individual farms.

305. Animals should be under the care of a veterinarian but are often treated by farmers and stockpeople. Where diseases are misdiagnosed an incorrect treatment might be given. The connection between animals, their keepers and their veterinarians needs to be strong to ensure proper diagnosis and treatment of all sick animals.

306. A better system for recording diseases and treatment efficacy would inform health planning on farm. The success of treatment strategies should be part of the herd/flock health plan, and kept under regular review by dialogue between the animal keeper and his/her veterinarian. Capture of this information electronically could enhance national health planning strategies.

Recommendations

307. Farmer/stockperson disease awareness and recognition skills should be improved through awareness campaigns either via veterinarians to the farm or direct to animal keepers. The veterinarian has an important role in education and training of stockpeople.

308. Veterinarians and animal medicine advisors need to work closely to maximise the benefit to animal health and welfare through a team approach. Consideration should be given to how these relationships could be strengthened to maximise the value of the expertise delivered to farms.

309. Livestock sectors should define the core competencies in diagnosis and treatment skills for anyone to work with livestock and at what level. There should be formal accreditation of stockpeople in certain tasks, e.g. storage, administration and recording of medicines, following appropriate training.

310. Treatment protocols, success rates and resistance profiles should be part of herd/flock health planning.

311. The development of more pen-side diagnostics, providing rapid, specific and sensitive results to support clinical observation, is an area for research that needs support from Government and industry.

312. *The cost and benefits of electronic recording systems to capture trends in treatment use and efficacy should be evaluated by Government and industry.*

Availability and use of veterinary medicines

313. There are gaps in the authorised provision of veterinary medicines for farm animals but the Cascade system enables veterinarians to prescribe medicines in those cases where gaps arise. Difficulties may arise when using the Cascade system. For example, increased withdrawal periods in situations where production cycles are short could lead to treatment not being given close to slaughter date. In some minority species, there is a lack of information on dose levels and efficacy. Recent licence applications for new products are restrictive in their authorisations causing veterinarians to rely increasingly on the Cascade system.

314. There is increasing pressure to reduce the use of antimicrobials and to adopt a treatment codex (enshrining exactly which treatment should be used for which disease) because of the concern of potential development of resistance where classes of antimicrobials are used in humans and animals.

315. The Veterinary Medicines Directorate produces an annual report surveying national trends in sales by product class and species. There is, however, no national surveillance of reason for use or efficacy. Veterinarians vary widely in the type and amount of antibacterials they prescribe and there seems to be inconsistency. Vetstat⁶³ and Danmap⁶⁴ schemes (used in Denmark) collect better quality information that enables more comprehensive analysis and hence a greater understanding of usage trends. This has benefits for veterinary health planning as well as potentially for public health.

316. Many veterinary practices base their fees on a model where the advice given is subsidised through the sale of the veterinary medicines. Developing a culture where the advice provided by veterinarians is valued and clients transparently pay for advice would enhance the move of veterinarians to providers of whole herd health management and excellent treatment of individual sick animals, increasing client confidence, veterinary skills and animal health and welfare.

317. The current balance of research and development effort on viral and bacterial disease may not be correct, with viral disease attracting large sums in funding. The key diseases that impact animal welfare are the endemic diseases and, in the absence of better knowledge of how to counter widespread bacterial disease, treatment with antibiotics may continue.

⁶³ http://www.foedevarestyrelsen.dk/english/Animal/AnimalHealth/Veterinary_medicine/Pages/default.aspx

⁶⁴ www.danmap.org/

Conclusions

318. Veterinary service provision needs reviewing to put a greater emphasis on advice, training and preventive healthcare to reduce antibiotic use.

319. The Cascade system is an essential tool through which the veterinary profession can ensure that necessary treatments are available. Sharing of information on dose levels and efficacy, particularly in the minor species, could improve the effectiveness of treatments.

320. The adoption of a treatment codex risks restricting clinical freedom, which is essential to effective treatment and relief of suffering, and deterring pharmaceutical companies from developing and marketing new products. Better information is required on efficacy of treatment at farm level and surveillance on reason for use and efficacy at a national level. This could contribute to the case for evidence-based veterinary medicine.

Recommendations

321. *Government and industry should work together to develop systems which demonstrate antibiotic stewardship.*

322. *The clinical freedom of veterinarians to prescribe appropriately for each disease situation should be preserved whilst they work towards antibiotic reduction.*

323. *More support should be given by Government and industry to research into endemic bacterial diseases to discover better ways of tackling these infections and thus improve animal welfare and reduce antibiotic use.*

Prophylactic/metaphylactic antibiotic use

324. Prophylaxis is action taken in an attempt to prevent disease, especially by specified means (such as vaccination or antibiotic injection) or against a specified disease. Metaphylaxis is the timely mass medication of a group of animals to eliminate or minimize an expected outbreak of disease.

325. For example, if a farmer was concerned about respiratory disease in a group of cattle he/she could consider antibiotic therapy of all animals in anticipation of the disease (prophylaxis) or after a certain proportion of cattle had shown signs of disease (metaphylaxis). The accepted veterinary practice would be to treat only diseased animals and monitor their progress but this involves more time and labour such that metaphylaxis is now recommended in many published articles.

326. In 2009, the BVA launched an eight-point plan⁶⁵ for the responsible use of antimicrobials in veterinary practice:

1. Work with clients to avoid need for antimicrobials
2. Avoid inappropriate use
3. Choose the right drug for the right bug
4. Monitor antimicrobial sensitivity
5. Minimise prophylactic use
6. Minimise use perioperatively
7. Record and justify deviations from protocols
8. Report suspected failure to the VMD

327 Antimicrobials are essential for the treatment of diseases in animals, but every day use increases both the risk that resistance will develop and the potential for its transfer to humans via food-borne pathogens. To protect animal and human health and optimise food safety, the BVA states that antimicrobials should only be used when necessary and always responsibly.

328. The dilemma of prophylactic treatment includes the balance of the welfare impact of handling large numbers of sick animals and the practical inability to treat individuals in very large flocks or herds versus the potential development of antibiotic resistance. Any use of prophylactic treatment should demonstrate health and welfare benefits to the flock/herd whilst the farmer, with his veterinarian, should look for better long term solutions.

329. Whilst various studies have supported the short term benefits of prophylactic or metaphylactic antibiotics to reduce disease, the long term effects may simply prolong poor husbandry and welfare standards. In addition, routine prophylactic use of antibiotics, particularly oral antibiotics to neonates, leads to selection for multiple resistant strains not only in the targeted organism(s) but in other bacteria present in the animal(s).

Conclusions

330. Whilst prophylactic medication might reduce the risk of disease and poor welfare in the short term, there is a concern that prophylactic medication is or becomes an alternative to the research, development and use of husbandry systems and approaches that negate the need for such medication.

331. Addressing the deficiencies in production systems which cause disease, through good planning and management, should reduce the need for prophylactic treatments.

Recommendations

332. *Farmers and veterinarians should be aware of the British Veterinary Association (BVA) guidelines and educated to understand appropriate antibiotic use. The require-*

⁶⁵ http://www.bva.co.uk/public/documents/BVA_Antimicrobials_Poster.PDF

ment for prophylactic medication should be evidenced through veterinary diagnosis and continually reviewed.

333. Reducing the need for prophylactic and metaphylactic treatment is a key role of farm health planning and the relationship with the veterinary practitioner, and a challenge for the wider industry to highlight systems that minimise the risk of disease and remove the barriers to adoption of good practice.

Prevention/treatment of pain

334. Animals should not be allowed to suffer pain when alleviation is possible. However, the number and types of drugs available to farm animals for the treatment of pain and inflammation and information on their effectiveness are limited. Studies in rats and chickens show, however, that when lame they will drink preferentially from water containing an analgesic. This has been the basis for diagnosing that animals are suffering pain, using analgesics as 'probes'.

335. The practice of administering pain relief for individual animals (e.g. treatment of lameness or as supportive therapy in cases of mastitis in cows/sows) is largely dependent on individual veterinarians' and farmers' personal perspectives on the subject. The lack of robust clinical efficacy data to support the case for the use of pain relief hampers discussions to promote their usage. There is also resistance to use of pain relief in conditions such as lameness, as a result of the perceived cost of products relative to the value of the animals and the length of withdrawal periods, as products may have to be administered under the Cascade system.

