



ACAF REVIEW OF ON-FARM FEEDING PRACTICES

Updated recommendations on identifying hazards and minimising risks

Preface

In the years since the publication of the Committee's original report, there have been a number of developments and changes, for example changes to legislation and technical advances which have helped productivity and safety in the animal feed sector. However, despite these, there have been a number of high profile feed safety incidents that have affected the European feed industry. Such incidents often have widespread economic effects through contaminated feed and food being withdrawn from the market and restrictions placed on feed businesses, including farms. Notable major incidents have involved dioxins: Ireland (2008) and Germany (2010/11).

In the light of these events and to help minimise the possibility of a major incident occurring in the UK, the Advisory Committee on Animal Feedingstuffs was asked by the Food Standards Agency to consider possible gaps and weaknesses in the UK feed sector that may compromise feed and food safety. The aim was that, following the identification of any such gaps/weaknesses, appropriate follow-up action could be carried out by the feed industry, enforcement authorities or central government to address concerns. The Committee's conclusions and recommendations were published in December 2013 and can be viewed on the ACAF website.

In light of these developments and events, the Committee has carried out a review of its On Farm Feeding Practices report and has updated it to reflect the new concepts, developments and safety aspects. This document replaces the 2003 report and therefore in addition to making new recommendations, where appropriate recommendations from the previous report which remain valid have been incorporated.

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Recommendations

The Committee makes the following recommendations:

Purchasing

1. Farmers should take care when purchasing either new types of feed or feed material, or from new suppliers, especially when the material in question is abnormally cheap.
2. All materials, purchased by farmers for animal feeding, should come from sources and suppliers who can demonstrate compliance with recognised quality assurance standards and are registered as Feed Business Operators.
3. If purchasing feed materials (former foodstuffs) from food factories or retailers farmers should find out why the food has been rejected and be aware of the possible hazards to livestock.
4. Farmers should ensure that former foodstuffs are covered by an appropriate assurance scheme such as FEMAS or the appropriate module of the BRC scheme.
5. It is important to ascertain that products bought from outside the UK comply with EU law and recommendations in this report.

Transport & Storage

6. It is imperative that equipment used to transport feeds, either to a home mixer or within the farm itself, is suitable for the purpose, has not been used previously to transport inappropriate loads, is adequately cleaned and is driven by trained personnel.
7. Farmers responsible for organising their own road haulage are advised that compliance with the code of practice for road haulage (TASCC) will provide them with a level of independent assurance.

8. Feeds must be stored in a way to minimise any food safety risks and in particular the storage of moist co-products should prevent deterioration in quality, and loss.

Nutritional intake

9. It is important for farmers to be conscious of the total nutrient intake of their animals, taking advice of suitable qualified personnel and where necessary performing feed analysis.

Competency

10. Everyone involved in mixing animal feed must be able to demonstrate their competence, having appropriate skills to match the scale, risks and complexity of the feed mixing operation.
11. It is important that the farmer has access to the necessary expertise when identifying feed and food safety hazards within the business and deciding upon suitable and effective control measures.

Hazards

12. In the case of floor feeding risk assessments for this practice are needed as there may be a risk of faecal contamination of feed and thus ingestion of faecal material.
13. Farmers must apply good manufacturing practice across the farming system and adopt a systematic approach to the identification, evaluation and control of hazards within their own feed production and feeding system.
14. The hazards and risks associated with the discharge and handling system must be assessed on each farm and effective control measures applied.
15. It is important to be sure that the methods adopted to prevent any cross contamination are effective.

16. On all farms, regular cleaning to remove residues of earlier feeds from troughs and hoppers is essential.
17. When deciding on the methods of feeding and supplementation farmers should consider the risks of disease transmission from wildlife accessing the feed, such as badgers and deer transmitting bovine TB.

Hobby farmers

18. It is important that communication strategies are adopted to engage this sector to ensure awareness and compliance.

Executive Summary

1. At its meeting in February 2014, ACAF Members agreed that the Committee should review and update the report “On-Farm Feeding Practices” which it published in 2003. It is an important document and should reflect current trends in a changing environment.
2. Since the original review was undertaken during 2001 to 2003, the legislation has been strengthened and new provisions, particularly those in Regulation 183/2005, now apply to on-farm feeding operations. In addition, farm assurance schemes have been extended and developed to cover feed safety issues and a significant proportion of livestock farmers are members of such schemes.

Summary of Changes

3. Listed below are the main updates which have included as part of the review of the 2003 ACAF report:
 - Target audience
 - Other Sectors
 - Overview of current feeding practices: A summary of developments since 2003
 - Feed Assurance
 - Earned Recognition
 - Digestive Physiology
 - Information Technology
 - Feeding Practices
 - Animal Feed
 - Environmental Implications of Feeding Practices

Section 1 – Introduction

4. This document provides an update on on-farm practices, legislation and responsibilities since the publication of the “ACAF Review of On-Farm Feeding Practices: Recommendations on identifying hazards and minimising risks” in September 2003 and serves to highlight both improvements and new areas of risk.

Target Audience (New Section)

5. This document is primarily aimed at farmers, anyone supplying feed or feed materials to farms and anyone who falls within the scope of Regulation 183/2005. Additionally, it will be important for those with a more general interest in feed safety related to on-farm feeding practices and also ‘hobby’ farmers and those who rear animals for their own consumption.

Background (Paragraph 1 of original report).

6. The BSE Inquiry report in October 2000 concluded that the chain of animal feed manufacture, distribution, on-farm mixing and on-farm use was complex, and that the ease with which cross-contamination occurred within it was one of the most concerning issues in the BSE outbreak. The outbreak of Foot and Mouth Disease in 2001 provided further focus on on-farm feeding and feed issues. Following discussions at its Open Forum held in July 2001, ACAF agreed that a review of on-farm animal feeding practices should be included in its forward work plan as a matter of priority.
7. The Committee undertook to carry out a review of on-farm feeding practices that would:
 - identify current practices, with a view to issuing recommendations on “best practice” for all stakeholders and their advisors involved in supplying, transporting, storing and using feeds;
 - include all aspects of feed sourcing, transport, storage, feeding on-farm, including on-farm mixing, liquid feeding systems, the use of bought-in feed materials (such as co-products from the food industry) and handling home-grown feeds; and
 - identify the main hazards and risks arising from the above processes and increase awareness of these amongst the farming community and other stakeholders.

8. The Committee was mindful of the economic implications to farmers of further regulation or controls. It wanted the report of its review to be a tool to help farmers and others identify hazards and to implement controls and corrective action. It was agreed that any recommendations would be based on the need to protect human or animal health.
9. The report was published in September 2003. In tandem with the report, a poster outlining the main points of the recommendations made by the Committee when feeding livestock was also produced.
10. Since the review was undertaken, the legislation has been strengthened and new provisions, particularly those in Regulation 183/2005 (feed hygiene), now apply to on-farm feeding operations. In addition, farm assurance schemes have been extended and developed to cover feed safety issues and have been widely adopted.
11. A sub- group was formed in 2014 to consider reviewing the guidance provided in 2003 to ensure that it reflects current farming practices and technological developments and that it addresses compliance with the legislative requirements. This is in line with the Committee's terms of reference, viz. to advise 'on the safety and use of animal feeds and feeding practices, with particular emphasis on protecting human health, and with reference to new technical developments'. The intention though was not to reproduce a manual for livestock farmers but rather to reflect the relevant changes since 2003.

Scope of the Review

12. The sub-group agreed that the revised document should highlight hazards and advise how to minimise risks in a concise guide that also reflects changes that have occurred to current farming practices, technical developments¹ and legislative requirements since the publication of the 2003 report.

¹ Gillespie et al, *Veterinary Record* 2015 doi: 10.1136/vr.102759.

ACAF Consultation

13. The first stage of this review consisted of meetings of the sub-group to identify the areas of the report that required updating. The sub-group then liaised with external stakeholders and other government departments.

Other Sectors (New Section)

Hobby Farming

14. There has been a rapid rise in hobby farming over the past twenty years or so. A hobby farm can be anything from a house with a large garden, a small holding or small farm but the key distinction is that it does not provide a main source of income and is a pastime rather than an occupation. It covers a wide spectrum of agricultural output from fruit and vegetables, free range poultry, small herds of goats and pigs and sheep flocks. Many hobby farmers keep the rarer and traditional native breeds which are attractive, and hardy. These farmers often find support and advice from the breed societies and at agricultural shows. However, a recent survey from Liverpool Veterinary School indicated that many hobby pig farmers are not aware of, or adhering to, legislative requirements regarding registration or feeding of waste feed. It is important that communication strategies are adopted to engage this sector to ensure awareness and compliance.
15. It is estimated that almost half of the farms sold in England and Wales in recent years have been bought by non-farmers. In the south west for example it is estimated that up to 80% of all farms are bought by non-farmers. The trend is to live in the farm house but rent most of the land out to other farmers, while keeping a few acres to 'hobby' farm. Research by the Royal Institute of Chartered Surveyors indicates that hobby farmers are becoming the dominant producers on small farms of 40 acres or less.
16. Although for small hobby farms most of the agricultural production is for own consumption, doorstep sales and in particular selling through farmers markets has become increasingly popular. For some producers of specialist livestock and artisan foods, selling at farmers markets has grown to the stage where their products are also to be found stocked in other outlets. Most are members of FARMA (National Farmers Retail & Markets Association) - a co-operative of around 500 businesses from across the UK that promote food which is grown and sold locally.

Aquaculture

17. The Agricultural Industries Confederation (AIC) has advised that, apart from possible development work on feed for new species, on-farm production of fish feeds generally does not take place in the UK. However, a number of fish farms in NI are approved for the manufacture of fish feed, which entails the incorporation of medication into fish feed.

Section 2 – Overview of current feeding practices: A summary of developments since 2003 (New Section).

18. Over the past 12 years, since the publication of the first review in 2003, farming and the animal feed industry have continued to respond and adapt to the challenges of the 21st century. On a global scale, fewer farmers are required to produce more for a growing population whilst responding to the challenges of climate change and environmental impact. Across the EU, the Common Agriculture Policy was reformed in 2003 with subsidy payments no longer being linked to production but to environmental, food safety and animal welfare standards. This had a significant impact on the farming system practised on many farms which will continue with the new scheme introduced in 2015. In the UK, consolidation and developments in the animal feed supply industry and feeding practices continue.
- The animal feed industry is worth about £4.4 billion per annum
 - UK - wide there are approximately 200,000 businesses involved in feed.
 - The UK livestock industry utilises approximately 22 million tonnes of feed per annum.

Feed Assurance (New Section).

19. The majority of UK livestock producers now belong to a farm assurance scheme because it is a requirement set down by many of the major food retailers. Production standards cover food safety, environmental protection, animal welfare issues and other characteristics deemed to be important by consumers. Scheme members must demonstrate that all feedstuffs used on the farm comply with current EU, and domestic legislation, be stored in good conditions and relevant records must be kept to ensure all feed is traceable. As membership of a scheme includes regular, independent checks to ensure that rules are adhered to, farm assurance is now recognised as being a valuable means of demonstrating best practice.
20. It is estimated that membership of assurance schemes varies by business type. In the feed manufacturing sector membership it is around 99%; in the farming sector it is approximately 46%.
21. The three feed/ food safety schemes operated by AIC (Feed Materials Assurance Scheme, Trade Assurance Scheme for Combinable Crops and

Universal Feed Assurance Scheme) have been reviewed and revised regularly throughout the last decade to take into account new legislative requirements, emerging risks and industry best practice. In addition, AIC has worked with inspection and certification companies operating the schemes to further strengthen auditor competence and improve compliance with the standards. AIC would estimate that in excess of 98% of feed ingredients and compound feeds produced in the UK are now subject to independent inspection and certification under an AIC scheme.

