Report on the welfare of broiler breeders (1998)

LETTER TO MINISTERS

Minister of Agriculture, Fisheries and Food
Secretary of State for Scotland
Secretary of State for Wales

6 August 1998

Dear Minister,

I have pleasure in submitting the Farm Animal Welfare Council's Report on the Welfare of Broiler Breeders which is published next week. We considered a wide range of issues and carried out extensive consultation with interested organisations. Many of our recommendations reflect practices that are already well established and are followed by the majority of the industry but we include them here in the hope that they will be incorporated in a new welfare code.

Broiler breeders are relatively valuable birds and the incentive to ensure they receive careful husbandry is strong simply on commercial grounds. However, it is appropriate to set out the areas where attention should be focused. The Report deals with breeder stock throughout the rearing and laying phases and addresses in detail the major welfare dilemma of feed control. The experience of 'hunger' is not in itself detrimental to the bird, but it is the extent and duration that can cause it to become a welfare problem.

The UK is an established world leader in the production of pedigree breeder stock. Nonetheless, breeding birds are kept in many other countries across Europe and we look to the Government to urge its EU partners to adopt welfare standards similar to ours. I shall be sending copies of the published Report to the European Commission and to the Council of Europe.

I hope the Government will find this Report helpful and carry out its usual consultation at an early date.

Yours sincerely

Professor Sir Colin Spedding
Chairman
Farm Animal Welfare Council

PART I - INTRODUCTION

REMIT

1. The terms of reference of the Farm Animal Welfare Council (FAWC) are to keep under review the welfare of farm animals on agricultural land, at market, in transit and at the place of slaughter; and to advise GB Agriculture Ministers of any legislative or other changes that may be necessary. The Council has the freedom to consider any topic falling within this remit. Our membership is at Appendix A.

2. In 1992, FAWC published its Report on the Welfare of Broiler Chickens. The report covered only those birds reared for the table and not that part of the industry selecting and breeding chickens for the producers of broiler meat. In 1996, FAWC was asked by the Agriculture Departments to consider the welfare of broiler breeders so that welfare codes could be prepared on all aspects of broiler chicken production. Broiler breeders are the breeding stock producing fertile eggs from which commercial broiler chicks are hatched. The remit of the study did not include welfare in transit (other than from farm-to-farm) or at slaughter because the Council has previously issued separate reports on these topics.

3. This report summarises our study and makes a number of recommendations.

METHOD OF INVESTIGATION

4. The Council carried out an extensive consultation exercise, considered scientific evidence and visited breeding companies and poultry farms. In addition, a seminar was held with invited experts from industry and research bodies; and oral and written evidence was taken from interested parties, including animal protection organisations, and from experts in the field.

5. Those who gave evidence and information are listed at Appendix B and we would like to thank all who participated. In particular, the Council is indebted to Heddwyn Owen (ADAS) who attended meetings and visits and provided expert advice.

6. The welfare of an animal can be defined as its state as regards its attempts to cope with its environment. Hence welfare encompasses the animal's health and general physical condition, its mental state and its biological fitness and depends on its ability to cope with any adverse affects of the environment in which it is kept. Although one single measurement can indicate that welfare is poor, studies comparing welfare in different systems, or using different husbandry methods, should utilise a range of indicators.

7. Science makes an important contribution to our understanding of the subject by studying, for example, physiological changes, abnormalities of behaviour, occurrence of disease and injury, the strengths of animal preferences and the determination of growth and breeding characteristics. However, evidence is required not only from scientific study but also from practical, objective observation within the industry and examples of best practice in animal husbandry. Ideals, known as the Five Freedoms, have been adopted by FAWC and provide a framework for all our recommendations.

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.

In order to apply these principles, those in charge of livestock must practise caring planning; responsible and responsive management; informed, skilled and conscientious stockmanship; considerate handling and transport; humane slaughter. The planning of effective management practice and provision of appropriate living conditions are essential.

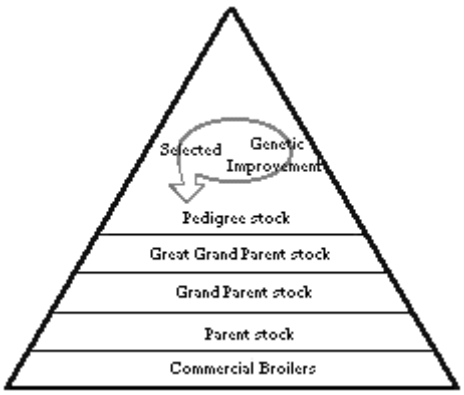
8. The welfare of any animal is dependent on the overall balance of factors contributing to its physical and mental state. When identifying welfare problems, it is necessary to consider both the extent of poor welfare and its duration. However, the many dimensions of animal welfare inevitably mean that an understanding of production conditions and scientific information alone cannot provide a sufficient guide for detailed recommendations. A broad-ranging approach taking into account all relevant views and factors provides the basis for preparing our report.

9. Welfare assessment concerns individual animals. However, where there are indications of poor welfare, we consider the problem to be more serious when more animals are affected.

PART II - THE INDUSTRY

BACKGROUND

10. At any one time there are approximately six million broiler breeder hens in the UK producing the fertile eggs to provide a supply of chicks (as hatched - i.e. approximately 50% male and 50% female) required by those producing table poultry. Well over 90% of the birds originate from two UK primary breeding companies who between them also supply a significant proportion of the world demand for broiler breeding stock. Both have pedigree stock in this country and carry out the complete selection and breeding programme for their national and international operations, typically through four generations:



11. By continual selection over the last 30 years the primary breeding companies have developed a genotype which is dramatically different from that which was farmed in the 1960s. Initially, progress concentrated on improving growth rate, feed conversion and conformation. Latterly more sophisticated methods of selection have enabled a much wider range of traits (currently in the region of 40) to be taken into consideration.

12. All genetic selection is undertaken within the pedigree flock and, because of the number of generations involved, any change at the pedigree level will take 4-5 years to reach the commercial broiler stage. Examples of selection traits are:

Age at sexual maturity
Body conformation/meat yield/fat deposition
Cardio-vascular health
Feathering
Feed conversion
Foot and leg health
Growth rate/weight for age
Health/resistance to disease
Reproductive performance (e.g., egg numbers, fertility, hatchability, egg size, sperm count, mating behaviour)
Social behaviour (e.g., aggression, docility)

13. Breeding birds are largely in the hands of some ten integrated companies with their own hatcheries and parent flocks which provide a constant supply of hatching eggs. These birds are normally reared from day-old to 18 weeks of age on premises which are separate from the laying farm. At that age, point-of-lay pullets and the appropriate number of cockerels (approximately 10%) are transferred to the laying farm. To about 60 weeks of age each female parent will produce some 120 broiler chicks. Based on a 47 week cycle (42 in lay and a five week turn around period between flocks) this represents about 2.5 chicks per female per week. Some 780 million broiler chicks are currently placed annually in the UK.