Conclusion

336. Pain is a serious welfare issue associated with many disease states. Analgesia is rarely given.

Recommendations

337. Farmers should ensure that where pain relief is available and effective it should be used, giving the animal the benefit of any doubt. Where the benefit of pain relief for diseased animals is unclear research should be undertaken to clarify the situation.

338. The range of licensed pain-relieving pharmaceutical products available for the treatment of farm livestock is very limited and should be improved by the pharmaceutical industry.

Euthanasia

339. Palliative care is used more in some sectors than others. Sick poultry are likely to be culled during the stockperson's daily inspections. Larger, higher valued individual animals are more likely to be considered for treatment than for immediate euthanasia.

There are also differences in approach to young and adult animals. Management of animals in a hospital or isolation pen is critical. Isolating a pig will prevent it being targeted by other pigs but isolating a sheep would increase stress. Sick animals should not be left to see if they improve. They should be treated promptly and if treatment proves ineffective they should be euthanased.

340. An animal suffering a severe and debilitating disease that is untreatable, a disease or injury where the extent of pain and suffering outweighs the likely benefits (to the animal) from treatment, or where care and treatment are unavailable should be euthanased promptly. It is the responsibility of the stockperson to determine the point at which any animal is suffering to the extent that it has a life that is no longer worth living, with veterinary advice if necessary.

341. The Royal College of Veterinary Surgeon's Code of Conduct states that veterinarians "*must treat all patients of whatever species humanely, with respect and with welfare as a primary consideration*". When considering the prognosis of animals under their care, veterinarians should take into account the extent of injuries or disease and the likely quality of life after treatment as they assess the options for treatment or euthanasia based on welfare grounds. Whilst they have a personal duty to act in this way, in their advisory roles to the owners and stockpeople who have the day-to-day responsibility for the farm animals under their care, they have an indirect responsibility to educate, guide and advise on the principles and practicalities of assessing the prognosis of injured or diseased stock.

342. Judgements about euthanasia are often difficult but should always minimise suffering. Sound knowledge of normal behaviour of healthy animals is important. The stage of development of the disease, the response (or lack thereof) to previous treatment as well as knowledge of the efficacy of available treatments must all be taken into account. Assessment of such animals needs to be made regularly and decisively by those entrusted with their day-to-day care and stockpeople must be equipped to make a decision to euthanase an animal.

343. Guidelines are available to veterinarians and farmers about which diseases and conditions necessitate euthanasia for welfare reasons. Examples of guidance include: The Casualty Sheep (Sheep Veterinary Society, 1994)⁶⁶; BCVA Emergency Slaughter Booklet (British Cattle Veterinary Association, 2005)⁶⁷; Casualty Pig (Pig Veterinary Society)⁶⁸. These guidelines need to be easily accessible to those that are responsible for decision-making.

344. Humane Slaughter Association publications are suitable for commercial farmers, stockpeople, smallholder farmers and hobby farmers as well as those who keep farm animals as pets. They provide practical information on handling, marketing and slaugh-

⁶⁶ [http://www.sheepvetsoc.org.uk/docs/casualty sheep.pdf](http://www.sheepvetsoc.org.uk/docs/casualty%20sheep.pdf)

⁶⁷ [http://www.bcva.eu/bcva/sites/default/files/ES%20Booklet%202010\(2\).pdf](http://www.bcva.eu/bcva/sites/default/files/ES%20Booklet%202010(2).pdf)

⁶⁸ <http://www.pigvetsoc.org.uk/>

ter of a variety of farm animals⁶⁹, e.g. a guide to humane killing of calves, lambs, and poultry.

345. There is concern that some farmers are reluctant to euthanase a diseased animal that is in pain, even when there is no likelihood of recovery. Lack of suitable equipment, unwillingness to undertake the procedure, perceived costs if undertaken by a veterinary surgeon, lack of training and a mistaken hope that the animal might recover could be factors influencing this decision.

346. Any person needing to kill an animal should be trained and competent and, in certain circumstances, may require a slaughterman's license, e.g. when using a captive bolt gun for planned euthanasia. Killing in an emergency or with a free bullet does not require a license.

347. Euthanasia is sometimes carried out by local knackery services although there are no official records of the extent of this service compared with on-farm euthanasia by the stockperson. Particularly in remote areas, where veterinary and knackery services are less accessible, there could be unacceptable delays in accessing external services. Euthanasia carried out by farm staff is preferable for speed of response and to avoid compromising farm bio-security. There are insufficient data to estimate the proportion of animals that are euthanased on-farm.

348. There is concern that many carcasses collected by local knackery services have evidence of long-standing chronic disease, and many would have suffered unnecessarily before death.

Conclusion

349. There are concerns that euthanasia is often delayed to the detriment of animal welfare.

Recommendations

350. Where care and treatment for sick animals is unavailable or ineffective they should be euthanased promptly and humanely. All flock or herd health planning must include a farm-specific plan to decide on when an animal should be euthanased. This plan should at least document where additional assistance can be sought to make the final decision to euthanase an animal and what means would be used to kill it. The species specific veterinary societies could usefully assist in the updating of euthanasia guidelines in line with the 2013 welfare at killing regulations.

351. On every farm an appropriate number of stockpeople should be trained and able to euthanase stock of all ages, to ensure that euthanasia is never delayed. Where this is inappropriate, holdings should be able to demonstrate the availability of trained personnel to respond to emergencies within an approved time limit.

⁶⁹ <http://www.hsa.org.uk/Publications.htm>

352. *Appropriate equipment for humane killing of livestock of all ages should be available to every farm.*

353. *The current confusion surrounding the required accreditation for use of equipment for euthanasia requires clarification. A separation of the legal requirement for killing of animals for food and killing for on-farm euthanasia would resolve this, with veterinarians empowered to issue certificates of competence for on-farm euthanasia.*

PART VI – FUTURE STRATEGIES TO IMPROVE ANIMAL HEALTH AND WELFARE AND THE ROLE OF DIFFERENT STAKEHOLDERS

Ethical reflection

354. The issue of farm animal health and disease raises the ethical question: to what extent is it acceptable for sentient animals under the management of a farmer or some other responsible person to experience avoidable suffering as a result of a disease? Of course, not all diseases result in suffering but most do.

355. One possible answer is simply to assert that it is unacceptable for farm animals to suffer from diseases that are readily treatable. The advantage of this answer is that it stops all of us as citizens becoming tolerant of unnecessary and avoidable suffering and of treating bad husbandry/care as normal. After all, most of us would regard it as unacceptable for a person or companion animal to suffer as a result of having a treatable disease that was not being treated.

356. Is this too idealistic? Farm animals are raised, primarily, to satisfy human commercial requirements for food or other products: economic forces are powerful and there are many vested interests. At what level, if at all, should we tolerate a certain amount of physical and/or mental suffering, whether as a result of disease or some other cause, if its prevention/treatment is judged too expensive?

357. Our view is that this is too defeatist a position and ethically unjustified. Part of the social contract farmers have with their animals is to enable them to have their needs, as summed up in FAWC's Five Freedoms, and some of their wants met⁷⁰. However, rather than calling for all treatable diseases that result in suffering to farm animals to be prevented/eliminated, our recommendation is that those with responsibility for farm animals must always seek to reduce the extent of suffering that results from such treatable diseases by rapid and appropriate treatment, while recognising that it may not be feasible to eliminate many diseases.

358. The extent to which suffering is tolerated is a balance of the scientific evidence of the ability of an animal to suffer and society's interpretation and moral evaluation of what constitutes poor welfare. Of course, these positions change over time, as evidence builds and society's perspectives alter. The dilemma in a complex food supply chain is: who should provide the leadership required to meet these changing values?

359. A further question is that of who is – or should be - financially responsible for prevention and treatment of diseases? In most cases the answer is simply those who own, and financially benefit from, the farm animals concerned; the Animal Welfare Act 2006 (England and Wales) and the Animal Health and Welfare Act 2006 (Scotland) clearly set out that statutory responsibility for welfare – presumably including financial

⁷⁰ (2) FAWC *Op.cit.*

responsibility – lies with the owner. Disease prevention and treatment should be a normal part of husbandry, along with the provision of food, fresh water and shelter.