22. AIC has also worked closely with scheme owners and trade associations at an international level to manage safety risks at source, and strengthened links with UK scheme owners such as Red Tractor, Quality Management System and Scottish Quality Crops.
23. In Northern Ireland the Food Fortress scheme for feed manufacturers is committed to improving the safety and security of the food chain. Through an industry-wide program of strategic sampling and testing it aims to reduce the risk from the principal contaminants which threaten the feed chain.
24. It is a requirement of the Northern Ireland Beef & Lamb Farm Quality Assurance Scheme that its members source their manufactured feedstuffs from a Food Fortress accredited manufacturer. Food Fortress has an Information Exchange Protocol in place with feed authorities in Northern Ireland, allowing access to results of all analyses carried out.

Earned Recognition (New Section)

25. The Food Standards Agency and the Veterinary Medicines Directorate (VMD) introduced earned recognition for feed businesses in 2014. The aim of earned recognition is to reduce the burden of regulation on compliant businesses and there are three broad earned recognition approaches. Businesses can -
 - demonstrate good levels of legal compliance via their own previous inspection history;
 - be members of an FSA approved assurance scheme which meets specific earned recognition criteria; or
 - be part of the Primary Authority scheme.

26. The first two approaches lead to businesses receiving less frequent inspections from local authorities, which in turn allow local authorities to focus their resources on businesses that are less compliant and higher risk. A number of assurance schemes have now been recognised by the FSA and further information can be found at - <http://www.food.gov.uk/business-industry/farmingfood/animalfeed/animal-feed-activity-and-inspections-in-the-uk>
27. The Primary Authority scheme, which is operated by the Better Regulation Delivery Office, offers businesses the opportunity to form a legally recognised partnership with one local authority, which then provides advice for other councils to take into account when carrying out inspections. The scheme is designed to reduce the risk of inconsistent enforcement action taken against businesses.

Information Technology (New Section)

28. Following a number of food-related issues, the general public have increasingly demanded to know what is in their food, where it has come from and whether it is safe and wholesome. Continuing developments in information systems have made a big impact on farms, with capability being now widely available to manage and monitor inputs and outputs. This has led to increases in efficiency, data recording, traceability, food safety and product quality.

Feeding Practices (New Section)

29. Different approaches to feeding farm livestock continue to develop. A shortage of and/or the cost of labour on some farms has led to increased intensification and mechanisation, e.g. increased use of mixer wagons and robotic milking. In contrast, low cost systems of production requiring fewer off-farm inputs have also developed widely, e.g. spring calving grass based systems of milk production, cattle outwintering, and use of forage crops. Public demand for livestock to be reared in a 'free range' environment has resulted in increases in free range laying hens and outdoor pig rearing, and to a lesser extent free range broilers.

Animal Feed (New Section)

30. The 2003 review recognised the many types of animal feed materials used for livestock production from forages, etc. to the various by-products. Whilst research continues to look at potentially new sources of animal feed such as insects, a major development has been the increased use and availability of genetically modified crops around the world. In addition the use of enzymes has increased and a wider range of synthetic amino acids is now available. The EU ban on antibiotic growth promoters in 2006 has led to significant work to identify new feed additives / functional ingredients with a positive impact on health and performance.

Digestive Physiology (New Section)

31. A greater understanding of digestive physiology over the past 12 years including gut health and immunity, rumen function and the impact of anti-nutritional factors has led to widespread use of feed additives. These include probiotics, enzymes, and highly available minerals such as chelates and proteinate. Knowledge of the importance of diet structure, amino acid requirements and availability, and the importance of different sources of dietary carbohydrate and fat have improved feed efficiency and utilisation.

Environmental Implications of Feeding Practices (New Section)

32. A significant development since 2003 has been a greater awareness of the impact of livestock production systems on the environment, e.g. introduction of nitrate vulnerable zones, the impact of excess phosphorus excretion on diffuse pollution and reduction of ammonia emissions from intensive livestock production. This has focused research on the nutrient requirements of livestock and for practical feeding on the dietary supply of protein and phosphorus with minimal wastage. Research is also focussing on nutritional additives or manipulations to reduce enteric methane production. The efficacy of these on commercial farms needs to be proven. Mechanised feeding systems e.g. using mixer wagons to produce and distribute complete diets use significant amounts of tractor power and fuel and need to be factored in to calculating environmental impact.

The Extent of On-Farm mixing of feeds (Previous paragraph 5-7 of original report)

33. As a result of changes in departmental responsibilities, the VMD holds records of, and approves, over 500 on-farm manufacturers, including around 100 fish

farmers specifically authorised to incorporate veterinary medicinal products or specified feed additives. Producers who incorporate additives (such as trace elements and vitamins) into manufactured feeds are required to be registered with their local Trading Standards Authority. Approximately 14,000 farms are registered with local authorities in Great Britain. In NI all farms registered automatically through herd registration & PPH/feed inspection carried where mixing category is clarified. Approximately 22,000 farms are registered in Northern Ireland.

34. Complete diet feeding is used increasingly to mix home grown forages, cereals, by-products and other bought-in feeds to produce rations for ruminants.
35. According to Defra's report 'Agriculture in the UK' 2013², approximately 22.8 million tonnes of animal feed were purchased in 2013 with just over half this amount (12 million tonnes³) being compound feed or blends (rather than separate feed materials). This is slightly up on the five-year average of 21.8 tonnes (of which 11.1 million tonnes is compound feed). While some of these will be fed without prior mixing with other feeds, a significant proportion will be mixed. Therefore, it would appear that on-farm mixing of feeds is widely practised.

Legislation and Codes of Practice (Previous paragraphs 8-10 of original report).

36. Since the publication of the 2003 report there have been changes in enforcement responsibilities. In Great Britain enforcement of the various aspects of animal feed legislation is now carried out by local authorities (for hygiene, composition and labelling aspects - normally through trading standards offices), VMD (re veterinary medicines issues) and the Animal and Plant Health Agency (APHA) re animal by-product controls. In Northern Ireland enforcement is carried out by the Department of Agriculture and Rural Development (DARD).
37. Regulation 183/2005 encourages the development of Community guides to good practice in the feed sector and for the application of HACCP principles. Although an assessment of these is not within the scope of this review, the

² https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/315103/auc-2013-29may14.pdf

³ This figure does not include integrated poultry feed production.

Committee believes that codes and assurance schemes do provide a valuable means of achieving best practice. The Committee therefore urges such codes and assurance schemes to be continued to be developed to address the particular hazards associated with on-farm mixing and feeding. The Food Standards Agency's Criteria for the Approval of Industry Assurance Schemes for Earned Recognition is a useful reference document for those devising such schemes and drafting codes of practice (see paragraphs under Guidance and assurance schemes).

38. Since the publication of the Committee's review of on-farm feeding practices the following legislative measures have been introduced.

Feed Hygiene Regulation (183/2005)

39. This legislation requires feed business establishments (including farms) to be approved or registered and adopt risk based practices. Farms must follow certain operating procedures. This includes standards relating to the prevention of contamination and spoilage of feed, ensuring clean equipment for the storage and transport of feed and the maintenance of certain records.
40. It should be noted that the following activities are not covered by the Regulation:
- (a) the private domestic production of feed:
 - (i) for food-producing animals kept for private domestic consumption; and
 - (ii) for animals not kept for food production;
 - (b) the feeding of food-producing animals kept for private domestic consumption or for the activities mentioned in Article 1(2)(c) of Regulation (EC) No 853/2004 of the European Parliament and of the Council of 29 April 2004 on the hygiene of foodstuffs⁴ ;
 - (c) the feeding of animals not kept for food production;
 - (d) the direct supply of small quantities of primary production of feed at local level by the producer to local farms for use on those farms;
 - (e) the retailing of pet food.

⁴ OJ L 139, 30.4.2004, p. 1. (Corrigendum: OJ L 226, 25.6.2004, p. 3).

41. However, as required by Regulation 178/2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety animal feed deemed to be unsafe cannot be placed on the market or fed to any food-producing animals. Article 5(1) and Annex I of EC Regulation 183/2005 sets out requirements for feed business operators (FeBOs) at the level of primary production of feed.

The Veterinary Medicines Regulations (VMR) 2013

42. These regulations implement the requirements of Directive 2001/82/EC, (as amended) and Directive 90/167/EC and outline the rules and requirements for the regulation of medicines for animal use and implement requirements in animal feed legislation relating to medicated feed.. The requirements apply to manufacturers of medicated premixtures and feedingstuffs.

Legislation on Medicated Feeds

43. The Veterinary Medicines Regulations apply the conditions of approval in 183/2005 to feed business establishments manufacturing medicated feeds. They also make provision to enforce Regulation 882/2004.
44. In addition, farms that mix medicated feedingstuffs and certain feed additives (e.g. coccidiostats and histomonostats) must apply the principles of HACCP (Hazard Analysis and Critical Control Points). However, if they are only adding vitamins or trace elements via premixtures then they are required to register and a HACCP is not necessary. Many of the provisions of Regulation 183/2005 reflect practices recommended by ACAF in its report on on-farm feeding practices.

Marketing and Use of Feed Regulation (767/2009)

45. This sets out labelling declarations for feed, establishes a catalogue of commonly used feed materials and contains a list of prohibited ingredients.
46. Regulation EC 767/2009 requires that the labelling and presentation of feed shall not mislead the user. The legislation also lays down requirements for

feed materials or compound feed marketed in bulk or in unsealed packages or containers. The aim of legislation 767/2009 is to harmonise the conditions for the placing on the market and the use of feed, in order to ensure a high level of feed safety and thus a high level of protection of public health, as well as to provide adequate information for users and consumers and to strengthen the effective functioning of the internal market.

Official Controls on Feed and Food Regulation (882/2004)

47. This lays down the principles to be followed by designated competent authorities in the enforcement of these controls and specifies the action to be taken both to check businesses' compliance with the rules and when breaches are found. The Regulation is enforced in England through the Official Feed and Food Controls (England) Regulations 2009. Separate but parallel legislation applies in Scotland, Wales and Northern Ireland. The Veterinary Medicines Regulations 2013 enforce Regulation 882/2004 with regard to Schedule 5 products. Schedule 5 products are veterinary medicines and specified feed additives intended to be used to manufacture a medicated feed. Specified feed additives cover the functional groups coccidiostats and histomonostats. It also covers any and all feedingstuffs and premixtures manufactured that contain veterinary medicines or specified feed additives.

Legislation on TSE and BSE

48. Feed measures relating to the control of animal disease, including transmissible spongiform encephalopathies (TSEs) and the use of animal by-products, are the responsibility of the Department for Environment, Food and Rural Affairs (Defra) and DARD in NI along with the other Devolved Administrations. However, the Agency maintains a close interest.
49. A ban on the feeding of almost all processed animal proteins (PAP), with very few specific exceptions, to all farmed livestock has been in force in EU legislation since 2001. This is to prevent the possible contamination of feed for ruminant animals (cattle, sheep and goats) with meat and bone meal which might contain the prion that is thought to have been the vector for BSE. The prohibition was relaxed with effect from June 2013 to permit the feeding of pig and poultry PAP to farmed fish. Feed for aquaculture containing PAP must be manufactured, stored, and transported under very strictly controlled conditions to prevent any possibility of cross-contamination with ruminant protein and ruminant feed. In addition, regular sampling and analysis of the non-ruminant PAP used in the production of the fish feed as well as the feed

itself is required in order to verify the absence of cross contamination with ruminant protein using a scientifically validated test. The EU Reference Laboratory has validated for this purpose a polymerase chain reaction (PCR) test capable of detecting very low levels of ruminant material in feed as described in Commission Regulation (EU) No 51/2013. The results must be kept available for inspection by the competent authority for at least five years.