PRODUCTION SYSTEMS

Rearing

14. Broiler breeders are reared in deep litter houses that have the lighting, temperature and ventilation controlled. Houses are normally sub-divided into pens containing about 1000 birds. Body weights are carefully monitored on a weekly basis and the body condition physically assessed by trained personnel. Depending on breed and strain, the body weight of an 18 week old broiler breeder will be in the region of 2kg. To achieve recommended body weights throughout the rearing period, feed intake is controlled and to ensure that all birds receive a fair share, great emphasis is placed on feed distribution methods. Birds are grouped by weight and it is necessary to transfer some individuals between groups periodically so as to adjust their feed intake and body weight to the target growth path.

Laying

15. Modern broiler breeder houses generally provide about two thirds of their floor area as litter and one third as a raised, slatted area. In recent years it has become common practice to provide separate feeders for the hens and the cockerels to control feed intakes, and hence body weights, of each separately. Controlling the weight of hens prevents too-rapid growth and deposition of fat which seriously affects their longevity and egg-laying performance. Controlling the cockerels' weight improves their mating behaviour, semen count and foot and leg health.

16. Male and female birds are subject to different feeding levels and they have different feed access. Cockerel feeders are suspended out of reach of the hens. Hen feeders deny access to the cockerels by the use of metal grills ("toast racks") or covers above the trough, set with a gap, which allow for the differences in head dimensions between the sexes. As in the rearing houses, the feeding space must be adequate and feed must be distributed rapidly and evenly to ensure minimum competition at feeding time. Pan feeders have recently been introduced which offer a more sophisticated means of separating male and female feed supply. Whichever system is used, a high standard of stockmanship is essential.

PART III - THE WELFARE ISSUES

STOCKMANSHIP AND TRAINING

17. All those who contributed responses to our consultation exercise expressed the view that stockmanship is a key influence on animal welfare. The most welfare-friendly system may fail if not accompanied by competent stockmanship and sound management practice. A good stockperson can anticipate and avoid many potential welfare problems, will have a compassionate and humane attitude, and an ability to identify any problems and respond to them. Some problems may be specific to a particular unit and the stockperson should be aware of these and the ways in which they may be overcome.

18. It is essential that those who look after broiler breeders are aware of their responsibilities to the birds. Such knowledge can be acquired by experience gained on-farm and by training to an appropriate standard. A combination of experience and training is the ideal. Inexperienced staff must receive appropriate training which is validated externally *before* being placed in charge of the birds. Farm managers can help to ensure that training is appropriately validated by encouraging trainees to enter schemes such as the National or Scottish Vocational Qualifications.

19. Broiler breeder companies made it clear to us that they take stockmanship and staff training extremely seriously and many of the recommendations which follow are already part of the established routine. The Welfare of Livestock Regulations 1994 require those attending livestock to have received instruction and guidance about the provisions of the relevant welfare code. In our experience, the industry takes its responsibilities here considerably further than this legal minimum.

20. The main breeding companies produce detailed manuals to assist farm staff. In addition, the industry provides practical training to employees that includes guidance on bird welfare. Much of this occurs on the farm, accompanied by supervised practice, although additional, specialised training may be required to meet specific needs. It is important that training continues throughout the duration of the employment, and suitable refresher courses should be undertaken regularly.

21. The development and implementation of a training plan should ensure that those working with broiler breeders recognise not only normal behaviour and good health but also signs of illness or disease. If specialised tasks are to be performed, for example beak trimming, then specific training must be given. Alternatively, the services of a competent contractor using trained staff should be obtained. Staff should be able to operate any equipment likely to be used in the daily work routine around the poultry house, be able to recognise malfunctions and, where possible, be able to carry out routine maintenance. Equipment which is not properly maintained may cause injury to both stock and operator, regardless of the care taken.

22. Breeding companies provide detailed instructions to customers which relate to the keeping of the birds and offer guidance on all aspects, including welfare. We recognise the value of this service and trust it will continue. We believe the onus rests with the primary breeding companies to ensure the instructions are clear and complete, are kept up-to-date and that copies are provided to all customers and farm managers.

Recommendations

23. It is essential that sufficient, well motivated and competent personnel are employed to carry out effectively all the necessary tasks throughout the year. Staff should be adequately managed and supervised, fully conversant with the tasks they will be required to undertake and competent in the use of any equipment needed to carry out these tasks.

24. Staff, including those employed by contractors, must be given appropriate training, not only on-farm from an experienced and competent poultryman, but also from a recognised training provider (either in-house or externally). They must demonstrate competence and understanding before they are given daily responsibility for the birds.

25. Training providers should take steps to ensure that standards and contents of formal training programmes are reviewed frequently and independently assessed.

26. The industry should take steps to ensure training is validated.

INSPECTION

27. It is a requirement of the Welfare of Livestock Regulations 1994 that all broiler breeders must be inspected at least once a day. On units we visited the birds were inspected more frequently than this legal minimum, and staff entered the sheds about four times a day for a variety of management purposes. Although the flocks were not necessarily thoroughly inspected on each occasion, the stockperson was nonetheless able to detect any obvious problems that might have arisen.

28. In order to reduce the risk of welfare problems developing, we conclude that thorough inspections are required at least twice daily. These may be linked with other visits to the poultry houses but each inspection should then be undertaken as a separate, specific procedure. Inspection is particularly effective at feeding time when any birds which are not fit will be slow to feed and can be identified.

29. The Council accepts that it is not possible to examine each bird individually during routine inspection but a good indication of flock health must be gained on each occasion. Light intensity should be increased to an appropriate level during the inspection to stimulate activity and to enable all the birds, at all parts of the house, to be seen. The stockperson should pass close enough to all of the birds to see them clearly and for them to be disturbed and so move away. This should enable the identification of any individual that is sick, injured or weak and which must be removed to a hospital pen, treated or humanely culled.

30. It is a legal obligation to inspect automatic equipment daily. Such equipment is essential to modern broiler breeder production and we noted that staff on poultry units we visited complied with this requirement.

Recommendations

31. A systematic inspection of all flocks must be undertaken at least twice each day at appropriate intervals. In order to ensure thoroughness, the stockperson should walk within about 3 metres of every bird and encourage it to move.