360. In certain circumstances there can be an argument for a Government assuming financial responsibility for management of disease. Livestock disease and its control may result in negative externalities (outcomes for others), which include impacts on the health of other producers' livestock, on human health, on animal welfare and sometimes on the environment. In addition, livestock disease and its control have 'public good' characteristics. Such goods are non-excludable and non-rival in consumption (i.e. anyone and any number of people can consume, or benefit from, the good). For example, good disease risk management by a livestock farmer potentially benefits all other livestock farmers and, in the case of a zoonotic disease, may benefit many people in society more widely. However, the individual farmer practicing good disease risk management may not be rewarded through the market for these benefits (because the farmer cannot 'charge' for them). The World Organization for Animal Health (OIE) considers veterinary services to be a global public good.

361. Because such important externalities and public goods are generally not taken into account by individual decision makers, such as farmers producing for market, they are a potential source of market failure - where resources are not allocated in an optimal way and where societal welfare is lower than it might otherwise be. In such circumstances, there may be a strong case for Government or some other body to intervene to influence the allocation of resources to disease control, to achieve an economic optimum which maximizes the net welfare of society. Government may be best placed to intervene – for example, by using regulation, taxation, subsidies, etc.⁷¹. This does not mean necessarily that Government (tax payers) should pay the cost of these activities. It may be appropriate for Government to recover the cost from those involved or for a sharing of costs (and responsibilities) between those involved (e.g. animal keepers) and Government.

Responsibility and cost sharing

362. Recent discussion on responsibility and cost sharing has put the spotlight on the boundaries of shared decision-making in disease control and prevention policies. Government currently retains responsibility for maintaining a competent veterinary service, funding some research and development and providing essential infrastructure for diagnostics and surveillance for the prevention and control of exotic disease and to identify new and emerging disease.

363. However, FAWC believes that if Government is to fulfil its guardianship role to protect and promote animal health and welfare, and the potential to improve health and welfare is to be maximised, greater input is required by Government. The current separation of exotic and endemic disease is artificial and misses opportunities to improve disease prevention and control through collaborative effort. The principle of how re-

⁷¹ Farm Animal Welfare Council. Opinion on policy instruments for protecting and improving farm animal welfare, 2008

sponsibilities and costs are shared depends on the benefits of better animal health and welfare, who reaps those benefits and what financial value they have.

364. For example, better animal performance is a direct benefit to farmers, and an indirect benefit to society through cheaper food and improved food security with financial benefits to both. An improved international trading position provides direct benefit to farmers and Government through balance of trade with financial benefits to both. Safer food has indirect benefits to farmers through market position, direct benefits to society through better health and a greater financial benefit to society. Better welfare has indirect benefits to farmers through market position and indirect benefits to society through the 'feel-good' factor.

365. The principle of joint responsibility and ownership is important to ensure that all parties value the process. Determining how responsibility and costs should be allocated requires an appropriate framework to facilitate discussions. The Government's D2R2 prioritisation model could provide a useful starting point for this framework.

366. A number of countries have public/private partnership cost-sharing schemes that aim to share appropriately both responsibilities and costs in relation to certain livestock diseases. These schemes are diverse and vary greatly from one country to another or from one area of a country to another, reflecting different needs, cultures etc. In some countries, such as Australia, industry and Government have agreed specific proportional cost shares associated with specific diseases. There are two main objectives of each of these schemes which are: (i) to achieve an appropriate and fair balance of costs associated with disease and its control along the food supply chain, particularly between livestock producers and Government/tax payers; and (ii) to manage disease risks, improve animal health and welfare e.g. through appropriate incentives to good practice, and reduce the total costs associated with disease and its control.

Government's role and responsibilities

367. Government could support the objective of improved animal health and welfare in many ways which may not always involve direct funding: acting as an enabler to incentivise collaboration where collaboration adds value; applying the affordable principle by assisting when a measure is too expensive for farmers to fund individually or collectively; encouraging early adopters when a new practice is risky; promoting good practice; incentivising good practice and new technologies where these fit other Government re-mits.

368. FAWC consultations highlighted the different approaches in the devolved administrations and the greater engagement of the Scottish and Welsh with endemic diseases and veterinary involvement in the care of farmed animals. Some consultees considered that Scotland was successfully tackling some diseases because of the close collaboration between industry, the Scottish research institutes and close involvement with Government. We were also told during consultation that less money, relative to the number

of animals, is spent in England on Government's animal health and welfare initiatives than in Scotland and Wales.

369. FAWC identifies the following specific areas for Government involvement important:

- a) Surveillance is a key area for Government involvement because of the increasing threat of exotic disease but also because of the opportunities to improve endemic disease prevention. Government should take the lead, supported by industry, in the systematic sourcing and integration of data to maximise the value from data currently collected by various parties e.g. farm assurance schemes, retailers, individual farmers.
- b) Sectors vary in how well developed the electronic recording of locations and movements of animals are, with the cattle sector most advanced. Knowledge of animal location and movements is an essential component of surveillance and disease control and all sectors should have good information on where animals are and when and where they move.
- c) The role of Government involvement in research and development should be reassessed. Research and development is an essential component of efficient and productive livestock sectors. In recent years, public funding has declined and is delivered through a variety of channels, across different Government departments, in a manner which is not aligned with individual sector priorities. Funding needs to reflect long-term strategic capital investment rather than year-on-year allocation of funds that are subject to cuts. Research should focus on developing efficient, high welfare, high health systems with minimal disease that reflect the additional benefits of lower environmental emissions, maximise the use of scarce resources and food security in addition to high welfare.
- d) There are specific concerns about whether there is sufficient expertise in applied farm animal health research in Great Britain. There is often only one centre of excellence for a subject area, and none for many areas. Government needs to consider the need to have a GB base. Whilst there are clear benefits to international collaboration, there may be some situations where adopting research results from other countries leads to inappropriate implementation because of differences in climate, species, housing and management.
- e) There are areas of research where lack of funds, high level of risk or inability to maintain intellectual property, discourage funding from private sources that can only be addressed through public funding.
- f) For areas where external funding is possible, Government should maximize the catalyst role of public funding to secure private funding, supporting collaborative efforts with other European and global partners.
- g) Government has a role in delivery to remove barriers to progress, such as allowing the veterinary profession to create business models that maximise preventive healthcare (e.g. allowing technicians to undertake certain roles), aiding sector bodies with support for collaborative health programmes and improving knowledge exchange.
- h) Government has a catalyst role in incentivising health and welfare improvements. Protection and maintenance of preferred environmental practice is incentivised

through environmental stewardship schemes funded by Pillar II funding. A similar welfare stewardship scheme could provide support to improve on-farm health and welfare. Health and Welfare Schemes have been available on a limited, competitive basis through previous Rural Enterprise schemes but should be extended on a non-competitive basis to all livestock holdings under principles similar to Environmental Entry Level Stewardship. Specific elements could cover biosecurity standards, systems with high welfare standards, building improvements and a skills framework to increase accreditation and competence of stockpeople.

- i) The cost of endemic disease at national, as well as farm, level needs to be estimated. This should include wastage from endemic disease and a value for the welfare dis-benefits to the animal. Knowledge of these costs could inform the extent of Government involvement in endemic disease control.
- j) As evidence from research grows of the important links between disease/physical health and negative and positive mental states, Government has a role to ensure that this knowledge is transferred into practice to benefit animal welfare.
- k) Positive steps forward in improving farm welfare through physical and mental health need to be communicated to citizens as part of the broader coverage of the responsible use of animals in Great Britain; be an integral part of any claim of welfare provenance made by retailers and the food service sector; and be part of a trading system that rewards farmers and others in the supply chain for producing animals to high health and welfare standards. Citizens, as consumers of animal products should be encouraged, through the communication of appropriate information on the welfare standards and outcomes of production systems, to act responsibly in the acquisition of animal products. Government has a guardianship role to ensure that continuous improvement is recognised fairly.