50. Compound feed manufacturers producing complete feed, which contains pig and poultry PAP, for farmed fish do not require specific authorisation (unless producing medicated feed where approval from the relevant competent authority is needed) from the competent authority. However, the following conditions must be adhered to:
 - a) they are registered by the competent authority;
 - b) they keep feed only for aquaculture animals;
 - c) they produce complete feed for aquaculture use only on the holding on which it is produced; and
 - d) the compound feed contains less than 50% total protein.
51. The existing strict controls which exclude all mammalian meat and bone meal from ruminant feed will remain in place. There are no plans to review these controls.

Farm assurance schemes

52. Farm assurance standards have been refined since 2003 to take into account the legislative requirements of Regulation 183/2005 on feed hygiene and Regulation 767/2009 on the marketing and use of feed. In the egg production sector, Lion Quality Eggs has requirements on feed hygiene and traceability in accordance with relevant legislation. The Red Tractor Assurance standards include feed specific standards which relate back to the legislative requirements, and include some additional requirements (over and above those in the legislation) which enhance traceability.
53. The Red Tractor scheme produced a Code of Practice for On-Farm Feeding a decade ago and this was revised in 2010 to take account of legislative changes. The revisions were made in full consultation with the FSA and other

stakeholders. The document is not restricted to scheme members and is available for free download from the Red Tractor website⁵.

54. Assurance Schemes Red Tractor Assurance and Lion Quality Eggs require their members to obtain feed via members of recognised feed assurance schemes such as those run by the AIC. The schemes for feed supply and farming dovetail well together; liaison between Red Tractor and AIC provides consistency of approach.
55. Since 2005 the National Association of Agricultural Contractors has run an assurance scheme for mobile feed mixers and processing which ensures that assured mobile mixers comply with legislative requirements for traceability, hygiene and operator competence. For on-farm mixing, the industry produced Code of Practice is available to all on-farm mixers (not just assurance scheme members).

⁵ http://assurance.redtractor.org.uk/resources/000/824/525/rt_code_farm_feeding.pdf

Section 3 – Review of Current On-farm Practices (Paragraph 17 of original report)

56. The production, processing, storage, transport and distribution of safe and suitable feeds are the responsibility of all participants in the food chain, including farmers. It is essential therefore that farmers' adopt necessary controls to ensure production of safe feed and food. An overview of the main elements of sources of feeds, on-farm storage, mixing and feeding is given as a flow diagram in Annex I. The following sections identify areas that require particular attention.

Sources and Selection of Feedingstuffs (including feed materials, complementary, dietetic and compounds) (Paragraphs 12-46 of original report)

57. In the 2003 report it was noted that feeding ruminant protein to ruminant animals, such as cattle and sheep, was prohibited in the UK from 1988 in response to the Bovine Spongiform Encephalopathy (BSE) crisis, with mammalian protein banned from such feed in the European Community from 1994. In the UK, mammalian meat and bone meal was banned from all feed for farmed animals on 1 August 1996, the date of the reinforced feed ban. The various feed bans have been part of a range of measures effectively controlling and reducing the number of new BSE cases from a height of 36, 682 confirmed cases in 1992, to 3 confirmed cases in 2013. In 2001, various controls on BSE and scrapie were consolidated into the Transmissible Spongiform Encephalopathies (TSE) Regulation (EC) No. 999/2001. The TSE Feed Ban part of this regulation, controlling the use of various animal proteins and processed animal proteins in farm animal feed has evolved since then, but (together with the Animal By-products Regulations 1069/2009) remains a cornerstone in the prevention of new BSE cases arising or new novel TSEs developing. Further details on the current controls can be found in Annex V.
58. Details of type and quantities of some of the feed materials used on livestock farms are given in Annex VI. As noted above, feeding ruminant protein to ruminant animals, such as cattle and sheep, was prohibited in the UK from 1988, with mammalian protein banned from such feed in the European Community from 1994. The latest EC controls prohibit feeding processed animal protein (including that from poultry) to all farmed animals, although there are some strictly controlled exceptions:
- the feeding to farmed animals other than ruminants of fishmeal;

- the feeding to farmed animals of gelatine derived from non-ruminant animals;
 - the feeding to farmed animals other than ruminants of dicalcium phosphate (specifically bone derived not mined);
 - the feeding to farmed animals other than ruminants of hydrolysed protein;
 - the feeding to farmed animals of milk and milk products.
59. Livestock farmers have several choices regarding the types of feed they use and the form in which they are fed. Feeds may be either purchased or produced on the farm where they are used (on-farm produced). Purchased feeds may be obtained directly from other farms, from compound feed mills, feed merchants, supplement suppliers or food processing factories or retailers (registered to supply surplus food as feed). It should be noted that concentrated products cannot be fed directly to animals unless they are 'authorised' dietetic products and listed in the annex to Directive 38/2008, as amended.
60. On-farm produced feeds are primary agricultural products such as forages, cereals and pulses. Forages may be fed fresh (e.g. grass) or preserved (e.g. silage or hay). Cereals such as wheat and barley, and pulses such as peas and beans, are most commonly harvested at the point of maturity when the seed heads (grains) are at their fullest. These grains may be used on farm or sold for feed or food use. Generally, some form of processing is required to breakdown the seed coat (husk) and improve digestibility. The most common processing prior to feeding involves physical treatment of the grains, e.g. rolling or grinding. Ground cereals and pulses are used both for direct feeding on farms and by commercial feed manufacturers. On some ruminant farms, the entire grains may be treated with alkali (in liquid or solid form) such as caustic soda (sodium hydroxide) or ammonia, in order to degrade the outer seed coat and aid digestibility. Less common is the addition of propionic acid to barley to act as a preservative and aid digestion by beef cattle. Cereal grains harvested before they are fully mature may be crimped before storage as a means of improving the digestibility of the grain. A weak acid may be added to prevent aerobic spoilage. Cereal straw, which remains after the grains have been harvested, can also be fed to ruminant livestock, despite it having low digestibility in its natural state. However, as with grains this can be improved through treatment with caustic soda or ammonia. Cereals and pulses may also be harvested prior to maturity to produce whole crop cereal

silage. This may be either ensiled and fermented or, when harvested at a later stage, treated with urea or alkali.

61. Co-products (also referred to as by-products) are associated with the production of food or drink for human consumption, and include cereal by-products after the extraction of flour for bread making (e.g. wheat feed), oilseed meals after oil extraction (e.g. soya bean meal) and liquid by-products (e.g. whey from the manufacture of cheese). By-products of a number of industrial processes, including starch extraction and fermentation, are also used (e.g. maize gluten feed). Moist co-products are usually obtained locally whereas, dry products may be transported over long distances or imported and pass through intermediate stores.

New text

62. It is important that care is taken during the storage of moist co-products to prevent deterioration in quality, and loss. Feed spoils during storage -whether it deteriorates quickly or slowly depends partly on its quality when received, but very largely on how it is stored on farm. Environmental factors, such as moisture (feed moisture content and relative humidity), temperature, light, and oxygen influence deteriorative changes and losses in feedstuffs. These affect the feedstuff either directly or by influencing the rate of development of insects and fungi which consume the feed during storage.
63. One important reason to ensure that moist feed is stored correctly is to prevent the growth of mould (mycotoxins) which are toxic to both humans and animals. Fungi grow at relative humidities above 65%, moisture contents generally above 15% (although some mycotoxin producing fungi grow well at only 9-10% moisture) and temperatures which are specific to the fungal species. Most fungal growth occurs at temperatures above 25° C and relative humidities above 85%. Higher temperatures and moisture levels favour increased growth. Fungal growth itself encourages local rises in temperature and moisture content. Many fungi are killed during the processing of ingredients but their spores are resistant and remain present to re-infect the material later if the environmental conditions become favourable for their development.
64. Fungal growth causes weight loss, increases in temperature and moisture, staleness (off-flavour), discolouration and, perhaps worst of all, some common

species produce mycotoxins. Sorghum, maize and its by-products, groundnut, cottonseed, cassava, coconut and sunflower are ingredients especially prone to contamination with mycotoxins.

65. Additionally, certain primary and processed foods intended for direct human consumption, which are either surplus to requirements or have been rejected for quality or presentational reasons may either be sold direct to farms or via intermediate processors. Included here can be bakery products (such as bread, cake, pastry, misshapen biscuits) pasta, chocolate, sweets and breakfast cereal but not animal products such as, meat, fish, or products incorporating these.
66. However, farmers buying direct from food factories or retailers should find out why the food has been rejected and be aware of the possible hazards to livestock. The UK Former Food Processors Association⁶ has been formed in the last two years to promote the industry standards.
67. Manufactured complementary compound feeds are purchased to complement home grown and other feed materials, and provide the animal with a properly balanced diet. These compounds will vary from vitamin/mineral premixtures to higher inclusion/usage products, typically containing protein sources to balance lower protein cereals. Many poultry and pig farmers will purchase complete compound feeds requiring no further mixing or dilution on farm. Feed blocks are another feedstuff used to feed livestock and these are particularly useful in extensive grazing systems where other methods of feed are inappropriate.

Transport (Paragraphs 18-21 of original report)

68. Road hauliers often represent the final part of the transport chain, with many feed materials being imported by ship and then transported to the store prior to delivery to farm.
69. Feed materials can be transported to the farm and/or the farm's storage facilities using either:

⁶ <https://www.agindustries.org.uk/sectors/animal-feed/adding-value/aic-launches-new-former-foodstuffs-body/>

- a road haulier;
 - a specialist contractor (most likely in the case of harvested forages, etc.);
 - the farmer's own equipment or that of another farmer.
 -
70. Equipment used may or may not be designed specifically for, nor exclusively used for the transport of feed materials.
71. Many of the UK-based hauliers involved in feed transport subscribe to an independently audited code of practice for road haulage⁷. This code emphasises the need for vehicle hygiene and cleanliness, correct loading, avoidance of contamination and cross-contamination, and delivery to the correct destination. It also specifies materials that must not be carried and gives advice on lorry cleaning. However, not all feedingstuff hauliers subscribe to this code of practice. Annex I of Regulation 183/2005 stipulates that feed business operators shall ensure, as far as possible, that primary products produced, prepared, cleaned, packed, stored and transported under their responsibility are protected against contamination and spoilage. The industry code is a useful reference for farmers wishing to specify prohibited materials. The code also requires hauliers to provide details of the previous three loads carried for auditing purposes. Regardless of this, the haulier should be registered as FeBO.
72. The 2003 report made reference to requirements for the transportation of feed materials. Hauliers of certain animal by-products which may be used in farm animal feed are required to be registered under the ABP Regulations and in certain instances the TSE Regulations. This applies to those transporting milk; processed animal proteins such as fishmeal or blood meal; or derived products such as blood products or dicalcium or tricalcium phosphate of animal origin. Dedication of use or cleaning between loads is required after haulage in bulk of certain feeds, such as fishmeal, destined for use in only feed for non-ruminant animals and before haulage of feeds destined for use in ruminant animals.
73. Transport of feed should be done in a manner to minimise food safety risks. Farmers should be aware that contamination may take place or disease

⁷ <https://www.aictradeassurance.org.uk/tascc/documents/codes-of-practice/>

spread by tractors being driven over animal feed when scraping out. Contamination of feed with cattle faeces from the tyres used to scrap out can transmit infectious disease such as salmonella if it is already present in the herd. Schemes such as TASCC may help to mitigate the potential risks.