32. Light levels during inspection must be sufficient to ensure that all birds are clearly visible.

HOUSING AND ENVIRONMENT

General

33. Broiler breeder birds are reared in houses in which temperature, humidity, ventilation rates, light levels and photo-periods are carefully regulated. A well designed house will incorporate insulation and heaters, ventilation fans and vents, effective lightproofing, and a lighting system providing controllable light levels with uniform distribution.

Hygiene and disinfection

34. It is essential to provide all birds with an environment that minimises the potential for disease and its spread. Bio-security is a key part of broiler breeder farming, particularly at pedigree level, and the breeding companies go to great lengths to ensure a high health status. All those in contact with broiler breeders should practise strict hygiene and disinfection procedures. Ideally, birds kept on any one site should be of a similar age. This will facilitate effective cleaning, disinfection and disinfestation procedures across the site because all houses are empty simultaneously. This will also provide a period when there are no birds on site as a disease break. Further, it is important that the buildings preclude entry of rodents and wild birds.

Recommendations

35. Guidance on hygiene and disinfection, based on paragraph 34 above, should be incorporated in the proposed welfare code.

36. When houses are emptied and cleaned, old litter should be removed from the site so as to reduce the carry over of disease.

Temperature and ventilation

37. House temperature should be carefully monitored and controlled. This is influenced by factors such as efficiency of insulation, ventilation and the presence of supplementary heating and/or fans; all of these may be easily regulated in a modern broiler breeder house. The guidance provided by the primary breeding companies includes optimum temperature ranges for the various growth stages. The stockperson needs to monitor the behaviour of the birds in order to ensure that temperatures are appropriate and make adjustments as necessary.

38. Chicks should be placed in the brooding area when they arrive in the house and their behaviour monitored carefully. Young chicks are particularly susceptible to extremes of temperature and the even distribution of the chicks in the house will indicate when they are comfortable.

39. Older birds are less susceptible to variations in temperature. Nonetheless, extremes should be avoided by use of supplementary heaters or cooling fans. Birds on restricted feed are more susceptible to low temperatures but less so to high temperatures. Thus, if the temperature is allowed to fall there may be a need to increase feed.

40. We observed no welfare problems directly related to temperature control and were pleased to note that the industry is well aware of the adverse effects of temperature extremes on the welfare of the birds.

41. Effective ventilation is essential to control temperature and humidity and so reduce the likelihood of heat stress, as well as being the major determinant of both air and litter quality. It follows that the design of the ventilation systems has a major influence on bird welfare. The systems should provide air containing sufficient oxygen to allow normal growth and development; and should also maintain an air-flow sufficient to remove excess ammonia, carbon monoxide, carbon dioxide, moisture, dust and heat. In hot weather, the system should have capacity to prevent temperature levels rising significantly above the ambient. A fast air speed at bird level can be used to moderate the effects of high temperature. In cold weather, the system must deliver sufficient air to the birds without allowing them to become chilled.

42. We found no evidence of serious heat stress during our visits to broiler breeder houses. This might have been expected as stocking densities are at levels that limit the build up of heat and humidity. Furthermore, the controlled levels of feed reduce the production of metabolic heat. Birds experience heat stress when they are in a hot environment and are unable to prevent their body temperature from rising to unacceptable levels. Panting is the most important method of losing heat and its efficiency is reduced significantly if humidity levels are high. Producers must remain vigilant, particularly during periods of high external temperature.

Recommendations

43. At times of extremely high temperature, management should adopt techniques which minimise the risk of poor welfare.

44. When ambient temperatures rise above the birds' comfort zone', as indicated by periods of continuous panting, immediate, effective action must be taken.

45. Minimum ventilation rates should be sufficient to ensure air quality meets the birds' needs for oxygen, and controls ammonia, carbon monoxide, carbon dioxide and dust to levels that are not harmful.

46. Those keeping broiler breeders should apply the advice given in the MAFF publication Heat Stress in Poultry - Solving the Problem (PB 1315).

Light

47. Daylength and light intensity are major factors in the development of the reproductive system of the broiler breeder. The varying pattern of daylength/ light intensity in rearing and laying houses stimulates reproductive activity and egg laying. Controlled-environment houses allow the manipulation of light pattern and intensity, and breeding companies work to precise lighting programmes. When chicks are first placed the period of darkness is fairly short and light intensity levels relatively high (50-60 lux) but by the time they reach about 10 days of age they are on a constant daylength of about 8 hours in significantly lower light levels. We were concerned to note that some producers routinely kept light levels on rearing farms as low as 2-3 lux as a precautionary measure to reduce the risk of aggression. Shortly before the planned onset of lay, daylength is increased in a step-wise fashion to a maximum of about 16 or 17 hours which is held from 30 weeks of age. Light intensity during lay may be as high as 60 lux.

48. It is important for the welfare of the birds that they are kept in light at sufficient intensity that enables them to see clearly and to investigate their surroundings. Extremely dim light can cause damage to birds' eyes. Lighting systems in rearing houses should provide a minimum of 10 lux at bird eye height to encourage investigation and stimulate activity. It has long been industry practice to provide birds with a period of darkness which is important for bird welfare.

Recommendations

49. The proposed welfare code should incorporate information about minimum light intensities and photo-periods. Suggested figures are:

up to 10 days - minimum of 60 lux at day old, reducing to 10 lux and an uninterrupted minimum of 8 hours by 10 days of age.

up to point-of-lay - minimum of 10 lux. Uninterrupted daylength minimum of 8 hours.

laying - minimum of 20 lux. Uninterrupted daylength increasing from 8 hours to a maximum of 18 hours.

All the above should be measured at bird eye height. If aggression occurs, the lights should be dimmed for a few days.

50. After the first few days of life, there should be a set period of at least 6 continuous hours of darkness in any one 24-hour period.

Enrichment

51. Rearing houses are relatively barren. They provide for the birds' basic environmental comfort and nutritional needs but offer little in the way of additional novel stimuli. Even the feeders and drinkers may be raised for part of the day in some systems. We discuss access to feed and water later but this section is concerned with stimulation provided for the birds.

52. To create enrichment, it is good practice to offer insoluble grit (spread on the litter) from about 6 weeks of age. This will also help to enable the gizzard to break down any litter or feathers that may have been consumed and encourage scratching and foraging behaviour which has the added advantage of improving litter quality. Perches in the rearing house may provide a form of enrichment to aid the birds in performing another of their natural behaviours. Perches will also aid the birds' adaptation from litter to raised, perforated floors when they move to the laying house.

Recommendations

53. Environmental enrichment, such as the provision of perches and the scattering of grit on the litter, should be available in rearing houses.

54. Studies should be undertaken to ascertain the materials and means which most effectively enrich the environment for broiler breeders.