Livestock industry role and responsibilities

370. Livestock keepers have the primary responsibility for the health and welfare of livestock in their care. The industry sector bodies have a pivotal role in supporting livestock keepers in achieving improving and high levels of health, and facilitating involvement by all stakeholders (allied support industries and Government) to deliver continual improvements in health and welfare. They need to identify appropriate structures and participants, create effective models for delivery and regularly review progress in improving animal health. Specific priorities should be to guide research, development and knowledge exchange, to set targets to reduce disease and to identify responsibility for delivering improved animal health.

371. There can be conflicts between approaches that maximise animal health and welfare, food safety, public health, environment and sustainability; choices have to be made. For example, development of sustainable intensification in animal farming may have negative implications for welfare and so requires the inclusion of factors that ensure high animal welfare.

372. Industry has a role in promoting a greater appreciation of the benefits of good health and welfare for food safety, through reduced carriage of zoonotic diseases and reduced risk of antimicrobial resistance in humans with reduced use of antibiotics in livestock.

373. There is a role for industry in encouraging integrative programmes of research and promoting better collaboration and co-operation across the European industries, e.g. the joint initiative conference in 2012 between the Farmers Club and the UK's Biosciences Knowledge Transfer Network on European Collaboration in Applied Research, Development and Knowledge facilitated the meeting of interested dairy research and development organisations from across Europe, to share experiences and understand common research and development needs.

374. The industry sector bodies need to take a lead in identifying major gaps in the current research and development funding, prioritising the need in discussions with Government. New innovations should be supported by research in the laboratory and on farm to assess the effect on health and welfare. On farm studies need support from industry to ensure that they are useful and representative.

375. Sector bodies should promote open exchange of information on the disease status of regions and individual holdings and facilitate good bio-security on farms, in regions and in networks of farms. Markets and movements of animals can lead to transmission of diseases and a whole chain bio-security approach is required to control disease spread. The current dysfunctional relationships in the supply chain often work against progress and are a key area where sector bodies can negotiate change.

376. Many endemic diseases have remained at significant levels because they are complex. There is a role for the sector bodies in knowledge exchange to facilitate access to the appropriate advisory services to encourage uptake of good management of such diseases.

377. In our recent report on education, communication and knowledge application in relation to farm animal welfare⁷² FAWC recognised the gap between generation of knowledge and its application. There has been significant expansion of scientific and technical research in the last decade, including the effect of farm, transport and slaughter practices. However, these have not always translated into improved husbandry. The report recommended that sector bodies should play a key role in the development of industry-led competency and Continuing Professional Development (CPD) schemes to enhance knowledge exchange.

378. Progress is unlikely to be made unless targets are bench-marked with effective feedback promoting further action. The sector bodies have a responsibility with Government to set targets, and to gather appropriate data on health and welfare to feed back to producers. The integration of appropriate 'iceberg indicator' outcome measures

⁷² Farm Animal Welfare Committee. Report on education, communication and knowledge application in relation to farm animal welfare, 2011

can add value to routinely collected management data providing early warning indicators of poor health and welfare for intervention. Advances in electronic data recording and information flow, also provide the opportunity to use these data for disease prevention. Combining ante and post mortem data can provide powerful trends of health and welfare. There is a role for 'composite indices' to give a simple benchmark of herd health, e.g. a 'herd health index' measuring levels of treatment, mortality and factory condemnation in a pig herd.

379. Formation of the Agricultural and Horticultural Development Board (AHDB) has created a forum for collaborative work where sectors can share experiences, collaborate on joint Research and Development where appropriate and create efficient structures to deliver knowledge exchange, Continuing Professional Development and competency frameworks.

Retailer and processor roles and responsibilities

380. Retailers, quick service restaurants and the catering trade currently have a range of different methods of engagement over welfare issues depending on their size, market position and customer base. The activity usually, but not exclusively, covers own label products with different or no standards on prepared and branded foods. Relationships tend to be stronger between retailers and farms in the dairy, egg and broiler sectors and may be managed directly with dedicated producer groups or through a processor base. The level of interest and activity driving health and welfare standards has increased substantially over the last two years.

381. Different retailers use different scheme standards. Most seem to regard health and welfare as non-competitive with a baseline standard and then differentiation across tiers based on other attributes such as farming systems. There is recognition that their customers expect the retailer to provide reassurance on welfare concerns. The drive of some, but not all retailers, to engage with individual farms provides this reassurance, allows the retailer to demonstrate compliance with other schemes (such as carbon reduction) and secures a long term sustainable supply of product.

382. Some retailers use external farm assurance schemes with additional checks at abattoir (such as liver fluke damage in sheep); there is growing interest in welfare outcome measures both on-farm (e.g. locomotion scoring of dairy cows) and post mortem (e.g. hockburn in chicken). A range of initiatives including provision of vets on farm and engagement in research that is then developed into farm and best practice (e.g. canopy cover in laying hens to reduce injurious pecking) has been developed.

383. Although retailers work directly with a relatively small proportion of farms, they (and their processors) have made significant progress in some areas through benchmarking initiatives. This type of activity is valuable for all parts of the chain to understand the opportunities for improved health and welfare and the costs involved in implementing change. Processors have a role to ensure that ante and post-mortem feedback is provided in a timely manner to their suppliers.

384. We were informed about good examples of processor engagement with their supply base in terms of disease, e.g. CPD workshops on liver fluke and other disease impacting on production. The aim is to develop cross-industry relationships that make practical and meaningful training accessible locally and that can show knowledge improvement across the supply base. This kind of engagement can provide essential knowledge that can help strategically target treatments as well as reduce treatments and thus the threat of resistance. It can target local problems and build towards national solutions that deliver economic and welfare benefits.

385. Data from retailer specific schemes could be used towards national benchmarking of diseases e.g. dairy cattle lameness.

386. Although there are strong financial drivers at farm level to improve health and welfare, periods of low or negative margins have an adverse impact on animal health and welfare through reduced labour and veterinary input on farm, lack of investment in infrastructure and short term economies. Recognition by retailers of the true average costs of livestock production and establishing links with their supply base with the use of cost-of-production-linked contracts would have a direct impact on the ability of the farmer to deliver improved animal health and welfare. This closer working relationship and understanding and reward for higher health and welfare standards would incentivise on-farm improvements and provide security for producers to encourage investment in better facilities.

The veterinarian's role and responsibilities

387 The veterinary trilemma is as follows: To whom — and for what — is the vet responsible? Is it to the animal (under his/her care), the client who pays the bills or the business that employs him (including himself/herself in the sense of his/her self-respect)? The answer is clear in Great Britain. The novice veterinary surgeon declares on admission to the Royal College of Veterinary Surgeons (RCVS), *"I PROMISE AND SOLEMNLY DECLARE that I will pursue the work of my profession with integrity and accept my responsibilities to the public, my clients, the profession and the Royal College of Veterinary Surgeons, and that, above all, my constant endeavour will be to ensure the health and welfare of animals committed to my care."*

388 Thus, in Great Britain — but not necessarily in other countries where a different declaration may be made — the answer is that the vet is primarily responsible for the welfare of the animal committed to his care.

389. The Lowe report⁷³ highlighted the changing agenda for veterinary services and the changing roles and potential conflicting relationships between private veterinarians and Government, industry bodies and their clients. The farm veterinarian of the future will be key to improving animal health and welfare through preventive health planning for prevention, control and treatment of disease.

⁷³ <http://archive.defra.gov.uk/foodfarm/policy/animalhealth/vservices/pdf/lowe-vets090806.pdf>

390. Following the Lowe report, the Veterinary Development Council (VDC)⁷⁴ has recently looked at the market for veterinary services in the food supply chain, and considered how it could be best served and organized; it recommended actions to maintain a sustainable, effective and efficient market. These covered the need for veterinary engagement with the whole supply chain, making the link between health, welfare and food safety; the need for different business models; allocation of tasks with an increasing role for technicians and suitable qualified lay persons in minor veterinary service activities.

391. The recommendations from the VDC report have many implications for veterinary education and training. There was a suggestion that veterinary specialism should start before graduation as preparation for continuation after graduation; the base level of expertise that a graduate requires to be effective on farms is now so high that there is insufficient time to develop this without specialisation before graduation. Focusing on graduates who wish to specialise in farm animal practice and research would allow better access to good farms and practices where students can develop their expertise and raise the average standard of farm animal vets. FAWC supports this recommendation.