74. Non-medicated feeds shall be separated from medicated feed materials and additives, in order to avoid any cross-contamination of the processed feed; proper packaging materials shall be used.

Receipt and Handling (Paragraphs 22 -24 of original report)

75. This section deals with discharge of feeds on arrival at the farm. Ideally, feeds will be discharged to their point of final storage without being discharged to an intermediate point. Bulk feed deliveries may be made with tipper lorries which would preferably unload directly into the store/bunker or into an intake pit for conveyance to a bulk bin. Blower lorries discharge dry feeds directly through a blow line into lofts or bulk bins, etc. Bulk liquids are carried on tankers which pump the liquid direct to the storage tank. Bagged deliveries are generally made on flatbed lorries. Care should be taken when unloading to minimise contamination of feed bins correctly discharged.
76. Revised paragraph 23: When direct discharge to the final point is not possible, or when farmers need to move feeds to different premises, they may use tractors fitted with front-end loaders or farm trailers. Feed Business Operators (FeBOs) should take adequate measures to keep clean, and where necessary after cleaning, to disinfect in an appropriate manner, facilities equipment, containers, crates and vehicles used for producing, preparing, grading, packing, storing and transporting feed.
77. For harvested forages such as silage or hay, farmers may use their own machinery, or that of specialist contractors to cut, transport and store the crops. While some of the machinery particularly that involved in harvesting is specific for the purpose, some will have multiple uses.

On-Farm Storage (new paragraph to follow paragraphs 25-26 of original report).

78. There are many options for on-farm storage. These include:

- storage bins or silos for bulk materials which may be sealed or unsealed;
- bunkers or bays for storing bulk materials on the floor, usually separated by concrete or wooden partitions;
- tanks for liquids;
- sheds or other farm stores for bagged ingredients; and
- feeds stored in heaps in unsealed buildings.

79. Due to the variety of feedingstuffs, there is a wide range of potential storage systems and associated mixing and feeding systems on farm. Storage is needed both before and after mixing. The physical nature of the material (i.e. whether dry, liquid or moist) will determine the type of storage facility. The feeding system on the farm will also be taken into account. Because of the over-riding influence of physical form of the material on the storage options, these are described separately below.

New text

80. Separation during storage and use is required by the TSE Regulation, if feeds only eligible for use in non-ruminant animals, such as fishmeal, are present on farms where ruminants are kept.

Dry Feedingstuffs

81. Dry feeds or feed materials stored in bulk are held in sealed hoppers, lofts or bins. Some may also be stored outside where they are exposed to the elements. Feed may be stored in bays or bunkers, on the floor, particularly on dairy and beef farms. Feeds and feed materials are usually moved from the storage hoppers or bins to the mixers or feeding troughs/hoppers by means of conveyors or augers, particularly on pig and poultry units. Pelleted, compound dairy feeds may be stored in a loft above the milking parlour for easy dispensing to dairy cows during milking. Materials stored in an unsealed bunker may be carried by front-end loader to a feeder wagon for mixing with silage to produce a ration for dairy cows. Low inclusion materials such as vitamin and trace element supplements included at less than 50 kg/tonne in the home mixed ration, and feeds used in relatively small quantities, are purchased and stored in sealed paper or plastic bags.

Moist Feedingstuffs and Dried Forages

82. These materials are most commonly found on ruminant farms although older pigs may occasionally be fed on moist materials (brewer's grains, pressed sugar beet pulp and bread) or on root crops (potatoes and fodder beet). Root crops may be fed in situ so avoiding the need for harvesting and storage. Whilst dairy cows, beef and sheep are able to graze grass for several months of the year, they also need preserved forages such as silage or hay. Silage is stored either in large bunkers (clamps) or in smaller bales sealed in plastic to prevent deterioration as a result of exposure to air. Once opened, the silage face is exposed to the elements; birds are a particular problem as far as whole crop cereal silages are concerned. Hay and straw are stored dry (i.e. less than 18% moisture content) in buildings or under plastic sheeting, to prevent deterioration with exposure to moisture.

New paragraph

83. As described in paragraphs 62-64 care should be taken when storing moist feedingstuffs and any mouldy feed should never be fed to animals in view of the potential for the mould to contain aflatoxins which could be harmful.

Liquid Feedingstuffs (new paragraph to follow paragraph 29 of original report)

84. Use of liquid feed materials is largely restricted to ruminant and pig farms although addition of soluble vitamins to drinking water is common on many poultry units. Liquid feed materials are stored in tanks of varying sizes. Some of these materials may be consumed directly (e.g. molasses may be 'licked' from specially designed feeders or metered into feeder wagons for inclusion in the complete diet). Others, particularly those found on pig farms, may be transferred by pipes to a liquid mixing tank for ultimate feeding via a pipeline feeding system.

New text

Medicated Feedingstuffs

85. Medicated and non-medicated feed intended for different categories or species of animals must be stored in a manner to reduce the risk of feeding to non-target animals. [Taken from Annex III of 183/2005].

86. Medicated feed must be prescribed by a vet following a clinical assessment of animals that are under that vet's care. The majority of medicated feed includes antibiotics but there are other prescription only premixes incorporated into feed. The number of animals to be treated and their feed intake can be used to calculate the amount of feed that needs to be ordered rather than a full load which may be fed to other animals. Advocating this approach could reduce the amount of antibiotics used in feed and focus use of those animals for which the antibiotic has actually been prescribed.
86. Under the VMR 2013, commercially manufactured feed must be labelled with the words 'MEDICATED COMPLETE FEED' or 'MEDICATED COMPLEMENTARY FEEDINGSTUFF' and it must be in capitals. This assists farmers in ensuring clear segregation of medicated and non-medicated feed.

Mixing and Feeding Practices (Amending paragraphs 30 and 31 in original report)

88. The principal objective of feed mixing is to ensure that there is a homogenous mix of the feed ingredients, particularly those added at low levels (e.g. minerals, trace elements, vitamins and medicinal or specified feed additives). This ensures that livestock consuming the feed receive neither an excess nor a deficiency of any particular ingredient or nutrient. There are many different types of farm mixing systems (including the shovel on very small units) ranging from dry mixers through to liquid mixing tanks, feeder wagons and, visiting mobile mill and mix units. Since feeding systems and practices vary widely for different forms of livestock production, they are described separately in paragraphs 73-88 for pigs, poultry and ruminants.

Pigs

Extent of Home Mixing for Pigs

89. Pigs are omnivores and the comparability of the pig's digestive system with that of humans has influenced how pigs have been fed over many generations. Feeding a variety of human foods and food co-products has been common practice. This has led to a number of different types of feeding systems, ranging from traditional dry home-mix units to liquid feeders.
91. The feeding of kitchen waste, waste from catering facilities and processed catering waste ('swill') was banned during the Foot and Mouth Disease outbreak in 2001, and remains illegal. However, illegal movements of food by

road, sea or air (whether for commercial or personal use) into the UK from disease affected areas in other countries (both EU and further afield) still present a potential risk for an incursion of exotic notifiable disease. If food waste from such sources entered the farm animal feed chain, it would present a potential threat to the agriculture industry and wider business community.

92. It is generally thought that approximately 50% of growing and finishing pig units involve some form of home- mixing activity. Sow breeding units are more focused on feeding purchased complete compound feeds, not least because an increasing proportion is kept out-of-doors on more extensive farming systems. Some examples of the main types of feed mixing activity are shown in Table 1.

Table 1 - Examples of Feed Mixing Activities on UK Pig Farms

| Examples of Purchased Manufactured Feeds | Examples of 'Home Mixing' Activity |
|--|---|
| Complete compound feed. | No further mixing required. Provides the complete diet. |
| Complementary compound feed ranging from vitamin/ mineral supplements to higher inclusion (10-40%) mixtures. | Will be mixed on-farm with cereals (home grown or purchased) and, possibly, other dry feed materials (often purchased) including medicinal and/or specified feed additives. Daily ration may also include moist feeds and vegetables. |
| Complementary compound feed (dry but designed to suit liquid systems). | Mixed with other liquid components and other dry feed materials including medicinal and/or specified feed additives. |

NB These are examples only and do not give an exhaustive summary of the possible feeding systems or combinations.

Feed Mixing Systems for Pigs

93. The main feed mixing systems are:

- (a) Dry mixing –it may involve nothing more than a few feed materials, a bought-in complementary compound feed or vitamin/trace element premix and a shovel. However, dry mixing is generally mechanised. Feeds are usually mixed in batches suited to the size of the mixer and

are transferred to other storage bins prior to feeding. The majority of pig home-mixers produce feed entirely for their own use.

(b) Liquid feeding – a proportion of growing and finishing pig farms, historically those sited close to suitable food factories, feed liquids requiring a mixing tank and delivery pipelines to each pen. Many farmers feed a combination of liquid feed materials and dry feeds, mixed in the liquid mixing tank.

(c) Mobile mill and mix services – in addition to static mixers on farms, a number of service companies operate mobile mill and mixing services. These visit farms, processing home-grown cereals, and mixing them with purchased feed materials, including sources of protein and minerals.

Feeding Practices for Pigs

94. The choice of feed type and feeding system is dictated, in part, by the scale and type of housing. There is a preponderance of indoor pig units although an increasing proportion of UK breeding pigs are now kept out-of-doors.

Indoor Pig Units

95. Traditional dry mixers tend to produce feeds in meal form; few have the facilities to manufacture pelleted feeds. It is estimated that approximately 20% of pigs are fed on diets which include liquids. Although liquid feeds tend to be cheaper than dry feeds, the need for specialised storage and handling facilities means that they tend to be used more on larger sized units. The majority of pig farmers, including home mixers, buy in their piglet starter feed as this is difficult to produce in most farm situations. This high quality, milk-based feed is usually supplied in small pellet form from specialist manufacturers and encourages early feed consumption helping the piglets during the weaning phase. After weaning, dry feeds in meal or pellet form are generally fed in troughs, although 'on-floor' pelleted feeds may be fed. Liquid feeds are pumped into troughs for direct consumption by pigs. Groups of growing and finishing pigs usually consist of animals of similar age and this permits formulation or purchase of diets that meet their specific nutritional requirements depending on the weight of the animals.

Outdoor Pig Units

96. Outdoor sows may be fed in a variety of ways (e.g. by hand or by a mechanical feeder). Home mixing is rarely practised on these farms, as loose 'meal' and even pellets would quickly be wasted when cast on the ground. Instead, farmers tend to purchase compound feed in large nugget form to minimise wastage. Sows are sometimes fed on root crops or moist food co-products. Some growing pigs are reared outdoors for specialist markets e.g. free range and organic.

Poultry

Extent of Home Mixing for Poultry

97. There are four main types of producer as far as the size and scale of feed purchase and on-farm mixing are concerned. These are:

- a) integrators who make their own feed, keep their own birds and even run their own processing factory or egg packing station. Some of these will also sell feed;
- b) those who have farms and undertake processing but do not make feed, and buy compounds from commercial feed manufacturers;
- c) independent flock farmers who buy all of their feed from commercial feed manufacturers; and
- d) independent flock farmers who have feed mixing facilities to produce their own 'home-mix' ration(s). There are not many producers in this group.

Integrators who produce feed for their own use and for sale could be categorised as both home mixers and as commercial feed manufacturers. They are of a scale at least as big as, if not bigger than, the largest independent commercial feed businesses.