Litter

55. Broiler breeders spend their lives in contact with litter and their welfare, especially their health, is linked to its quality. Litter quality results from a complex interaction of factors such as ventilation, temperature, humidity, diet, stocking density and management. Good management of litter is crucial and all the farms we visited during the study had well kept litter. The Welfare of Livestock Regulations 1994 require housed poultry to be kept on, or have access to, well maintained litter.

Recommendation

56. Those keeping broiler breeders must ensure the birds have access to litter that is in good, friable condition and apply the advice given in the MAFF publication Poultry Litter Management (PB 1739).

FEED CONTROL

General

57. The major concern expressed in the initial consultation exercise was that broiler breeders are subjected to an unacceptable degree of feed deprivation from about 15 days of age to point-of-lay. As a result, we studied this situation very closely, in the field, by considering scientific evidence and by meeting some of the scientists involved. Different production methods are applied to parent broiler breeders and pedigree (elite) stock and it was upon this difference that much concern was founded.

Parent broiler breeders

58. The vast majority of broiler breeders are fed on a controlled diet from 15 days. This diet is considerably less than the birds would eat if fed ad libitum but the restriction is essential on welfare and economic grounds because birds fed to demand would become obese, fail to survive through the laying period and breeding would be severely impaired. We recognise that feed control is essential in these circumstances, as it is with the breeding stock of other species of farm animal. However, feed control raises a dilemma in that management practices essential to ensure good health and reproductive performance may impair other aspects of welfare.

59. Commercial broilers produced for the table are grown at a rate close to their genetic potential being fed at, or close to, ad libitum to reach a typical target slaughter weight of approximately 2.1kg at about 40 days of age. However, this is not the natural or most appropriate regimen for the welfare of breeding birds which need to reach a similar body weight over a growing period of about 18 weeks. Hence, breeding birds are reared on an entirely different regimen whereby feed intake is controlled to produce point-of-lay pullets with a body weight and condition which promotes fertility and which enables them to lay subsequently close to their potential egg production. They are fed on a regimen which aims for a steady increase in their bodyweight throughout rear of at least 7% per week.

60. Scientific experiments have demonstrated that severe feed restriction, during the rearing stage, in broiler parent stock can result in behavioural changes compared with ad libitum fed birds. These may include abnormal oral behaviours, such as stereotyped pecking at non-food objects and increased drinking activity. Studies of feeding motivation in birds fed on commercial rations have also concluded that because broilers have been selected to display a prodigious appetite, broiler breeders will be hungry for considerable periods of time. On the other hand, studies which have examined physical health have shown that feed control and slower growth have important welfare benefits such as improved immune system response and disease resistance, fewer skeletal problems, and significantly decreased mortality compared with birds fed to appetite.

61. It is clear that some degree of feed restriction is essential for welfare, but there is no agreed method of determining objectively at what level restriction becomes unacceptable. The birds we observed during our farm visits were fit, healthy and active. We saw little evidence of stereotypic behaviour but acknowledge that this may not always have been obvious during a visit. Excessive drinking is recognised as a problem which requires careful management. We conclude that whilst extreme feed restriction and ad libitum feeding are both unacceptable for the modern broiler breeder, a degree of control is necessary to optimise bird welfare.

Recommendations

62. During the first 6 weeks of life feed levels should be adequate to ensure good skeletal development. The level of feed intake throughout rear should be managed to achieve a steady growth, not less than 7% week-on-week, and the appropriate weight and condition at point-of-lay.

63. It is necessary to establish, as a matter of urgency, the point at which feed restriction creates a situation when the bird cannot cope with the hunger which results.

64. Research should be carried out to explore further the potential for alternative feeding strategies and management practices to alleviate hunger.

Pedigree (Elite) Stock

65. A nucleus of birds, which represents significantly less than 1% of the national broiler breeder flock, is maintained and selected to form the basis from which all future generations are produced. In order to be able to identify those birds best suited to the future requirements of the industry, primary breeding companies undertake detailed selection performance testing on these stock. They are reared to their maximum potential growth rate up to at least 6 weeks of age, at which point selection takes place; those reaching the required standard will be moved to rearing accommodation where further monitoring and selection is carried out. Those which are not selected are culled.

66. This process creates a welfare dilemma because, having been fed ad libitum, the weights achieved by the birds at about 8 weeks of age will be above those required at point-of-lay. It is therefore necessary to restrict feed intake severely during the next 2 or 3 weeks to return the bird to physical fitness. The level of restriction which is imposed may limit intake to as little as 25% of previous feed over this period and this would imply a potentially serious welfare problem.

67. We recognise that this process of detailed selection performance testing needs to be undertaken in order to ascertain bird potential and deficiencies and it is essential for the health and welfare of future generations. The management of these birds during the period from 8 weeks to point-of-lay must provide even feed distribution, effective environmental control, avoid disease and ensure they are not exposed to any other welfare challenge. Additionally, we advocate that the feed restriction of these birds, and the number subjected to this procedure, be minimised by the industry which should constantly review the processes which make them necessary. Consideration should also be given to halting the procedure earlier, for example at 35 days.

Recommendations

68. The primary breeding companies should identify the best means of minimising the number of elite birds subject to detailed selection performance testing. Ideally, consideration should be given to reviewing the need for the process. Also, the breeding companies should assess and minimise the stress during the period of feed restriction whilst the birds are returned to fitness before the laying period.

69. Once the selection procedures are complete, weekly recording of weight gain must be used to check that these birds achieve a steady, progressive week-on-week increase in bodyweight growth.

WATER

70. A reliable supply of clean, pathogen-free, fresh water is vital for good welfare. Water intake is related to the age of the bird, feed intake, ambient temperature and humidity, dietary ingredients and

nutrient content, flock health and management practices, such as vaccination. Water intake may also be affected by periods of hunger and stress.

71. Daily records of water consumption provide an early warning of potential problems and a water meter is a necessary management tool.

72. Daily access to water throughout the period of lighting and a sufficient number of drinkers, well distributed and correctly adjusted, should be provided. It may be necessary to manage the supply of water in relation to the feeding system and programme this to reduce excessive drinking and to maintain litter quality.

73. If the time during which water availability is restricted, it is vital that there is generous provision of drinkers with adequate flow to enable all birds to drink, without undue competition, when the water supply is turned back on.

74. Where there is any risk of disruption to water supply, provision should be made for a 24-hour reserve of water on-site calculated for maximum usage, for example, birds at peak production during hot weather.

Recommendations

75. Water should be available throughout the period of lighting and adequate drinkers should be provided to ensure all birds can drink without undue competition.