392. It is implicit in the Veterinary Medicines Regulations and the Code of Professional Conduct of Veterinary Surgeons that medicines may only be prescribed by a veterinary surgeon for “*animals under his care.*” The supporting guidance⁷⁵ to the Code states that:

“4.9 The Veterinary Medicines Regulations do not define the phrase 'under his care' and the RCVS has interpreted it as meaning that:

- a) the veterinary surgeon must have been given the responsibility for the health of the animal or herd by the owner or the owner's agent;*
- b) that responsibility must be real and not nominal;*
- c) the animal or herd must have been seen immediately before prescription or*
- d) recently enough or often enough for the veterinary surgeon to have personal knowledge of the condition of the animal or current health status of the herd or flock to make a diagnosis and prescribe; and*
- e) the veterinary surgeon must maintain clinical records of that herd/flock/individual.”*

“4.10 What amounts to 'recent enough' must be a matter for the professional judgement of the veterinary surgeon in the individual case.”

“4.11 A veterinary surgeon cannot usually have an animal under his or her care if there has been no physical examination; consequently a veterinary surgeon should not treat an animal or prescribe POM-V medicines via the Internet alone.”

⁷⁴ <http://www.bva.co.uk/public/documents/VDC-Report-2011-2012-May-2012.pdf>

⁷⁵ <https://www.rcvs.org.uk/advice-and-guidance/code-of-professional-conduct-for-veterinary-surgeons/supporting-guidance/veterinary-medicines/>

“4.12 The Veterinary Medicines Regulations do not define ‘clinical assessment’, and the RCVS has interpreted this as meaning an assessment of relevant clinical information, which may include an examination of the animal under the veterinary surgeon’s care.”

393. Under scrutiny by an RCVS disciplinary committee, a vet would have to explain that he/she had acted within these guidelines. It is reasonable to expect that more frequent visits to animals under his/her care would naturally be required to larger scale farms, farms where the nature of production is more “intensive” or farms where animals are being managed closer to their biological limits. Furthermore, if the request to supply medicines was frequent and/or for large amounts of veterinary medicines, the veterinarian would be expected to have a greater degree of personal experience of the clinical situation on the farm.

394. As a minimum requirement to gain sufficient understanding of a farming business to allow for compliance with RCVS dispensing guidelines we would expect even the most extensive farming businesses to have at least two veterinary herd/flock health visits a year, pending further research into an assessment of the optimal quantity and quality of visits, for different complexities of farm businesses, to gain most health and welfare benefit.

395. FAWC identifies the following specific roles for the farm veterinary professional as important;

- a) The private veterinarian has a key role in detection and diagnosis of disease and any new model of national surveillance must draw on their expertise to provide the required representative surveillance network on farms and in abattoirs.
- b) National or regional health programmes which eliminate infectious disease, gradually upgrade the health status of an area or improve the specific level of disease on farm rely on the involvement of veterinarians in the design of the programme, promotion of the benefits to their clients and help in enacting and review of the programmes.
- c) In their advisory and knowledge exchange role, private veterinarians should have an input into research and development of field trials where appropriate. There are numerous areas where endemic disease and welfare projects would benefit from veterinary involvement.
- d) Proactive health care makes veterinarians an essential part of the farm management team delivering preventive healthcare, engaging with clients to manage short and long term changes in husbandry practices and taking a responsible approach to pharmaceutical use. The development of welfare outcome measures as ‘iceberg indicators’ of health and welfare provides new opportunities of additional evidence to drive improvement as part of the preventive health programme, and to feed back into industry health and welfare improvement, research and development and knowledge exchange. This cannot succeed without good health, welfare and production records.
- e) The veterinarian has a role as a trainer in treatment and nursing skills and underpinning knowledge to deliver key competencies and ongoing professional de-

velopment to livestock keepers and their staff. As the central advisor to the farm, there is a role to co-ordinate other advisors that may provide expert advice to farms (for example, nutritionists) and to assist the farmer to translate a mix of messages into the best on-farm solution for an individual business.

- f) Veterinary professionals could play a major role in sector improvements in health and welfare as advisors, involved in collection and auditing of key health and welfare data.
- g) Concerns over conflicts of duty to animal keeper (client), animal or own business could be overcome through novel approaches to audit veterinary involvement on farm whilst maintaining client confidentiality. There are similar approaches to resolving this issue within the NHS model of audits of GP practices.

Research and development themes for the improvement of farm animal health and welfare

396. During our study we have encountered the following topics that would benefit from further research and development effort and, which resolved, would benefit farm animal health and welfare:

- a) Greater emphasis on studying disease and its impact on animal mental well being and welfare with the ultimate aim of understanding how disease affects animal welfare;
- b) Measurable indicators of animal welfare, particularly those that can be automated with the aim of providing information to farmers about likely sick animals;
- c) Development of rapid diagnostics and pen side testing to determine health and disease, again particularly those that can be automated/high throughput;
- d) Using existing data to predict likely outbreaks of disease on farm using statistical modelling;
- e) Fundamental studies on mechanisms that enable animals live with pathogens without disease, e.g. understanding the role of microbiomes in the gut, lungs, skin, reproductive tract or mammary gland that are communities of bacteria that support health;
- f) Whether there is a maximum level of productivity that can be demanded of animals without compromising welfare;
- g) Why and how animal owners, keepers and vets make decisions about treatment and care of diseased animals with the ultimate aim of ensuring that all sick animals are treated and nursed appropriately;
- h) How economic theory can be used to evaluate welfare;
- i) Optimising the value of data of varying quality and quantity in surveillance;
- j) The optimal number of veterinary herd health planning and production management visits to maximise welfare and productivity to farms;
- k) Identification of livestock that are susceptible and more resistant or resilient to disease using genetic theory and genomic technologies;
- l) Integrating cellular level research with farm level disease incidence;
- m) Research into bacterial disease solutions that can lead to reductions in the use of antibiotics.
- n) The impact of early development on long term health and welfare.

397. There should be greater interaction between research and development programmes as well as clear communication on research and development requirements up and down the research, development and demonstration chain.

Key themes to improve farm animal welfare through improved health: conclusions

398. FAWC believes that the key themes for improving welfare through improved health management over the next 20 years should include the following.

- a) Greater use of preventive health planning and production management with the veterinarian as the key external advisor;
- b) Greater involvement of the veterinarian in diagnosis and appropriate treatment of sick animals, ensuring that animals are not left untreated or treated inappropriately and research into how this can be done cost effectively;
- c) Continuing professional development of all connected with farmed livestock, with a particular focus on linking physical and mental health, and a requirement for demonstration of competency in nursing and technical ability to administer medicines and vaccines;
- d) Provision of appropriate resources to improve preventive healthcare (taking into account the three-way relationship of the animal, the pathogen and the environment), including greater use of new technologies, land management techniques, building design and genetic procedures;
- e) Creation of a balance of legislation and self-regulation and effective partnership working that maximises the uptake of opportunities to improve health and welfare. A Health and Welfare Stewardship Scheme could be a central driver for change;
- f) An appreciation by all stakeholders that improved welfare through better health also delivers for other policy areas, e.g. productivity, emission reduction, food safety standards and reduction in energy consumption.