98. Some examples of the main types of feed mixing activity are shown in Table 2.

Extent of Home-Mixing for Poultry (amending Table 2 of original report)

Table 2 - Examples of Feed Mixing Activities on UK Poultry Farms

| Examples of Purchased Manufactured Feeds | Examples of 'Home-Mixing' Activity |
|--|--|
| Complete compound feed. | No further mixing required. Provides the complete diet. |
| Complementary compound feed ranging from vitamin/ mineral supplements to higher inclusion (10-40%) mixtures. | Will be mixed on-farm with cereals (home-grown or purchased) and possibly, other dry feed materials (often purchased) including medicinal and/or specified feed additives. |

NB These are examples only and do not give an exhaustive summary of the possible feeding systems or combinations.

99. All the activities outlined in Table 2 involve dry feeds and dry feeding. Apart from integrators described in paragraph 95(a), the majority of poultry farmers now purchase proprietary compounds. Indeed, even integrators may buy-in feed, particularly low volume lines. There are a few traditional 'home mixers' who purchase either a proprietary complementary compound feed (high protein concentrate) for mixing with cereals, or a mineral/vitamin premix for mixing with cereals and protein materials.

Feed Mixing Systems for Poultry

100. The main feed mixing systems for poultry are as follows.
- a) Dry mixing – on a smaller scale, mixing is done with a grinder, a standalone weigher, a static mixer with associated tip-in hopper and a bagging-off point. As the scale increases, so does the complexity until at the extreme end there may be several bulk raw material bins feeding one or more weighers, a mixer with additives incorporated via a blow-line from the tip-in point, grinders, pelleting lines with different sized presses to form different pellet sizes, coolers, fat sprayers and bulk bins for finished product storage. This may also be true for pig farm home-mixing.
 - b) Mobile mill and mix services – some poultry farms employ the services of a mobile mill and mixing service.

Feeding Practices for Poultry

101. In general, the choice of feeding system is dictated more by the scale and type of housing than by whether the feed is a home mix or purchased compound feed. Most of the feed produced by traditional home mixers will be in meal form. Larger scale mills are able to produce feeds in a variety of forms, including meals, crumbled pellets (crumbs) for very young poultry, or pellets (ranging from 2.0 mm for smaller birds to 4 mm for adult turkeys). Thus, even home mixers may choose to buy their starter feeds from a commercial feed mill to encourage higher early feed consumption by chicks or poults using crumbs or very small pellets. Early uptake is further encouraged by sprinkling the crumbs on sheets of cardboard to give the young birds' easy access to the feed. Broiler producers may have a bin of wheat which is mixed proportionately with the complete feed or may have the feed delivered in combination with wheat.

102. For poultry reared or bred on the floor in sheds, the feed will be delivered around the house from the bulk feed container by track feeders. Such a system is common for broilers, broiler breeders and replacement laying hens. Alternatively, hoppers or pan feeders may be arranged around the poultry house. This type of regime is more common for turkeys. Laying hens in barn systems or cages may be fed from troughs or chain feeders. For free range or 'outdoor reared' poultry, feeding systems within the available housing are similar. However, some flocks may be fed out-of-doors in troughs. In addition to the 'compound' feed, free-range flocks also have access to the land or pasture, so giving them freedom to peck at the soil and vegetable matter, also pick up worms, insects and small mammals. On commercial broiler farms, wheat may be stored in a bulk bin and supplied in combination with the proprietary compound feed at varying ratios from 0% to 20% throughout the growing period.

Ruminants

Extent of Home Mixing for Ruminants

103. 'Home mixing' in the broadest possible sense is practised on a high proportion of dairy, beef and sheep farms. The feeds used and the types of systems employed are a direct consequence of the ruminant's unique digestive capabilities to digest and utilise large quantities of home grown forages such as grass and other arable and fodder crops with little additional supplementation. However, the available forages are frequently insufficient to meet the nutritional needs of modern livestock, particularly during the colder winter months, and so supplementation with other forages, concentrates and compound feeds is common practice. Conserved forages, which form the basis of cattle diets during the winter, are bulky and therefore difficult to mix with other feeds. As a result there has been increasing use of feeder wagons to mix together all of the dietary components to produce a complete diet.
104. Some examples of the main types of feed mixing activity are shown in Table 3.

Table 3 Examples of Feed Mixing Activities on UK Ruminant Farms

| Examples of Purchased Manufactured Feeds | Example of 'Home-Mixing' Activity |
|---|--|
| Complete compound feed. | No mixing required. Most ruminant compounds are 'complementary' feeds requiring a forage element to complete the daily ration. |

| | |
|---|--|
| Complementary compound feed for feeding with forages. | No actual mixing required but animals also require access to silage, hay or other moist feeds or forage crops. Alternatively the compound may be used to supplement a semi-complete diet that has been mixed in a feeder wagon. |
| Complementary compound feed ranging from vitamin/ mineral supplements to higher inclusion (10-40%) mixtures. | Mixed in a static mixer with cereals (home grown or purchased) and other dry feed materials (sometimes including medicinal products). Daily ration will include forages (fresh or preserved) and possibly moist feeds and root crops fed separately. |
| Complementary compound feed ranging from vitamin/ trace element premixes to higher inclusion (10-40%) mixtures. | Mixed in a feeder wagon, if necessary, with cereals (home grown or purchased) and other dry feed materials (often purchased), silage and other forages, moist feeds and root crops to produce a complete diet. |

NB These are examples only and do not give an exhaustive summary of the possible feeding systems or combinations.

Feed Mixing Systems for Ruminants

105. The main feed mixing systems are:

- a) Feeder wagons - the bulky nature of forages means that they are generally difficult to mix with other feeds without the use of specialist machinery. However, a significant and increasing proportion of dairy and beef farmers now use feeder wagons or complete diet feeders to mix forages with other feedingstuffs, complementary feeds or additives to produce total mixed rations. Feeder wagons are fitted with weighing facilities that allow specific amounts of individual feeds to be mixed together. Such rations may be fed several times a day in troughs. Some farmers use feeder wagons to mix forages with other dry or moist feed materials for feeding in troughs whilst still feeding compound feeds, either in the milking parlour or through out-of-parlour feeders.
- b) Dry mixing – a few ruminant farms produce their own home mixed ‘compound’ equivalent for feeding separately from the forage component.
- c) Mobile mill and mix units - as for pigs and poultry, some ruminant farms employ the services of a mobile mill and mixer unit.

Feeding practices for Ruminants

106. Forages, either fresh or conserved, constitute the main feeds for most ruminant livestock. Fresh forage (e.g. grass) is usually grazed directly by livestock, and not mixed with other feeds. Because of their bulk and physical nature, conserved forages (particularly hay and silage) may be fed as the sole feed or as discrete feeds, depending on the productivity of the stock in question. Grass or maize silage stored in clamps is fed to cattle or sheep on a 'self-feed' basis, with access controlled by some form of physical barrier. This approach is favoured where the silage clamp is in close proximity to the cattle or sheep accommodation. Alternatively, silage may be removed from the clamp and fed in ring feeders, or along troughs or feed passages, either on its own or as part of a complete diet. Either way, livestock have access to forage for most of the day. Conservation of silage in bales provides greater flexibility, particularly in respect to where it can be fed on the farm and the livestock to which it can be fed.
107. Where forages alone are insufficient to meet the nutritional requirements for growth, pregnancy or milk production, additional feeds are provided. These may be fed as discrete meals or as mixtures of feeds, the former being particularly common for bulky moist feeds (e.g. brewers' grains) or where only one other feed (e.g. a cereal or a compound feedingstuff) is fed.

Feeding practices for Ruminants (adding 1st bullet point in paragraph 46)

108. Ruminant livestock are generally fed on a group basis. Exceptions to this are:
- young calves which, during the first few weeks of life, are usually individually penned and fed on a purchased milk replacer and calf compound. After an initial feed of colostrum, calves may be fed whole milk produced on farm or commercial milk replacer. Colostrum substitutes are available but 3-4 litres of colostrum in the first six hours of life from a cow on the same farm tested to be antibody negative for Johne's disease would be best practice. If Johne's disease status is not known or at high prevalence in the herd pasteurisation of colostrum is recommended. The compound may be a home- produced or purchased meal, a coarse mixture or a purchased pelleted feed. Please note there are no veterinary medicinal products containing CTC or any other antibiotic veterinary medicinal products, which are authorised for incorporation into dry calf milk replacer in advance of reconstitution and immediate feeding to calves. Thus it is illegal to prescribe, manufacture, supply, possess or use any calf milk replacer containing CTC or any other antibiotic prepared in advance of immediate feeding to calves. The prescribing cascade cannot be used to prescribe CTC or any other antibiotic in calf milk replacer manufactured in this way. A CTC oral

powder product is available for feeding to calves but its authorisation means that it can only be prescribed for and added to calf milk replacer immediately prior to feeding calves. For ruminant calves, another veterinary medicinal product (a premix) containing CTC is authorised for incorporation into dry feed by a feed mill or on-farm mixer approved to incorporate premixes. However, this premix is not authorised for use in calf milk replacer. Both of the authorised oral CTC products are only available on receipt of a prescription from a veterinary surgeon. Other oral veterinary medicinal products are available which are also authorised for the treatment of respiratory disease in calves and contain antibiotics such as tylosin, tilmicosin and enrofloxacin. Once again their authorisations mean that they can only be prescribed for and added to calf milk replacer immediately prior to feeding calves; and

- milking cows, which are usually fed compound feed in the milking parlour or through programmed out-of-parlour dispensers or robotic milking stations. The amount of compound feed they receive is related to the quality and quantity of other feeds available to them outside the parlour and their level of milk production. Such compounds are purchased as pellets to aid their flow through the feeding equipment.

109. Total mixed rations have gained popularity. Feed may be discharged in to troughs or onto the floor and pushed up to a feed fence by tractor. Surfaces must be impervious and clean before feed is discharged. Care must be taken not to drive soiled tractor tyres through feed, particularly if the tractor has been used to scrape out slurry or mucking out buildings. This may represent a risk of disease transmission. Further work is needed to quantify this risk.
110. On floor feeding is being advocated in sheep husbandry both in housed bedded ewes and animals at pasture. Risk assessment for this practice is needed as there may be a risk of faecal contamination of feed and thus ingestion of faecal material. Diseases that may be transmitted could include E.coli, Salmonella, mycobacterium avium ssp paratuberculosis (MAP).

New text

Ordering Medicated Feed

111. Livestock producers can only be supplied with medicated feed if they have received a prescription from their vet. Livestock farmers should contact their vet when:
 - they believe that they have a livestock health issue that requires veterinary intervention; or
 - they have previously used medicated feed and the disease has not been resolved, or a new disease outbreak has occurred.

112. Farmers should only approach feed suppliers with orders for medicated feed once they have obtained a medicated feedingstuff prescription from their vet and it is the only method of medication administration possible.

Responsible use of antimicrobial medicines

113. Antimicrobial resistance is of global concern in both human and veterinary medicine. In 2013 the Department of Health launched its 5 year antimicrobial resistance strategy⁸ which aims to slow the development and spread of antimicrobial resistance by focusing activities around 3 strategic aims.
- improve the knowledge and understanding of antimicrobial resistance;
 - conserve and steward the effectiveness of existing treatments; and
 - stimulate the development of new antibiotics, diagnostics and novel therapies.
115. Veterinary antibiotics can be prescribed and administered to livestock in medicated feed. In all cases where an antibiotic veterinary medicine is prescribed, farmers should consider reviewing the management practice of the animals in their care with a view to minimising disease and thereby reducing the amount of prescribed antibiotics. The farmer's veterinary surgeon or other appropriate qualified advisor should be able to advise on all possible means to reduce the need for antibiotic treatment of their animals in the future. The responsible use of medicines in Agriculture (RUMA) Alliance has produced information on the responsible use of antibiotics for the different livestock sectors. Of particular importance is the strict observance of withdrawal periods following use of medicated feed and the prevention of any inadvertent cross contamination. Only the amount of medicated feed needed to feed the at risk group should be prescribed and supplied at any one time. A therapeutic dose should be given and medicated feed should not be diluted with non-medicated feed risking a sub-lethal dose and development of antibiotic resistant organisms.