76. Water meters must be fitted to each house to enable daily monitoring of water usage and pressure.

STOCKING DENSITY

77. The existing welfare code for domestic fowls requires provision of sufficient space to allow freedom of movement so that the birds can, without difficulty, stand normally, turn round and stretch their wings. Birds should also have access to sufficient space for normal movements such as preening and wing-flapping. Such space is routinely provided to broiler breeders and the birds we saw had no difficulty in moving around the poultry houses. As the birds grow, stocking densities will rise steadily to a maximum of 25kg/m² at about 20 weeks. Because body weights during the laying period increase only slowly, and a significant number of males are culled, the gross stocking densities will change little after this time and, at depletion, seldom exceed this level.

Recommendations

78. Stocking density for broiler breeders should not exceed 25kg/m², calculated by dividing the total weight of the birds in the house by total area available to the birds. The calculation should be on the basis of all stock within the house, including males.

79. The internal floor area available to the birds should be clearly and permanently displayed at the entrance to each house.

GENETICS

80. The primary breeding companies have a responsibility to ensure that the stock they produce is suitable for the market and can achieve a high standard of welfare. More sophisticated selection procedures have been established over recent years which can now take into account a wide range of

traits, many of which have potential welfare benefits. We look to the industry to ensure factors such as cardio-vascular health, foot and leg health, social behaviour and resistance to disease are given high priority.

81. The problem of hunger in broiler breeders is not easy to solve with present strains of birds and is likely to get worse if selection for fast growth continues. A long-term solution is to change the genetic strains but, in any case, breeders must avoid exacerbating the problem and reduce their demand for ever increasing growth rates.

Recommendation

82. The objectives of the breeding companies in the future development of strains of broilers should include welfare improvement, in particular the avoidance of problems of prolonged hunger in broiler breeders.

RECORD KEEPING

83. The keeping of accurate records is essential and will aid management, bird welfare and auditing procedures. Responsibility for maintaining the information rests with the person in charge of the animals. The records should be readily accessible to other staff on the farm, to the veterinary surgeon and to those checking that welfare controls are adequate. All of the producers we met keep detailed records and recognise that it is good management practice so to do. Some of the information they record is not directly relevant to bird welfare and is not therefore covered in this report. Those relevant to welfare include the following:

Available floor area of the house.
Number of chicks placed.
Mortality, cause and number affected.
Feed, amount consumed (daily and cumulative).
Body weight, recorded frequently in relation to agreed/breeding company targets.
Water, daily consumption.
Temperature, daily maximum and minimum.
Light, intensity and duration.
Vaccination, date and dosage.
Medications, date and dosage.
Disease, type, date and number of birds affected.
Disinfection, bacterial counts at farm cleanout.
Veterinary consultation, date and outcome.
Incidents, such as equipment malfunctions.

Recommendation

84. Accurate records should be kept which incorporate the information outlined above and should be readily accessible and available for inspection by veterinary staff and enforcement authorities.

MUTILATIONS

General

85. Mutilations can cause considerable pain and therefore constitute a major welfare insult to farm animals. They are undesirable in principle and producers should consider carefully the necessity of performing any mutilations on broiler breeders. However, we recognise that there are systems where

certain procedures, which we would class as mutilations, may be necessary to avoid worse welfare problems. If mutilations of these are performed they must be carried out in a manner which minimises pain and distress to the bird. High standards of hygiene are essential. In this study we have considered beak trimming, dubbing, despurring, declawing and toe removal.

86. We were informed that some mutilations are undertaken by breeding companies in the hatchery at the request of customers outside the UK. They may be carried out to aid identification or to enable birds to be kept in systems which, in terms of animal welfare, have design or management shortcomings. Routine performance of mutilations for such purposes is unacceptable. Breeding companies in the UK have told us that they try to minimise performance of these operations but there is room for improvement. These companies should not carry out routine mutilations at the request of customers and should instead emphasise that such operations are not necessary.

Recommendation

87. Where mutilations are deemed necessary, they must be carried out in accordance with the law and by trained, competent staff.

Beak trimming

88. Although female chicks are not beak trimmed, it is common to beak trim male chicks so as to lessen the likelihood of aggressive pecking when the birds are older and thus reduce the level of damage during mating. Avoiding injurious pecking by male broiler breeders is a significant problem and research workers and the poultry industry must continue to search for ways to minimise feather pecking and cannibalism without recourse to beak trimming. In our report on laying hens (1997), we called for improved liaison between the government, research bodies and the industry because a combined approach is more likely to achieve results. This we reiterate and it is essential that the broiler breeder industry plays its part.

89. Breeding companies have the opportunity to investigate the relationship between strain of bird, stocking density, house environment and feeding regimen. Selection against traits which have a negative effect on welfare, such as injurious pecking behaviour, should be pursued with vigour. There appears to be potential for genetic selection to overcome the problems of feather pecking and cannibalism and hence eliminate the need for beak trimming. We urge breeding companies to make strides to reduce significantly the tendency to injurious pecking.

90. All beak trimming must be carried out within the law which states that not more than one third of the upper and lower beak may be removed. In practice, only the tip of the upper mandible is removed from male broiler breeders; this is done at about 5 days of age which allows the chicks to establish eating and pecking behaviours before the operation takes place. Beak trimming of older birds causes acute pain at the time of the operation and, in the longer term, chickens suffer chronic pain resulting from neuromas. Recent evidence indicates that beak trimming at under 10 days of age results in little long-term pain and industry practice suggests that 5 days is the optimum time.

Recommendations

91. Beak trimming is a most undesirable mutilation which should be avoided, if at all possible, and used only if veterinary advice is that the procedure is essential to prevent worse welfare problems of injurious feather pecking and cannibalism. It is unnecessary to beak trim female broiler breeder chicks.

92. The prevention of injurious feather pecking and cannibalism is a most important topic for research. The government, the poultry industry and research scientists must work together to find a solution which does not entail beak trimming.

93. If beak trimming of male chicks is deemed essential, it should be carried out in the first 10 days of life, ideally at 5-10 days, and only the tip of the beak should be removed.

Dubbing

94. The removal of all, or part, of the male comb is known as dubbing. The operation is usually performed when the chicks are one day old using sharp scissors. Once chicks are 72 hours or over, the procedure must only be carried out by a veterinary surgeon: this is a requirement of law.

95. The origins of this practice date back many years. It was first carried out to avoid damage to the comb by other birds, house fittings or from frost bite in open, cold environments. The industry has moved on and most males are now kept in well designed facilities where frost bite is not possible. Indeed, we were told that very few rearing companies in the UK now require chicks to be dubbed. However, we understand that it is more common for some overseas customers to request dubbed chicks but largely, it would appear, for reasons of habit, and we do not accept that this is necessary.