Recommendations

399. *Governments should, as a public good, take responsibility to reduce the impact of endemic disease on the health and welfare of animals. Support is necessary in a guardianship role to monitor, enable, encourage and promote continual reduction in the priority diseases that impact on health and welfare. Important areas for Government involvement are listed in paragraph 369.*

400. *Governments should make support available through a Health and Welfare Stewardship programme, similar to the Environmental Entry Level Stewardship Scheme, to enhance health and welfare.*

401. *Governments should ensure that improvements in animal welfare through animal health initiatives are recognised and rewarded.*

402. *The livestock industry sector bodies, working with the Animal Health and Welfare Board for England (AHWBE) – and the equivalent co-ordinating committees in Scotland and Wales - should agree specific priorities to guide research, development knowledge exchange and improved animal health*

403. *The livestock industry, working with Governments, should co-ordinate the implementation (and regularly review progress) of national and regional health programmes designed to reduce the prevalence of important endemic diseases*

404. *Retailers should encourage the adoption of outcome measures of health and welfare in their supply chain, using measures that are industry standards to prevent duplication of effort.*

405. *Processors should feed back post mortem data to the farmer to inform the veterinary health plan.*

406. *Scheme data should be made available, with anonymity safeguards, for national analysis to aid health and welfare policy decisions. Consent for this should be obtained as an entry criterion to any scheme so that ‘confidentiality’ was not used as an obstructive issue.*

407. *Retailers and processors should take responsibility for ensuring that their supply base is adequately funded and prepared to deliver sustained good health and welfare and that improved standards of health and welfare are appropriately rewarded.*

408. *All veterinarians working in the farm sector should be competent in herd health and welfare planning and work with their clients to facilitate preventive health and welfare programmes. To benefit from such programmes veterinarians must see the farm stock and a minimum number of inspections per year is essential. The minimum number to see economic and health benefits needs to be determined by size of farm, complexity of system, species farmed and health status. Important roles for the farm veterinary professional are listed in paragraph 395.*

409. *Veterinary training and continuing professional development needs to be reassessed in line with the critical role that veterinary professionals will play in future health and welfare improvements. Potential farm veterinary professionals need earlier and closer contact with farming practices, development of expertise in all aspects of husbandry and farm economics as well as herd health and individual animal disease diagnosis and treatment. In addition, development of veterinary business and management skills are required. All of these are unlikely to be achieved without some pre-graduation specialization.*

410. *The animal keeper has primary responsibility to ensure that sick animals are nursed and treated appropriately and euthanased immediately if it is apparent that further treatment is inappropriate. Where medicines are used, a vet has a duty of care to ensure that appropriate treatment is given. This is a complex area and we recommend*

that efficacy of treatment is recorded and that the veterinary profession debate more fully the ethics and practicalities of this situation.

411. Government and industry should support suggested research and development opportunities that will benefit farm animal health and welfare. Research and development topics likely to be beneficial are listed in paragraph 396.

412. All stakeholders should take a proactive approach to improving farm animal health and welfare in future. Key themes for improvement are listed in paragraph 398.

APPENDIX A

MEMBERSHIP OF THE FARM ANIMAL WELFARE COMMITTEE (Winter 2012)

Professor Christopher Wathes – Chairman
Professor Michael Appleby
Professor Richard Bennett
Professor Henry Buller
Dr Joanne Conington
Mr Huw Davies
Professor Sandra Edwards
Mr Michael Elliott
Dr John Fletcher
Professor Laura Green
Mr Gwyn Jones
Mr Neil Manchester
Professor Richard Moody
Reverend Professor Michael Reiss
Dr Philip Scott
Mrs Meryl Ward
Mr Mark White
Mr Stephen Wotton

Former FAWC members Professor David Morton, George Hogarth and Mike Wijnberg were members of the Disease and Farm Animal Welfare Working Group. Former members David Main and Stephen Lister are also thanked for their assistance.

Advisers

David Pritchard (until August 2010)
Dr Liz Kelly (until June 2011)
Dr Sophia Hepple
Dr Rebeca Garcia

Secretariat

Richard Aram
Louise Mulcahy
Brenda Rawson

APPENDIX B

THOSE WHO GAVE EVIDENCE AND ASSISTANCE

Agriculture and Horticulture Development Board
Animal Aid
Animal Health Veterinary Laboratories Agency
Assured Food Standards
Aviagen
Biosciences Knowledge Transfer Network
Biotechnology and Biological Science Research Council
British Cattle Veterinary Society
British Egg Industry Council
British Pig Executive
British Poultry Council
British Veterinary Association
British Veterinary Poultry Association
Co-operative Society
DairyCo UK
Defra
English Beef and Lamb Executive
Farm Animal Genetic Resources Committee
Game and Wildlife Conservancy Trust
HCC Meat Promotion Wales
LANTRA
National Farmers' Union
National Farmers' Union Scotland
National Pig Association
National Sheep Association
Nottingham Veterinary Group
Pig Veterinary Society
Professor Alistair Lawrence
Professor John Webster
Quality Meat Scotland
Royal College of Veterinary Surgeons
Royal (Dick) Veterinary School
Roslin Institute
Scottish Agriculture College
Scottish Government
Sheep Veterinary Society
Tesco
University of Liverpool
Veterinary Medicine Directorate
Welsh Government

APPENDIX C

SCALE OF LIVESTOCK INDUSTRY SECTORS⁷⁶

Number of livestock on main and minor holdings for each UK country, June 2000

| | Scotland | England | Wales | N. Ireland | UK |
|--|-------------------|--------------------|-------------------|-------------------|--------------------|
| Cattle: | | | | | |
| Dairy cows(2) | 207,150 | 1,575,480 | 268,590 | 283,390 | 2,334,610 |
| Dairy heifers in calf for the first time | 51,900 | 357,980 | 60,820 | 60,880 | 531,580 |
| Beef cows(2) | 518,220 | 781,260 | 224,380 | 317,960 | 1,841,820 |
| Beef heifers in calf for the first time | 51,900 | 357,980 | 60,820 | 60,880 | 531,580 |
| Bulls for service | 20,450 | 46,090 | 10,090 | 16,280 | 92,910 |
| Other dairy and beef heifers for breeding | 134,890 | 490,650 | 94,390 | 74,810 | 794,740 |
| Fattening cattle | 434,490 | 948,200 | 237,330 | 390,430 | 2,010,450 |
| Cattle under one year | 608,960 | 1,598,130 | 316,630 | 470,860 | 2,994,580 |
| Total cattle | 2,027,960 | 6,155,760 | 1,273,050 | 1,675,480 | 11,132,240 |
| Sheep: | | | | | |
| Ewes for breeding | 3,712,980 | 7,829,100 | 4,918,350 | 1,182,450 | 17,642,870 |
| Rams for service | 113,120 | 229,330 | 113,550 | 32,200 | 488,200 |
| Gimmers for breeding | 819,300 | 1,108,120 | 726,420 | 150,170 | 2,804,010 |
| Others(3) | 89,420 | 258,780 | 114,210 | 8,230 | 470,630 |
| Lambs | 4,449,030 | 9,719,010 | 5,319,690 | 1,367,540 | 20,855,270 |
| Total sheep | 9,183,850 | 19,144,350 | 11,192,220 | 2,740,590 | 42,261,000 |
| Pigs: | | | | | |
| Female breeding herd: Total | 57,670 | 502,700 | 7,710 | 41,800 | 609,880 |
| Gilts 50kg & over for breeding | 5,860 | 67,550 | 770 | 3,650 | 77,830 |
| Boars for service | 2,710 | 25,040 | 530 | 1,350 | 29,630 |
| Barren sows for fattening | 970 | 6,820 | 180 | 590 | 8,550 |
| Other pigs: 20kg and over | 328,700 | 3,431,580 | 37,680 | 267,150 | 4,065,110 |
| Under 20kg | 162,180 | 1,408,780 | 21,260 | 98,940 | 1,691,160 |
| Total | 490,870 | 4,840,360 | 58,940 | 366,090 | 5,756,270 |
| Total pigs | 558,080 | 5,442,470 | 68,130 | 413,480 | 6,482,160 |
| Poultry: | | | | | |
| Fowls in laying flock: Hens in 1st lay season | 2,205,730 | nc | nc | 2,049,920 | na |
| Moulted hens | 38,620 | nc | nc | 250,040 | na |
| Total | 2,244,350 | 23,131,510 | 1,010,320 | 2,299,960 | 28,686,130 |
| Pullets being reared for laying | 774,450 | 7,533,260 | 355,070 | 798,290 | 9,461,070 |
| Fowls for breeding | 1,350,000 | 6,826,160 | 295,190 | 2,196,330 | 10,667,680 |
| Broilers/other table fowls | 9,828,360 | 77,959,660 | 8,244,880 | 9,655,440 | 105,688,340 |
| Other poultry(4)(5) | 99,070 | 14,245,610 | 498,470 | 425,850 | 15,268,990 |
| Total poultry | 14,296,220 | 129,696,190 | 10,403,930 | 15,375,880 | 169,772,220 |
| Goats: | | | | | |
| Female goats which have kidded | 2,210 | 31,620 | 3,090 | 1,590 | 38,510 |
| Other female goats previously used in breeding | 1,070 | nc | nc | nc | na |
| All other goats and kids | 4,440 | nc | nc | nc | na |
| Total goats | 7,710 | 58,620 | 6,590 | 3,360 | 76,270 |
| Deer | 6,850 | 26,000 | 960 | 2,680 | 36,490 |

⁷⁶ Economic Report on Scottish Agriculture 2001 and 2011 Editions
<http://www.scotland.gov.uk/Resource/Doc/158232/0042834.pdf>
<http://www.scotland.gov.uk/Publications/2011/06/15143401/68>

| | | | | | |
|--|---------------|----------------|---------------|--------------|----------------|
| Horses: | | | | | |
| Horses used in agriculture or horticulture | 630 | nc | nc | nc | na |
| All other horses and ponies | 22,760 | nc | nc | nc | na |
| Total horses | 23,390 | 222,230 | 35,900 | 9,540 | 291,050 |
| Other livestock | 215,560 | nc | nc | nc | na |

(1) All figures rounded to the nearest 10.