⁸ <https://www.gov.uk/government/publications/uk-5-year-antimicrobial-resistance-strategy-2013-to-2018>

Section 4 – Identification of Possible Hazards and Risks Associated with On-farm Feeding (paragraphs 47 to 49 of original report)

116. In order to maximise the safety of animal feed and food products, thus protecting animal health and the ultimate consumer, farmers must apply good manufacturing practice across the farming system and adopt a systematic approach to the identification, evaluation and control of hazards within their own feed production and feeding system. In evaluating their own procedures, farmers are encouraged to adopt the principles of Good Agricultural Practice (GAP)/Good Manufacturing Practice (GMP). There are various guides to GAP and GMP that can be used to identify the general hazards relating to on-farm feed production and handling. Through the application of GMP, farmers can prevent many of the possible hazards from entering into, or developing on their farms. Farmers who buy-in feed additives (except silage agents) and premixture products including medicated premixtures and mix them directly with feeds (forage, silage, haylage, cereals etc.) must comply with Annex II of the EC Feed Hygiene Regulation (183/2005) and develop written procedures which apply the principles of HACCP to such mixing operations. Alternatively, farmers mixing (bought-in) compound feed may choose to initiate a Hazard Analysis and Critical Control Point (HACCP) plan (see paragraphs 120-122 below). HACCP is most useful where hazards are known to exist on the farm and require management to ensure that they do not pose a threat to human or animal health.
117. Section III reviewed the range of on-farm mixing and feeding practices in the UK. The following list summarises the general areas of concern identified in that section:
- sourcing and selection of feedingstuffs;
 - transport;
 - receipt and handling;
 - on-farm storage;
 - manufacturing and mixing;
 - feeding practices;
 - competence and training; and
 - documentation and traceability.

118. This review has highlighted the need for farmers to consider their own farming system when identifying the key components involved in each process step. In overview, these are summarised in Annex II. Please note this Annex does not identify hazards per se; these will be dealt with subsequently.

Practices and Practical Control Measures

Hazard Analysis and Critical Control Points (HACCP) (paragraphs 50 to 51 of original report)

119. HACCP was developed in the early 1960s and in brief, HACCP is a systematic method for identifying hazards to the safety of products and for introducing controls at critical points in the process/supply chain to prevent such hazards from occurring, or for reducing them to levels below critical limits. It is not the intention of this review to describe HACCP in detail. There are a number of excellent textbooks⁹ on the subject and several food and feed industry bodies run training courses. HACCP could be part of a well-managed feed production system.
120. There are a number of hazards which, if not controlled in feedingstuffs can pose a significant risk to animal and/or human health and safety. Some hazards may not be a risk to the animals themselves but can be concentrated in the resulting human food product at a level that is unsafe to the ultimate consumer. The hazards covered by HACCP are categorised as follows:
- biological contaminants e.g. bacteria, fungi and other microbial pathogens;
 - mycotoxins;
 - prohibited processed animal proteins;
 - chemical contaminants e.g. residues of medicines, zootechnical substances, pesticides, polychlorinated biphenyls and dioxins, lead and other heavy metals, fertilisers or other chemicals; and
 - physical contaminants, e.g. soil and other foreign material (glass and metal fragments).

In addition, HACCP principles are increasingly being applied to the attainment of other feed quality aims, such as non-GM status, even though this is not necessarily a safety issue.

⁹ Codex Alimentarius – Food Hygiene Basic Texts – FAO / WHO – ISBN 92-5-104021-4
CCFRA – HACCP: A Practical Guide (Second Edition) April 1997 – ISBN 0-905942-05-01

121. Articles 6 and 7 of Regulation EC 1831/2003 lay down requirements for feed business operators concerning procedures based on the HACCP principles. These include that the FeBO puts in place, implements and maintains a permanent written procedure or procedures based on the HACCP principles. The legislation provides details of the principles.
122. The FSA was developing an on-line tool to assist FeBOs to undertake analysis of the hazards associated with the activities they undertake and develop a HACCP study which details identified hazards and the steps taken to control them. The work involves further development of an existing tool called 'MyHACCP' which the FSA has produced for food businesses which can be found at <https://myhaccp.food.gov.uk> . However, at the time of publication work on this has been put on hold following recent discussion within Europe and within Codex on HACCP approaches and the flexibilities necessary across the range of feed businesses.

Good Agricultural Practice (GAP) and Good Manufacturing Practice (GMP)

Sourcing and Selection of Feedingstuffs (amending text of paragraphs 53 to 58 of original report)

123. Through GAP and GMP, farmers can successfully avoid many of the above hazards. The following sections, read in conjunction with Annex III, are designed to illustrate the role of good practice in hazard prevention and management.

Sourcing and Selection of Feedingstuffs

124. The hazards and potential risks associated with the supply of raw materials (whether bought-in or home-produced) will vary from negligible to very serious. For example, the risk associated with purchasing a feed material from farmers or merchants who are certificated to an appropriate quality assurance scheme and therefore have assured storage and handling facilities is low. In comparison, there may be high risks associated with purchasing a feed material from a non-assured farmer or merchant who lacks technical knowledge and appropriate storage and handling facilities. In the context of this report 'assured' refers to membership of/certification to an independently audited assurance scheme.

125. Article 5(6) of EC Regulation 1831/2003 requires that FeBOs and farmers shall only source and use feed from establishments which are registered and/or approved. This is to ensure that the hazards and potential risks associated with the supply of raw materials are minimised.
126. The Committee was also concerned that farmers purchasing former foodstuffs direct from food factories or retailers should not assume that the material is necessarily safe as animal feed. Farmers should ensure that former foodstuffs are covered by an appropriate assurance scheme such as FEMAS or the appropriate module of the BRC scheme. Such products can be susceptible to spoilage e.g. mould and mycotoxin formation, and require effective removal of any packaging prior to feeding. There may also be restrictions under the TSE or ABP legislation.
127. The commercial feed industry in the UK has taken steps to ensure that feed materials and manufactured feeds are judged independently to be safe and fit as animal feedingstuffs. As a result, many merchants and compounders are already audited independently to a certificated standard embracing both GMP and HACCP. Such companies, in turn, require their suppliers to be 'assured'. Similarly, many UK livestock assurance schemes require their farmer members to purchase feedingstuffs only from assured sources. By opting to buy from assured sources, the farmer is spared the need to undertake his own in-depth checks unless he has reason to believe that the product is not sound.
128. As the commercial feed sector increasingly subscribes to assurance schemes, non-assured materials, including those produced on-farm or traded locally between farms, are the only feedingstuffs not subject to the standards of quality control expected of other parts of the industry. Improved and consistent standards of food safety should be the aim of the farming community and certification should encompass all feeds/feed materials from whatever source. There is no reason, not even on the grounds of small or irregular volumes, for anyone to be excluded from this requirement. Although the onus for demonstrating quality should be on those supplying the material, farmers should exercise particular caution when purchasing cheap or unusual feedingstuffs, including distressed materials. A number of recent food safety incidents in Europe have arisen from contaminated feed materials supplied either to farms or feed manufacturers.

129. Farmers who utilise their own products in effect become their own suppliers with all of the expectations this imposes. The farmer must apply GAP/GMP to the production, handling and storage of such materials taking care to ensure that pesticides and herbicides are used in accordance with published recommendations, and that storage facilities and equipment are cleaned and maintained appropriately. Farmers are reminded that visual inspection alone is insufficient and that some testing is necessary to demonstrate that feedingstuffs do not contain excessive levels of, for example, microbial pathogens, mycotoxins or other undesirable substances. A reputable, accredited laboratory should be used for this purpose.
130. Farmers who sell feed materials to other farmers or businesses will be required to demonstrate 'due diligence' to their customers; such farmers are likely to require membership of an appropriate farm assurance scheme.
131. E-commerce is increasingly used as a medium for buying and selling crops and other feeds. There are no additional hazards for materials traded via E-commerce, provided they come from assured sources. It is important to ascertain that products bought from outside the UK comply with EU law and recommendations in this report.

Transport (paragraphs 59 to 61 of original report)

132. Hazards that may be a risk to feed or food safety can be introduced as a result of contamination prior to arrival at the farm during transportation. Such contamination will not be eliminated simply by good management on the farm and may not be controlled by further processing through the home mix plants (e.g. materials contaminated with salmonella as a result of transport in unclean vehicles will not be effectively de-contaminated unless the feed itself is subsequently processed at a certain temperature for a specified duration or treated using organic acids). Inappropriate loads would include, for example, manure, soil, carcasses or other meat materials, domestic waste or non-food/non-feed items such as coal, glass and fertiliser. Therefore, transportation to the farm and on the farm must be tightly controlled.
133. It is imperative that equipment used to transport feeds, either to a home mixer or within the farm itself, is suitable for the purpose, has not been used previously to transport inappropriate loads, is adequately cleaned and is driven by trained personnel.

134. When the feed supplier provides the transportation, farmers should ensure that they can provide evidence of membership of the industry-wide scheme for road haulage, or request written assurance that the correct standards are applied, adhered to and maintained. Compliance with the code of practice for road haulage will provide assurance to the farmer. This code includes a full list of prohibited materials, haulage of which could pose a threat to animal or human health. There is also a list of other materials which trigger thorough cleansing after haulage. The responsibility for safe transport moves to the farmer in situations where the farmer's own vehicles are used. Farmers responsible for organising their own road haulage are advised that compliance with the code of practice for road haulage will provide them with a level of independent assurance.

Receipt and Handling

135. The farmer must check that the delivery conforms to the order and that all accompanying paperwork is correct. A visual appraisal of bulk and packaged goods should be undertaken to confirm that the product is as required and free from visible contamination. It would be in the farmer's best interests to take a sample prior to discharge for future reference and testing.
136. If the feedingstuff arriving at the farm fails visual and/or paperwork checks, then the supplier must be contacted and an appropriate course of action agreed, and rejected as necessary. Unsafe feeds must be disposed of legally.
137. The risks of spoilage or contamination will depend on the discharge facilities available on the farm and associated practices. Care should be taken to minimise feed safety risks by avoiding tipping in areas open to the elements, with vehicles and livestock movement. Preferably the raw material should be blown into a closed bin used specifically for that raw material. The risks are considerably higher for open tipping than for closed bins. When direct discharge to the final storage point is not possible, or when there is a need to move feeds to different premises, tractors fitted with front-end loaders or farm trailers may be used. This equipment should be dedicated to handling feed alone. If used for other purposes, this poses a high risk of contamination and such machinery should be cleaned thoroughly before feed use. The hazards and risks associated with the discharge and handling system must be assessed on each farm and effective control measures applied.

On-farm Storage

138. Feedingstuffs must be stored in a way to minimise any food safety risks. For example, if a feed material is stored in warm, damp conditions, the fungus *Aspergillus flavus* could develop and grow, producing Aflatoxin B₁, thus rendering the raw material both toxic and illegal for use in livestock feed. Similarly, overheating can occur where damp materials are stored in poorly ventilated conditions, resulting in elevated temperature, growth of mould, and in extreme cases, combustion.