96. There are two distinct advantages from retention of the comb. First, in hot climates the comb helps the male to control its body temperature more efficiently. Second, in separate-sex feeding systems the comb helps to exclude males from female feeders due to the larger size of the head.

97. We conclude that removal of the comb offers no welfare advantages to offset the disturbance caused by the procedure and believe the practice should be phased out.

Recommendation

98. The dubbing of broiler breeders should be discontinued. The primary breeding companies should be encouraged to educate their customers that this practice is not necessary.

Despurring

99. This is the removal, at day-old, of the spur bud on the back of the male's leg using a heated wire. If the spur grows to be very pronounced it may cause damage to females during mating. The two main breeding companies in the UK adopt different philosophies. One removes the spur from all male chicks; the other attempts to persuade customers that the operation is unnecessary because its genotype has short, blunt spurs.

100. Members observed the despurring operation and noted that outwardly the chicks displayed little obvious distress. We found no scientific evidence about the levels of pain that might be involved but it is logical to suppose the procedure causes some pain. The Council is encouraged by the efforts of certain breeding companies to reduce significantly the percentage of despurring. This approach should be adopted by all those in the industry, even if it means development of a different genotype.

Recommendation

101. Routine despurring should not be necessary. The government should press all breeding companies to pursue development of genotypes with short, blunt spurs and so remove the need for despurring.

Declawing

102. Some parts of the industry remove the dew and pivot claw from the feet of breeder males to prevent damage to females during natural mating. The procedure is usually carried out at day-old using sharp scissors. We also saw examples of removal of only part of the claw, leaving the toe complete. Trials by one of the primary breeding companies suggested that damage to females at mating was greater if the ratio of males:females was excessive. It would therefore seem possible to reduce the potential for mating damage through improved management and efforts have been made, with some success, to convince customers that double declawing is unnecessary.

103. It is still common to remove only the dew claws as these cause significantly more damage than the pivot claws. In the absence of an assessment of the likelihood of damage to female breeders if the males' dew claws are retained, we are not in a position to recommend prohibition of the operation. Nonetheless, we urge the industry to embrace management practices which obviate the need for this mutilation.

Recommendations

104. The practice of removing the pivot claw should be phased out within three years.

105. The industry should adopt management strategies which avoid the need to remove the dew claws of male birds. If the operation is considered necessary, it must be carried out only in the first 24 hours of life unless undertaken by a veterinary surgeon.

Toe removal

106. This is the removal of a specific toe at the first knuckle and is quite distinct from declawing of males to protect female birds. It is practised on a limited number of pedigree birds solely for identification (i.e. management) purposes and FAWC is totally opposed to this unnecessary mutilation. Companies must urgently find alternative methods of identification that do not adversely affect the chicks' welfare.

Recommendation

107. Toe removal for purposes of identification must be discontinued within one year.

HEALTH & DISEASE

General

108. A disease challenge may be first noticed by a change in water consumption or a reluctance to eat. It is, therefore, good management practice to keep daily records of feed and water intake. If a disease problem is suspected, a veterinary surgeon should be consulted. Early, appropriate treatment of a disease incident will minimise the adverse effects on the birds' welfare, health and reproductive performance and also minimise the effects on the welfare, health and quality of the progeny.

109. Breeding birds tend to have very few health problems and are given a comprehensive vaccination programme both to protect their own health and pass on immunity to their progeny. It is universal practice to vaccinate breeders for coccidiosis, Mareks disease, Newcastle disease, infectious bronchitis, infectious bursal disease and infectious avian encephalomyelitis (epidemic

tremor). In addition, depending on location, vaccination for salmonella enteritidis, avian rhinotracheitis, egg drop syndrome, chick anaemia and reovirus may be required.

110. The commercial availability of an effective coccidiosis vaccine in the last 10 years has removed the principal cause of mortality, uneven growth and poor welfare in young breeding birds, which generally have good health status and low mortality. It is now quite reasonable to expect birds to be reared to 18 weeks with no more than 2% losses, either culls or mortality.

111. When birds are transferred to their laying quarters at about 18 weeks they receive treatment to prevent the development of Ascaris worms and are vaccinated by injection to give long lasting immunity to various infectious diseases. An example vaccination programme is at Appendix C.

112. The vaccination programme will control all the major infectious diseases, so that mortality is generally due to a variety of miscellaneous conditions. These include peritonitis, heart failure, tumours, joint infections and injuries.

113. The improved health status of the national flock is also due to better preventive health management. Generally referred to as "bio-security", most breeding farms have strict rules on access by visitors, the use of protective clothing and cleansing and disinfection of equipment and transport. During lay, especially in summer, it may be necessary to treat the equipment in the houses to remove parasites such as red mite. This parasite is becoming more common and the use of automatic egg collection systems with slats makes control more difficult.

Recommendations

114. Each flock should have a written health and welfare programme produced, where necessary, with expert advice. This should set out health and husbandry activities covering the whole of the production cycle. The programme should be reviewed and updated annually by the farm manager and should be available for inspection by enforcement authorities.

115. Infectious diseases should be controlled by good management and attention to detail including the keeping of daily records of feed and water consumption.

116. Immediate veterinary attention should be sought at an early stage in any outbreak of disease so that the cause can be determined and appropriate action taken.

117. Diseases caused by external parasites should be controlled by appropriate parasiticides.

Hospital pens

118. Should the farmer decide that there is a good chance of a sick bird recovering, it may be worth isolating it in a hospital pen. However, if a bird is suffering and cannot be treated it must be humanely killed without delay.

Recommendation

119. If a hospital pen is set up it should be within the main house and used to segregate sick birds or sexing errors and these birds should be examined frequently throughout the day.

Availability of vaccines

120. We believe that birds with clinical signs of disease should not have treatment withheld. It is essential that the welfare, and particularly the health, of birds in the UK is not adversely affected by limitations on the availability of medicines which are known to be effective and do not pose a food safety hazard.

Recommendations

121. We urge the Government to take action to ensure that the welfare of the UK flock is not disadvantaged by formalities which inhibit the availability of effective medicines.

122. Government should pursue with its EU counterparts improved harmonisation of registration procedures to ensure uniformity and increase the range of medicines available.

CATCHING AND TRANSPORT

General

123. Whilst there is a potential to cause considerable stress to broiler breeders during catching and transport, their high value tends to ensure the breeding companies take great care to plan and control the movement of birds from rearing to laying accommodation. By contrast, this incentive is less with birds at the end-of-lay and particular attention should be paid to ensure that no reduction in standards is allowed. The section deals only with movement of birds from farm-to-farm. For comments regarding depopulation, see our Advice to Ministers on the Handling of and Transport of Poultry (1990).