(2) Cows and heifers in milk and cows in calf but not in milk.

(3) Includes draft and cast ewes, and wethers in England and Wales.

(4) Includes turkeys, ducks, geese and guinea fowl.

(5) Includes ostriches in England and Wales.

na Information not available.

nc Information not collected.

Number of livestock for each United Kingdom country, June 2010

| | Scotland | England | Wales | Northern Ireland | United Kingdom |
|---|------------------|-------------------|------------------|------------------|-------------------|
| Cattle: | | | | | |
| Dairy cows ⁽²⁾ | 184,680 | 1,159,730 | 221,340 | 281,040 | 1,846,790 |
| Dairy heifers in calf for the first time | 40,490 | nc | nc | nc | na |
| Beef cows ⁽²⁾ | 456,880 | 756,310 | 185,820 | 257,650 | 1,656,650 |
| Beef heifers in calf for the first time | 46,930 | nc | nc | nc | na |
| Bulls for service | 22,440 | nc | nc | nc | na |
| Other dairy and beef heifers for breeding | 133,390 | nc | nc | nc | na |
| Prime cattle ⁽³⁾ | 409,300 | nc | nc | nc | na |
| Cattle under one year | 531,680 | 1,557,990 | 312,510 | 459,090 | 2,861,270 |
| Total cattle ⁽⁴⁾ | 1,825,780 | 5,541,520 | 1,138,130 | 1,604,360 | 10,109,790 |
| Sheep: | | | | | |
| Ewes for breeding | 2,643,330 | 5,256,970 | 3,261,980 | 775,180 | 11,937,460 |
| Rams for service | 87,010 | 159,780 | 90,150 | 25,220 | 362,160 |
| Gimmers for breeding | 664,150 | 855,600 | 614,140 | 100,720 | 2,234,610 |
| Others ⁽⁵⁾ | 88,870 | 671,650 | 339,790 | 18,420 | 1,118,730 |
| Lambs | 3,269,290 | 7,295,830 | 3,938,110 | 928,150 | 15,431,370 |
| Total sheep | 6,752,640 | 14,239,840 | 8,244,160 | 1,847,690 | 31,084,340 |
| Pigs: | | | | | |
| Female breeding herd: Total | 38,910 | 346,000 | 3,440 | 38,510 | 426,850 |
| Gilts 50kg and over for breeding | 6,380 | 63,180 | 610 | 4,340 | 74,510 |
| Boars for service | 1,500 | 14,110 | 410 | 790 | 16,800 |
| Barren Sows for fattening | 570 | nc | 320 | 1,140 | na |
| Other pigs: 20kg and over ⁽⁶⁾ | 251,290 | 2,258,220 | 16,500 | 246,610 | 2,772,610 |
| Under 20kg | 110,650 | 924,610 | 5,700 | 133,220 | 1,174,170 |
| Total | 361,930 | 3,182,830 | 22,190 | 379,820 | 3,946,780 |
| Total pigs | 409,290 | 3,606,120 | 26,970 | 424,600 | 4,466,980 |
| Poultry: | | | | | |
| Fowls in laying flock: Hens in 1st laying season | 3,629,530 | nc | nc | nc | na |
| Moulted hens | 53,160 | nc | nc | nc | na |
| Total | 3,682,680 | nc | 1,229,560 | 2,099,360 | na |

| | | | | | |
|---|-------------------|--------------------|------------------|-------------------|--------------------|
| Pullets being reared for laying | 909,510 | na | 59,650 | 1,017,340 | 1,986,490 |
| Fowls for breeding | 1,176,740 | na | 224,080 | 1,078,150 | 2,478,970 |
| Total laying and breeding fowls | 5,768,930 | 35,629,570 | 1,513,280 | 4,194,850 | 47,106,640 |
| Broilers/other table fowls | 8,755,710 | 78,788,030 | 5,850,470 | 11,915,080 | 105,309,280 |
| Other poultry ⁽⁷⁾⁽⁸⁾ | 67,980 | 10,755,180 | 206,930 | 421,160 | 11,451,250 |
| Total poultry | 14,592,620 | 125,172,790 | 7,570,680 | 16,531,090 | 163,867,170 |
| Goats and kids: | 3,710 | 78,920 | 7,450 | 2,880 | 92,950 |
| Deer: | 6,070 | 20,850 | 880 | 3,110 | 30,910 |
| Horses: | | | | | |
| Horses used in agriculture or horticulture | 710 | nc | nc | nc | na |
| All other horses and ponies | 35,570 | nc | nc | nc | na |
| Total horses | 36,280 | 214,030 | 48,530 | 12,470 | 311,310 |
| Camelids: | | | | | |
| Alpacas | 322 | 9,929 | nc | nc | na |
| Llamas | 184 | 1,216 | nc | nc | na |
| Other camelids | 32 | 74 | nc | nc | na |
| Total camelids | 540 | 11,220 | nc | nc | na |
| Other livestock: | 830 | 5,440 | nc | 18,460 | na |

(1) All figures rounded to the nearest 10.

(2) Cows and heifers in milk and cows in calf but not in milk.

(3) Male and female cattle one year old and over, not for breeding.

(4) In England and Wales data obtained from the Cattle Tracing System and in Northern Ireland from the Animal and Public Health Information System.

(5) Includes draft and cast ewes, and wethers in England and Wales.

(6) Includes barren sows for fattening in England.

na Information not available.

nc Information not collected.

APPENDIX D

DISEASES WITH FARM ANIMAL WELFARE IMPACT, FROM CONSULTATION RESPONSES

1. Consultees were asked to score their top priority diseases in each sector in terms of welfare impact based on intensity of welfare effect and duration of welfare effect.
2. There was reasonable consensus across industry on the top welfare issues for each sector with some regional differences and some differences depending on the role of the respondent. Disease caused by behavioural abnormality and some long-standing chronic issues were less well recognised.
3. The British Cattle Veterinary Association did not score diseases in their response but their priority cattle diseases included: lameness (digital dermatitis and severe claw horn lesions (sole ulcer, wall ulcer and toe necrosis), Johnes disease, dystocia, pneumonia, scour, injuries and mastitis in dairy cows.