On-farm Storage (amending text of paragraph 66 of original report)

139. Feed materials must be kept separate from each other and from other farm materials (e.g. fertiliser or other farm chemicals), and that they are clearly identifiable. Due care should be paid to the cleanliness and driving of vehicles within storage sheds. It is of critical importance that manufactured feeds (bought-in or home-produced), particularly those containing medicines or specified feed additives, do not contaminate other feed materials and vice versa, and that medicated feeds are kept separate from non-medicated feeds. Storage areas for each type of feed should be entirely separate and clearly marked, and bulk bins should be either dedicated to particular feeds or cleaned thoroughly if switching between different feeds.
140. There are many different types of storage as identified in Section III. Feed material suppliers are best equipped to advise on the most effective means of safe storage. These will vary depending largely on the moisture content of the material or feed. In the case of moist feeds, including home-produced forages, there are three key principles (in addition to the more general rules on hygiene). These are: consolidate, sheet and weigh down. By these means air is forced from the stack and excluded, thus safeguarding against undesirable fermentation and mould growth.

Manufacturing and Mixing (Amending text in paragraph 70 of original report)

141. Home mixing is a general term applied to any process by which the farmer mixes differing feedingstuffs together to form either a compound feed and/or a daily ration for the livestock. A wide range of mixing facilities is in use as mentioned in Section III, ranging from the traditional static mixing systems (similar to those used by the feed industry), more recent feeder wagons for ruminants and liquid feeding systems for pigs, to mobile mill and mixing

operations that move from farm to farm. In each case, the objectives of the mixing operation are the same:

- a) to obtain a thorough mix of all components, in the right proportions, such that there is good dispersion of nutrients and micro-elements within the feed;
- b) to avoid cross-contamination between batches of differing feeds thus preventing unwanted materials or additives in non-target feeds;
- c) to avoid contamination of feed from build-up of stale residues within the plant through regular cleaning; and
- d) to achieve a consistent product and safeguard against microbial spoilage in liquid feeds.

142. Achieving a thorough mix of the intended components relies on adding the correct amount of each ingredient and ensuring adequate mixing. This requires calibration of the weighing/addition equipment (including buckets, scoops, etc.) and mixing efficiency tests (achieved for example by testing a number of samples from the mix for salt or one of the trace elements such as manganese). Such tests should be conducted on a bi-annual basis.
143. Farmers should consider the principles of on-farm mixing for example consider the case of an approved and registered home mixer who produces a feed for growing pigs using a vitamin/trace element premixture containing a “prescription only” medicine and who also produces, using the same plant and equipment, a separate feed for finishing pigs containing a non-medicated vitamin/trace element premixture. It is very important that no trace of the medicine gets into the finishing pig feed as this would either delay slaughter (the extent of which would depend upon the specified withdrawal period of the medicine) or may leave residues in the meat for human consumption. Note that the problems arising from cross-contamination could be even higher if the farmer is producing feeds for other species, which may suffer adverse effects from the particular medicinal product used. Any such adverse effects would be highlighted on the medicinal premix label. The farmer must not only ensure correct mixing of both feeds but also prevent any of the medicine/medicated feed from contaminating the non-medicated feed.
144. Critical parts of the farm where cross-contamination could occur are:
 - a) the bagged material store where the premixtures are stored;

- b) the weighing point for premixture additions, including scoops, buckets;
 - c) the tip-in point for premixtures and other minor ingredients;
 - d) the any transfer lines i.e. conveyors to the mixer;
 - e) the mixer itself;
 - f) any subsequent transfer system for the mixed feed e.g. auger to the bulk bins or bagging-off point;
 - g) the storage facility for the finished feed i.e. bagged store or bulk bins;
and
 - h) any equipment used to move the feed to the animals.
145. Control at these critical points is vital. Annex III highlights some of the practical measures which can be taken to prevent cross-contamination. If a batch of non-medicated feed is to be produced after a medicated batch then the areas and equipment identified in paragraph 120 must be cleaned prior to manufacture. Cleaning may be achieved either by sweeping down with a clean brush or, if access is restricted or the feed plant in constant use, by “flushing” through the plant using a neutral material, e.g. ground barley. This will pick up any residues which can then be incorporated either into the medicated feed itself or stored for use in the next batch of medicated feed. Alternatively, the sequence of production can be scheduled to ensure that susceptible feed is not made too soon after the medicated feed. Where possible, facilities such as bulk bins should be dedicated to medicated or non-medicated feeds.
146. It is important to be sure that the methods adopted to prevent cross contamination throughout the plant are effective. To confirm this, samples of the non-medicated feed should be taken and sent for analysis for traces of the medicine used. If traces are found then extra cleaning, flushing or other control measures will have to be undertaken. Once the control measures have been validated, the frequency of sampling and testing can be reduced. Moist or liquid feeds will require suitable freezer/refrigeration capacity.
147. Whilst the example given in paragraphs 71-74 of the original report (now 121-122 above) refers to the use of a medicine, similar rules will apply to other specified feed additives posing a risk either to non-target species or of residues in food products.

Feeding Practices (amending paragraph 76 of original report)

148. As Section III illustrates, there are many types of feeding systems depending on the type and age of livestock and the feed materials. The aim is to ensure that each animal receives the correct quantity of the right feed. Delivering the correct quantity of feed requires maintenance and calibration of dispensing equipment, not only for automatic feeding systems but also for feed delivered by hand using buckets, or scoops. Giving animals the wrong feed can, in extreme cases, be fatal. Such a risk is highest on farms with more than one livestock species. For example, certain feed additives included in broiler feeds can be fatal if fed to turkeys and horses. Clear and unambiguous labelling of bagged feeds and bulk feeds/storage units is therefore vital. Farmers must check the labels on all purchased materials to ensure that they understand any limitations on use or contra-indications applying to the products. Sheep, for example, are highly susceptible to copper, and for this reason many other ruminant feeds containing supplemental copper are labelled 'Do not feed to sheep'. There have also been occasions when livestock have consumed the wrong feed as a result of poor penning of the animals or inadequate fencing (e.g. sheep have gained unintentional access to cattle feed and ducks and geese to ruminant feed). A further example is that of pet food which often contains processed animal proteins prohibited in farmed animal feeds. All such feeds, including those in bags, must be stored and used well separated from the feed intended for farmed animals and from access by non-target species, in such a way that prevents accidental misuse or access.
149. On all farms, regular cleaning to remove residues of earlier feeds from troughs and hoppers is essential. For example, there have been cases of mycotoxicoses in livestock which occurred as a direct consequence of them consuming old feed that had been allowed to deteriorate in troughs and hoppers. One of the main causes of tissue residues of medicinal and specified feed additives is failure to use up all of a batch of medicated feed and then, failure to empty feed bins thoroughly prior to changing to withdrawal feeds.
150. Another concern is possible contamination of feeds with manure, slurry (e.g. cattle that are floor-fed through feed barriers either side of a passage along which tractors, etc. are driven to dispense the feed in front of the livestock). Livestock cannot be kept separate from their faeces but it must be ensured that troughs and feed passages are kept clean to ensure there is no build-up of microbial pathogens.

151. Certain feed supplements, including salt licks and feed blocks, may be provided to animals at pasture where this may be deficient in essential trace elements and vitamins. Such blocks, as well as oral pastes, drenches and slow release capsules (boluses) can play an important part in meeting the animal's total nutrient requirements. However, it is important for farmers to be conscious of the total nutrient intake of their animals. For example, it is well known that copper is toxic to sheep at relatively low dietary concentrations. Less widely appreciated is that excess copper can also be toxic to cattle. Thus, cattle may be receiving copper from pasture, from home-produced or bought-in feed materials, from purchased complementary feeds (premixtures or concentrates) as well as from non-feed forms administered direct. This could lead to toxic intakes of copper and health problems for the animals. To help alleviate this issue the Committee endorsed a guidance note prepared by an industry-led group which can be viewed on the ACAF website.
152. "Top dressing" is a historic feeding practice where a premix or complementary feed was spread on top of other feed materials, commonly silage, in the feeding trough. The feed is not mixed and as a result there is a risk that some animals may consume an uneven share of the product spread on top. The VMD makes it clear to farmers that medicated premixtures (complementary feedingstuffs) must not be top dressed in this way as the practice falls outside the marketing authorisations for medicinal premixes.
153. It is a breach of the VMR if anyone promotes or labels a medicinal premixes or anything containing a medicinal premix as being suitable for top-dressing.
154. When deciding on the methods of feeding and supplementation at pasture farmers should consider the risks of disease transmission from wildlife reservoirs of infections accessing the feed such as badgers and deer and transmitting bovine TB. Use of cattle troughs by badgers (*Meles meles*): a potential route for the transmission of bovine TB. *Appl Anim Behav Sci* 80: 1–8).
155. The grazing of grass pastures and arable crops such as kale or fodder beet should be managed in such a way that possible contamination by physical, biological or chemical food safety hazards is minimised. Further advice is provided in Annex III of EC Regulation 1831/2003. For example, an adequate period should be observed before allowing livestock to graze pastures that have been treated with manure and/or between grazing rotations in order to

minimise biological cross-contamination from manure. Farmers should also ensure that required withholding periods following agricultural chemical applications (e.g. pesticides and herbicides) are observed. An additional consideration for grazing and growing crops is their proximity to factories or other industrial processes, where harmful emissions could lead to elevated levels of certain environmental pollutants, e.g. polychlorinated biphenyls and dioxins, within the surrounding soil and crops. Redundant farm machinery must be removed from animals' reach to prevent possible harm caused through leaking batteries, flaking paint, litter etc.

Competence and Training

156. Commission Regulation 183/2005 on the approval and registration of feed establishments, sets out requirements for manufacturing for placing on the market, or producing for the requirements of their own holdings, compound feedingstuffs using feed additives or premixtures containing feed additives and. Additives will be present in complementary feeds ("premixtures" or "concentrates") bought and used by the farmer. The Directive indicates that the feed manufacturer, in this case the farmer, must have sufficient staff possessing the necessary skills and qualifications. The National Farmers' Union Code of Practice for On-Farm Mixers Producing Complete Feeds for Their Own Use has provided a useful interpretation. It indicates that everyone involved in mixing animal feed must be able to demonstrate their competence, having appropriate skills to match the scale, risks and complexity of the feed mixing operation. Training should be either by practice or instruction. That apart, it is important that the farmer has access to the necessary expertise when identifying feed and food safety hazards within the business and deciding upon suitable and effective control measures. There is also guidance published by the FSA on Feed Hygiene Requirements for Farmers Mixing Feed Additives and Premixtures Directly in Feeds and Mixing Compound Feed with Additives see <http://www.food.gov.uk/sites/default/files/multimedia/pdfs/guidance/feedhygieneadditives.pdf>
157. Advice on feed and rations should be sought from a Member of the Agricultural Industries Confederation's Feed Advisor Register or the British Society of Animal Science.
158. The Defra Codes of Practice for the Control of Salmonella during storage, handling and transport of raw materials and on production of final feed for

livestock indicate that there should be sufficient personnel with the ability, training and experience necessary to ensure that the provisions of the Codes are applied. They refer to the need for clear guidance and instruction on their duties, and for training to cover not only specific tasks but also good hygiene practice and GMP generally, as well as the importance of personal hygiene.