Catching, loading and unloading

124. From a welfare point of view, the acceptability of loading and unloading operations is determined by the ability of the personnel involved. Proper training is essential and we encourage all companies to prepare written instructions for their staff. The loading and unloading should be supervised and those individuals with poor technique reminded of the instructions and given training. It is usual for the operation to be carried out by specialist teams who work under the supervision of a team leader. These teams are responsible for the catching and placement of birds into modules/crates which are then loaded by forklift truck onto the transporter.

125. It is industry practice not to feed birds on the day of transportation as they travel more comfortably with an empty crop but they are given an increased feed the day before. Water is generally available up to the time of catching.

126. During the catching operation, birds must be caught by both legs to minimise distress, damage and injury which may result if they were allowed to struggle and flap. The birds should then be carried, no more than two per hand, and carefully placed into the modules or crates. Density in the crates should be adjusted according to weather conditions and size of bird. It is important to ensure that once birds are loaded they are not exposed to extremes of temperature.

127. At unloading, care should be taken when lifting the birds out of the module/crate; they should not be tipped out as this would cause unnecessary distress. On arrival, water must be freely available and feed provided once all birds are in the shed.

Recommendations

128. The catching and handling of birds must be carried out only by suitably trained and competent personnel. Additionally, the operation must be properly supervised by a person nominated to be responsible for the movement of the birds.

129. All lifting, loading and unloading of birds must be in accordance with the requirements of the Welfare of Transport (Animals) Order 1997. Care should be taken to avoid distress to the birds. Birds should always be caught and carried by both legs and the amount of time they are inverted should be kept to a minimum. No more than two birds must be carried in one hand.

130. Account should be taken of extreme weather conditions and the number of birds loaded should be adjusted accordingly.

131. The use of any mechanical equipment for the loading of birds onto vehicles should be supported by an effective servicing and back-up system.

Transport

132. The careful planning of journeys is essential to ensure birds are only on the lorry for the minimum amount of time and to ensure transport time is within the current legislation (The Welfare of Animals (Transport) Order 1997). Planning should take into account traffic flow and weather conditions and, ideally, the movement of birds should take place overnight or in the early morning.

Recommendations

133. Adequate provision should be made in the event of lorry break-down by ensuring back-up lorries are available.

134. All vehicles should be thoroughly cleansed and disinfected after each journey.

PART IV - SUMMARY OF RECOMMENDATIONS

Recommendations for early action

Stockmanship and training

1. It is essential that sufficient, well motivated and competent personnel are employed to carry out effectively all the necessary tasks throughout the year. Staff should be adequately managed and supervised, fully conversant with the tasks they will be required to undertake and competent in the use of any equipment needed to carry out these tasks (paragraph 23).

2. Staff, including those employed by contractors, must be given appropriate training, not only on-farm from an experienced and competent poultryman, but also from a recognised training provider (either in-house or externally). They must demonstrate competence and understanding before they are given daily responsibility for the birds (paragraph 24).

3. Training providers should take steps to ensure that standards and contents of formal training programmes are reviewed frequently and independently assessed (paragraph 25).

Inspection

4. A systematic inspection of all flocks must be undertaken at least twice each day at appropriate intervals. In order to ensure thoroughness, the stockperson should walk within about 3 metres of every bird and encourage it to move (paragraph 31).

5. Light levels during inspection must be sufficient to ensure that all birds are clearly visible (paragraph 32).

Housing and environment

6. When houses are emptied and cleaned, old litter should be removed from the site so as to reduce the carry over of disease (paragraph 36).

7. At times of extremely high temperature, management should adopt techniques which minimise the risk of poor welfare (paragraph 43).

8. When ambient temperatures rise above the birds' 'comfort zone', as indicated by periods of continuous panting, immediate, effective action must be taken (paragraph 44).

9. Minimum ventilation rates should be sufficient to ensure air quality meets the birds' needs for oxygen, and controls ammonia, carbon monoxide, carbon dioxide and dust to levels that are not harmful (paragraph 45).

10. Those keeping broiler breeders should apply the advice given in the MAFF publication Heat Stress in Poultry - Solving the Problem (PB 1315) *(paragraph 46)*.

11. After the first few days of life, there should be a set period of at least 6 continuous hours of darkness in any one 24-hour period (paragraph 50).

12. Those keeping broiler breeders must ensure the birds have access to litter that is in good, friable condition and apply the advice given in the MAFF publication Poultry Litter Management (PB 1739) *(paragraph 56)*.

Feed Control

13. During the first 6 weeks of life feed levels should be adequate to ensure good skeletal development. The level of feed intake throughout rear should be managed to achieve a steady growth, not less than 7% week-on-week, and the appropriate weight and condition at point-of-lay (paragraph 62).

14. Once the selection procedures are complete, weekly recording of weight gain must be used to check that these birds achieve a steady, progressive week-on-week increase in bodyweight growth (paragraph 69).

Water

15. Water should be available throughout the period of lighting and adequate drinkers should be provided to ensure all birds can drink without undue competition (paragraph 75).

Stocking density

16. Stocking density for broiler breeders should not exceed 25kg/m², calculated by dividing the total weight of the birds in the house by total area available to the birds. The calculation should be on the basis of all stock within the house, including males (paragraph 78).

17. The internal floor area available to the birds should be clearly and permanently displayed at the entrance to each house (paragraph 79).

Record keeping

18. Accurate records should be kept which incorporate the information outlined in paragraph 83 and should be readily accessible and available for inspection by veterinary staff and enforcement authorities (paragraph 84).

Mutilations

19. Where mutilations are deemed necessary, they must be carried out in accordance with the law and by trained, competent staff (paragraph 87).

20. Beak trimming is a most undesirable mutilation which should be avoided, if at all possible, and used only if veterinary advice is that the procedure is essential to prevent worse welfare problems of injurious feather pecking and cannibalism. It is unnecessary to beak trim female broiler breeder chicks (paragraph 91).

21. If beak trimming of male chicks is deemed essential, it should be carried out in the first 10 days of life, ideally at 5-10 days, and only the tip of the beak should be removed (paragraph 93).

22. The dubbing of broiler breeders should be discontinued. The primary breeding companies should be encouraged to educate their customers that this practice is not necessary (paragraph 98).

23. Toe removal for purposes of identification must be discontinued within one year (paragraph 107).

Health and disease

24. Each flock should have a written health and welfare programme produced, where necessary, with expert advice. This should set out health and husbandry activities covering the whole of the production cycle. The programme should be reviewed and updated annually by the farm manager and should be available for inspection by enforcement authorities (paragraph 114).

25. Infectious diseases should be controlled by good management and attention to detail including the keeping of daily records of feed and water consumption (paragraph 115).