Summary of consultation responses on important diseases/conditions of farm animals

Intensity of welfare effect (1-4) - 1) normal, 2) mild, 3) moderate to 4) substantial deviation from the norm

Duration of welfare effect (1-4) - 1) acute (less than 24 hours), 2) short (days), 3) medium (e.g. weeks) to 4) long term (e.g. months) duration of welfare effect

Each entry gives intensity then duration, e.g. 3/4 means intensity of 3 and duration of 4. 'Yes' means the respondent noted that the disease/condition is a significant problem but did not score it.

| Poultry | BEIC | VLA | SAC | | | | |
|------------------------------|-------------|------------|------------|-------------|-------------------------|------------|-------------|
| IB | 3/3 | | | | | | |
| Erysipelas | 3/4 | | | | | | |
| Enteritis | Yes | | | | | | |
| Red mite | Yes | 3/3 | 4/3 | | | | |
| AI/Newcastle | | 2/2 | 4/1 | | | | |
| Injury | | 4/1 | | | | | |
| E. coli | | 4/3 | 4/3 | | | | |
| Pecking/cannibalism | | 4/4 | 4/3 | | | | |
| Lameness (various) | | 4/3 | 4/3 | | | | |
| Aggression | | | 4/3 | | | | |
| Coccidiosis | | | 4/1 | | | | |
| Reproductive tract disorders | | | 4/3 | | | | |
| Acute heart failure | | | 4/1 | | | | |
| | | | | | | | |
| Cattle | QMS | VLA | SAC | NFUS | Notts. Vet Group | UOL | AHDB |
| BVD | 4/4 | | 3/3 | 4/4 | | | |
| Johnes | 4/4 | | | 4/4 | | | |
| Leptospirosis | 3/4 | | | 4/4 | | | |
| Pneumonia | 3/4 | | 3/3 | 4/4 | Yes | Yes | 4/3 |
| Liver fluke | 3/4 | | | | | | |
| Mastitis | | 4/4 | 3/3 | 4/4 | Yes | | 4/3 |
| Dystocia | | 4/2 | | | Yes | Yes | |
| Lameness (various) | | 4/4 | 4/4 | 4/4 | Yes | 4/4 | 4/4 |
| Metabolic disorders | | | | 4/4 | Yes | | |
| Dietary disease | | | | | Yes | Yes | |

| Sheep | QMS | VLA | SAC | SVS | NFUS | UOL | AHDB |
|----------------------|------------|------------|------------|------------|-------------|------------|-------------|
| Sheep scab | 3/3 | 4/3 | 4/4 | 3/2 | | Yes | |
| Lameness (various) | 4/3 | 4/4 | 4/4 | 4/4 | 4/4 | Yes | 4/4 |
| Ticks | 4/4 | | | | 4/4 | | |
| Liver fluke | 3/4 | 4/4 | 3/3 | | 4/4 | | 3/3 |
| Fly strike | | 4/4 | 4/3 | 4/3 | | Yes | |
| PGE | | 3/3 | 3/3 | 3/3 | | | |
| Pasteurellosis | | | 4/1 | | | | |
| Clostridial disease | | | 4/1 | | | | |
| Pregnancy toxaemia | | | 3/3 | | | | |
| Colisepticaemia | | | 4/1 | | | | |
| Dystocia | | | 4/1 | 4/1 | | | |
| Inadequate nutrition | | | | 2/4 | | | |
| Pigs | QMS | VLA | PVS | | NFUS | UOL | AHDB |
| APP | 4/1 | | 4/3 | | 4/4 | Yes | 4/1 |
| Other pneumonias | | | | | | | 3/3 |
| Strep suis | 4/2 | | 4/3 | | 4/4 | | |
| PRRS | | 3/3 | | | | | |
| Salmonellosis | | 3/3 | | | | | |
| Swine dysentery | | 3/3 | 3/3 | | 4/4 | | |
| Osteochondrosis | | 4/1 | | | | | |
| Mange/worms | | | 2/3 | | | | 2/3 |
| Aggression | | | 4/1 | | | | |
| Tail biting | | | 4/3 | | | Yes | |
| Gastric torsion | | | 4/1 | | | | 5/1 |
| Gastric Ulceration | | | 2/3 | | | Yes | |

AHDB - Agriculture and Horticulture Development Board

BEIC – British Egg Industry Council

NFUS – National Farmers’ Union Scotland

Nottingham Veterinary Group

PVS – Pig Veterinary Society

QMS – Quality Meat Scotland

SAC – Scottish Agricultural College

SVS – Sheep Veterinary Society

UOL – University of Liverpool

VLA – Veterinary Laboratories Agency (now Animal Health Veterinary Laboratories Agency)

APPENDIX E

Glossary

Acute pain – does not outlast the healing process and responds to treatment

Adaptive – modifying to suit new or different conditions

Aetiology – cause of disease

Allodynia – increased sensitivity to stimuli that would be innocuous to normal individuals

Analgesic – a substance that causes reduction in sensitivity to pain without loss of consciousness

Chronic disease – a disease that is long lasting and re-occurring

Chronic pain – persists beyond the healing period, and remains after pain can serve any useful function

Compartmentalisation – a procedure which may be implemented by Government to define and manage animal sub-populations of distinct health status for the purpose of disease control and/or international trade

D2R2 (Decision briefing, Decision support, Risk analysis and Ranking) - a decision support tool created by Government to help prioritise animal health issues and direct resources at those which are likely to have the greatest risk and impact on society. It uses validated objective evidence to rank animal diseases on the basis of their relative importance in the context of the four reasons for intervention (RFI) by Government, as defined by the GB Animal Health and Welfare Strategy

Denominator data - The number of animals in a sample when estimating prevalence or incidence of disease

Ectoparasite - an organism that depends on the outside of its host (such as skin/hair) for survival

Endemic disease – disease that is constantly present in a given population

Endoparasite – an organism that depends on the internal part of its host (such as the gut) for survival and reproduction

Epidemiology – study of the factors determining and influencing the frequency and distribution of disease, injury, and other health-related events and their causes

Ethology – study of animal behaviour

Exotic disease – disease which is not normally present in a given population. Exotic diseases are previously defined (known) conditions that cross political boundaries to occur in a country or region in which they are not currently recorded as present

Externalities – a third-party effect, where an individual's production or consumption of a product directly affects others, other than through market prices

Farm assurance schemes – voluntary schemes which producers can join to assure customers that certain standards have been maintained in the production process

Foetid – rotten, putrid, smelly

Germplasm – in animals this refers to semen, ova and embryos.

Homeostasis – maintenance of the body fluids at the correct pH and chemical composition

Hyperalgesia - greater-than-normal sensitivity to pain that may result from a painful stimulus or a lowered pain threshold

Iceberg indicators – key welfare indicators that can reflect, or are closely correlated with, a range of other welfare indicators

Incidence – the number of new cases in a given time period

Maladaptive – modifying with a negative rather than a positive effect

Multivalent vaccines – having more than one immunogenic component making the vaccine effective against either a) several strains of the same disease-producing organism or b) two or more micro-organisms

Pathogen – any agent that can cause disease in a given host

Pillar II funding - the Rural Development Regulation expenditure scheme under the EU Common Agriculture Policy (CAP) that is intended to support rural communities to develop and diversify

Physiological – affecting a biological function (e.g. heart rate, blood sugar levels)

POM-V (Prescription Only Medicine – Veterinarian) - may only be supplied to the client once it has been prescribed by a veterinary surgeon following a clinical assessment of an animal, or group of animals, under the veterinary surgeon's care

Prevalence – the number of animals affected at any one time

Private welfare surveillance – surveillance either by farmer to aid farm management or by inspectors as part of farm assurance schemes

Psychosocial – relating to processes or factors that are both social and psychological in origin

Public good – a class of good (product, or state of affairs) that once produced can be consumed (or enjoyed) by many people in society without exclusion, sometimes referred to as 'collective consumption goods'

Public welfare surveillance – surveillance undertaken by the Government or its agencies as part of welfare guardianship to inform Government policy and ensure compliance with regulations

RADAR (Rapid Analysis and Detection of Animal-related Risks) - an information management system, developed to collect and collate veterinary surveillance data from many different sources around the UK. It provides specialist tools for the analysis of surveillance data and publishes reports highlighting the risks and distribution of veterinary threats to the public and animal health and welfare

RCVS (Royal College of Veterinary Surgeons) – the Royal College of Veterinary Surgeons (RCVS) registers veterinary surgeons and veterinary nurses to practise in the UK and regulates their educational, ethical and clinical standards. Their aim is to safeguard the health and welfare of animals under veterinary care, protect the interests of those dependent on animals and assure public health

Scanning surveillance (=passive surveillance) – monitoring for the appearance of novel diseases or changing trends in existing diseases

Sentience – the capacity to experience or feel in a way that is analogous to human experience

SNP (Single Nucleotide Polymorphism) – variation of the genetic code at a single point along the genome

Subclinical disease – a disease that stays below the surface of clinical detection, as distinct from clinical disease, which has signs and symptoms that can be recognised

Statutory/Notifiable Disease – required by law to be reported to the authorities, and subject to specific control strategies

Targeted surveillance – targeted structured surveys of populations or representative samples in their environment, may also include other activities such as examination of animals at abattoirs

Zoonosis (pl. zoonoses) – a disease that can be passed from animals to humans

APPENDIX F

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