26. Immediate veterinary attention should be sought at an early stage in any outbreak of disease so that the cause can be determined and appropriate action taken (paragraph 116).

27. Diseases caused by external parasites should be controlled by appropriate parasiticides (paragraph 117).

28. If a hospital pen is set up it should be within the main house and used to segregate sick birds or sexing errors and these birds should be examined frequently throughout the day (paragraph 119).

Catching and transport

29. The catching and handling of birds must be carried out only by suitably trained and competent personnel. Additionally, the operation must be properly supervised by a person nominated to be responsible for the movement of the birds (paragraph 128).

30. All lifting, loading and unloading of birds must be in accordance with the requirements of the Welfare of Transport (Animals) Order 1997. Care should be taken to avoid distress to the birds. Birds

should always be caught and carried by both legs and the amount of time they are inverted should be kept to a minimum. No more than two birds must be carried in one hand (paragraph 129).

31. Account should be taken of extreme weather conditions and the number of birds loaded should be adjusted accordingly (paragraph 130).

32. The use of any mechanical equipment for the loading of birds onto vehicles should be supported by an effective servicing and back-up system (paragraph 131).

33. Adequate provision should be made in the event of lorry break-down by ensuring back-up lorries are available (paragraph 133).

34. All vehicles should be thoroughly cleansed and disinfected after each journey (paragraph 134).

Recommendations for longer term implementation

Stockmanship and training

35. The industry should take steps to ensure training is validated (paragraph 26).

Housing and environment

36. Guidance on hygiene and disinfection, based on paragraph 34, should be incorporated in the proposed welfare code (paragraph 35).

37. The proposed welfare code should incorporate information about minimum light intensities and photo-periods. Suggested figures are:

up to 10 days - minimum of 60 lux at day old, reducing to 10 lux and an uninterrupted minimum of 8 hours by 10 days of age.

up to point-of-lay - minimum of 10 lux. Uninterrupted daylength minimum of 8 hours.

laying - minimum of 20 lux. Uninterrupted daylength increasing from 8 hours to a maximum of 18 hours.

All the above should be measured at bird eye height. If aggression occurs, the lights should be dimmed for a few days (paragraph 49).

38. Environmental enrichment, such as the provision of perches and the scattering of grit on the litter, should be available in rearing houses (paragraph 53).

Feed control

39. The primary breeding companies should identify the best means of minimising the number of elite birds subject to detailed selection performance testing. Ideally, consideration should be given to reviewing the need for the process. Also, the breeding companies should assess and minimise the stress during the period of feed restriction whilst the birds are returned to fitness before the laying period (paragraph 68).

Water

40. Water meters must be fitted to each house to enable daily monitoring of water usage and pressure (paragraph 76).

Mutilations

41. Routine despurring should not be necessary. The government should press all breeding companies to pursue development of genotypes with short, blunt spurs and so remove the need for despurring (paragraph 101).

42. The practice of removing of the pivot claw should be phased out within three years (paragraph 104).

43. The industry should adopt management strategies which avoid the need to remove the dew claws of male birds. If the operation is considered necessary, it must be carried out only in the first 24 hours of life unless undertaken by a veterinary surgeon (paragraph 105).

Health and disease

44. We urge the Government to take action to ensure that the welfare of the UK flock is not disadvantaged by formalities which inhibit the availability of effective medicines (paragraph 121).

45. Government should pursue with its EU counterparts improved harmonisation of registration procedures to ensure uniformity and increase the range of medicines available (paragraph 122).

Recommendations for research and development

46. Studies should be undertaken to ascertain the materials and means which most effectively enrich the environment for broiler breeders (paragraph 54).

47. It is necessary to establish, as a matter of urgency, the point at which feed restriction creates a situation when the bird cannot cope with the hunger which results (paragraph 63).

48. Research should be carried out to explore further the potential for alternative feeding strategies and management practices to alleviate hunger (paragraph 64).

49. The objectives of the breeding companies in the future development of strains of broilers should include welfare improvement, in particular the avoidance of problems of prolonged hunger in broiler breeders (paragraph 82).

50. The prevention of injurious feather pecking and cannibalism is a most important topic for research. The government, the poultry industry and research scientists must work together to find a solution which does not entail beak trimming (paragraph 92).

APPENDIX A - MEMBERSHIP OF THE FARM ANIMAL WELFARE COUNCIL

AUGUST 1998

Professor Sir Colin R W Spedding, CBE - Chairman
Professor M R Baxter
Mr M G Berry
Mrs A R Berry
Professor D M Broom
Professor S R L Clark
Mr J A C Don
Professor P R English
Mr T C Harris
Ms V L Hird
Mr G J Lloyd
Mr A R Lucas
Mrs J A MacArthur Clark
Mr R L Maunder
Professor J P McInerney, OBE
Miss M J Parker
Dr M Pattison
Dr M J Potter
Mr F E Shields, OBE
Mr P F Staines, MBE
Mrs J M Turnbull
Mr S M Vaughan
Dr A C Winter

APPENDIX B - THOSE WHO GAVE EVIDENCE AND ASSISTANCE

ADAS
Alistair Mews Memorial Trust
Biotechnology and Biological Sciences Research Council
B L Emery Ltd
British Poultry Meat Federation
British Veterinary Association
Compassion in World Farming
Cobb Breeding Company Ltd
Euribrid
Farm Animal Welfare Network
Grampian Country Chickens (Rearing) Ltd
Humane Slaughter Association
Marks and Spencer Plc
National Farmers Union
P D Hooks (Hatcheries) Ltd
Roslin Institute
Ross Breeders Ltd
Ross Poultry Ltd
Royal College of Veterinary Surgeons
Royal Society for the Prevention of Cruelty to Animals
Scottish Agricultural College
Scottish Society for the Prevention of Cruelty to Animals
Tesco Plc
Universities Federation of Animal Welfare
University of Leeds
University of Liverpool
Webbs Country Foods
Women's Farming Union

and the farmers, stockpeople and veterinarians who the members of the working group met during visits.

APPENDIX C - EXAMPLE PARENT STOCK VACCINATION

Age	Vaccine	Route of Administration
Day-old	Mareks disease	injection
5 days	Coccidiosis	drinking water
14 days	Mareks disease	injection
21 days	Newcastle disease Infectious bronchitis	drinking water
28 days	Gumboro disease	drinking water
42 days	Newcastle disease	drinking water
56 days	Avian rhinotracheitis	drinking water
70 days	Infectious bronchitis Newcastle disease	spray spray
84 days	Salmonella	injection
98 days	Avian encephalomyelitis	drinking water
112 days	Infectious bronchitis Newcastle disease Gumboro disease Avian rhinotracheitis Salmonella	} } - combined injection } } injection