Documentation and Traceability

159. The numerous feed-related incidents in Europe over recent years, including Foot and Mouth Disease, have highlighted the importance of traceability within the food supply chain. Without the ability to identify rapidly where animals, feed or food products have come from and gone to, it is impossible for anyone to respond quickly and effectively when problems are found within the system. The traceability of feed and feed ingredients throughout the feed chain is an essential element in ensuring feed safety. Regulation (EC) No 178/2002 contains rules to ensure the traceability of feed and feed ingredients and provides a procedure for the adoption of implementing rules applicable to specific sectors. Further requirements on traceability are included in Regulation (EC) No 1831/2003. Traceability will not be achieved without adequate and clear documentation. As far as livestock farmers are concerned, the minimum requirement will be:

- a) records of feedingstuffs purchased – date, description including ingredients, quantity, supplier, batch code for additives;
- b) records of any tests conducted on purchased feedingstuffs;
- c) details of storage e.g. main barn, bay 3;
- d) date and quantity mixed including formulation record and record of mixing sequence;
- e) records of any analyses conducted to confirm adequacy of mixing times, cleaning procedures;
- f) date fed (if different from above) and livestock details; and
- g) grazing records - dates of pasture treatments.

Section 5 – Conclusions and Recommendations

1. On-farm feeding applies to all livestock units and can carry from the feeding of a proprietary complete feed to sophisticated integrated poultry units where feed manufacturing is on a scale as large as commercial feed mills. There is also a wide diversity of feeding practices, dependent on the type and age of the livestock species, the nature of the feed materials and whether the farm operates an intensive, extensive or organic system.
2. The identification of hazards and the management of resulting risks has become an essential concept in the food chain. Farmers should apply good manufacturing practice across the farming system and adopt a systematic approach to the identification, evaluation and control of known hazards within their own feed production and feeding system. In evaluating their own procedures, farmers are encouraged to adopt the principles of GAP and GMP. The Committee recommends that all home mixers and livestock farmers implement a system based on a HACCP and/or GMP. In this way farmers who keep animals should make themselves aware of the hazards that are part of their feed sourcing, preparation, storage and use (paragraph 117). This is necessary to help avoid harm occurring either to their animals or indeed to the ultimate consumer of animal produce. Thinking through and identifying possible hazards and effective controls could be fundamental in preventing feed-related food scares. It is for this reason that future EC proposals seek to embody the HACCP approach in registration requirements for farmers and other 'feed businesses'.
3. The Committee recommends that all home mixers should have a risk assessment and control programme in place (paragraph 118). It is not the Committee's wish to prescribe how individual farmers tackle this exercise. The system chosen must be proportionate to the potential risks to animal and human health, which will be related to the types of feeds being fed, the number of livestock involved, the market outlets for those products and whether the farmer is also selling feed manufactured on-farm.
4. Annex III to this report provides a framework for farmers to identify hazards according to the potential risks they present at all stages. This could be a system categorising as high/medium/low or something more sophisticated. Some farmers may consider that they are too close to the mixing and/or feeding operation to be sufficiently analytical or objective. In these circumstances, the Committee recommends that farmers seek outside help,

from the feed industry, feed material suppliers, private consultants, assurance scheme auditors or other advisers in assessing hazards and risks on their farm. The Committee wishes to encourage use of a checklist similar to that in Annex III, although it is emphasised that this does not cover every possible source of hazard. The hazard analysis will therefore involve different factors, because all farms are different.

5. Identifying potential hazards is only the first step. It is necessary to consider the level of risk associated with each hazard, and then to apply appropriate control measures. The term 'appropriate' is used deliberately because the Committee recognises that full controls may not be economically viable. The Committee recommends that farmers undertake appropriate targeted feed analyses to demonstrate that practical control measures are working and that feeds are safe.
6. In terms of volume, large suppliers selling thousands of tonnes of feed have the potential to cause large scale feed and food safety problems; however they are often the participants in assurance schemes that aim to minimise risks. The Committee considered that smaller operators who are not members of assurance schemes, not registered with their local authority or approved by the VMD, and are likely to be less aware of hazards, are subject to fewer external controls. The Committee was also aware that several of the more recent European feed scares have resulted from the sale of feed materials and/or feed additives from relatively small operators to a wide network of farms/feed suppliers.
7. Many farmers already follow codes of practice and are members of existing livestock assurance schemes, requiring the establishment of quality assurance systems such as those developed for dairy, pigs, chicken, eggs, etc. Recognising the usefulness of such codes of practice and assurance schemes in developing quality assurance systems on farm, the Committee urges that such codes and schemes be further developed to address hazards associated with on-farm mixing and feeding practices. It also encourages farmers to participate in such codes and schemes, where available.
8. The Committee noted that the major feed, and food-linked, incidents in recent years have related to the safety of the feed materials used as animal feedingstuffs. The Committee believes that the production/sourcing, transport and receipt of feed materials must be particularly well controlled. The

Committee recommends that farmers take particular care when purchasing either new types of feed or feed material or from new suppliers, especially when the material in question is unusually cheap (paragraph 128).

9. Approximately 70% of the feed delivered to UK farms is produced by feed compounders, the vast majority of whom operate under feed assurance arrangements. The remainder is feed materials that are purchased and subsequently either fed 'straight' or are mixed or blended on-farm with home produced materials or other feeds. The Committee recommends that all materials purchased by farmers for animal feeding, should come from sources and suppliers who can demonstrate compliance with recognised quality assurance standards (paragraph 127). The Committee noted that the European Commission's proposals on feed hygiene will introduce the registration of all feed businesses, including producers of feed materials, who would be required to apply HACCP principles. The Committee supports this development (paragraph 128).
10. Some farmers, particularly those selling feed commercially, are certificated to the appropriate scheme for commercial feed manufacturers. The Committee encourages farmers selling manufactured feed to be independently assessed for compliance with an appropriate assurance scheme (paragraph 130).
11. Farmers responsible for organising their own road haulage are advised that compliance with the code of practice for road haulage will provide them with a level of independent assurance (Paragraph 134).
12. Successive feed crises have demonstrated that identifying the origin of feed is of prime importance in terms of health protection. In particular, traceability facilitates the withdrawal of feed and food that may pose a threat to human or animal health. It is therefore important to keep records that enable retrospective tracing of any subsequently discovered problems. Such problems can be identified at any point in the chain either as a result of feed or food testing or illness/death in animals and/or humans. The Committee believes that all feed materials should be traceable from point of origin through to the point of feeding to animals. The Committee recommends that farmers keep clear records enabling traceability of all purchased feed materials, additives or compound feeds used and fed on farm (paragraph 159) as demanded by legislation.

13. The Committee recognises the importance of the competence and training of those involved in on-farm feeding to the provision of a safe feeding system. The Committee recommends that everyone involved in on-farm feeding should be able to demonstrate their competence, having appropriate skills to match the scale, risks and complexity of the feed operation (Paragraph 156).

Recommendations

The Committee makes the following recommendations:

Purchasing

1. Farmers should take care when purchasing either new types of feed or feed material, or from new suppliers, especially when the material in question is abnormally cheap.
2. All materials, purchased by farmers for animal feeding, should come from sources and suppliers who can demonstrate compliance with recognised quality assurance standards and are registered as Feed Business Operators.
3. If purchasing feed materials (former foodstuffs) from food factories or retailers farmers should find out why the food has been rejected and be aware of the possible hazards to livestock.
4. Farmers should ensure that former foodstuffs are covered by an appropriate assurance scheme such as FEMAS or the appropriate module of the BRC scheme.
5. It is important to ascertain that products bought from outside the UK comply with EU law and recommendations in this report.

Transport & Storage

6. It is imperative that equipment used to transport feeds, either to a home mixer or within the farm itself, is suitable for the purpose, has not been used previously to transport inappropriate loads, is adequately cleaned and is driven by trained personnel.
7. Farmers responsible for organising their own road haulage are advised that compliance with the code of practice for road haulage (TASCC) will provide them with a level of independent assurance.

8. Feeds must be stored in a way to minimise any food safety risks and in particular the storage of moist co-products should prevent deterioration in quality, and loss.

Nutritional intake

9. It is important for farmers to be conscious of the total nutrient intake of their animals, taking advice of suitable qualified personnel and where necessary performing feed analysis.

Competency

10. Everyone involved in mixing animal feed must be able to demonstrate their competence, having appropriate skills to match the scale, risks and complexity of the feed mixing operation.
11. It is important that the farmer has access to the necessary expertise when identifying feed and food safety hazards within the business and deciding upon suitable and effective control measures.

Hazards

12. In the case of floor feeding risk assessments for this practice are needed as there may be a risk of faecal contamination of feed and thus ingestion of faecal material.
13. Farmers must apply good manufacturing practice across the farming system and adopt a systematic approach to the identification, evaluation and control of hazards within their own feed production and feeding system.
14. The hazards and risks associated with the discharge and handling system must be assessed on each farm and effective control measures applied.
15. It is important to be sure that the methods adopted to prevent any cross contamination are effective.

16. On all farms, regular cleaning to remove residues of earlier feeds from troughs and hoppers is essential.
17. When deciding on the methods of feeding and supplementation farmers should consider the risks of disease transmission from wildlife accessing the feed, such as badgers and deer transmitting bovine TB.

Hobby farmers

18. In terms of hobby farmers' consideration should be given to communication strategies to engage this sector and ensure awareness and compliance.

Section 6 – Glossary of Terms and Abbreviations (Amending and adding new definitions from original report)

| | |
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| ACAF | Advisory Committee on Animal Feedingstuffs. |
| AIC | Agricultural industries Confederation |
| Aflatoxin | One of a range of naturally occurring toxins produced by certain moulds on food and feed commodities grown in warm, humid conditions. |
| APHA | Animal and Plant Health Agency |
| Assured | Membership of/certification to an independently audited assurance scheme. |
| Auger | Metal screw for conveying feeds or feed materials. |
| Blend | A loose homogenous mixture of feed materials and other ingredients. |
| Boluses | Bullet shaped products containing soluble materials given directly to animals, which provide a slow release of additives in the animal's gut. |
| By-products | Usually by-products of food or drink manufacture which have value in their own right as feed materials (e.g. soyabean meal, brewers' grains, wheat feed). |
| BRC | British Retail Consortium |
| Codes of Practice | Guides to good practice. |
| Complementary compound feed | A compound mixture of feed materials |

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| | with a high compound feed concentration of certain nutrients (e.g. protein) which is sufficient to provide a daily ration only if fed in combination with other feedingstuffs. |
| Complete compound feed | A compound mixture of feed materials which supplies compound feed the total dietary needs of an animal (i.e. the daily ration). |
| Complete diet | Complete diet (often synonymous with Total Mixed Ration). Produced on-farm using a feeder wagon that weighs and blends forages, complementary feeds and other feed materials into a complete ration. |
| Compound feed | A mixture of feed materials, sometimes including additives, intended for feeding either as a complete or complementary feed. |
| Concentrate | term used to describe an animal feedingstuff with a high nutritional value relative to its weight. |
| Co-products | See by-products. |
| Crimped grain | Cereal grain, harvested before it is fully mature and pressed through rollers to break open the outer coat (husk). |
| DARD | Department for Agriculture and Rural Development in Northern Ireland. |
| Defra | Department for Environment, Food and Rural Affairs |

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| Dioxins | Group of closely related chemicals produced during most combustion processes and as unwanted by-products of some chemical processes. |
| Drench | Method of applying nutrients or medicines in a liquid, by passing it into the stomach through a tube. |
| Feed additive | Substances added to feed mainly to perform technological functions (e.g. binders, preservatives), sensory functions (e.g. flavours, colourants), nutritional functions (e.g. vitamins and trace elements) or to improve animal production (e.g. micro-organisms). |
| Feed blocks | Type of compound feed consisting of compressed feed materials (e.g. molasses and minerals) usually with added vitamins and trace elements and shaped in a block. Typically used as supplement for providing animals' nutritional requirements over a prolonged period of time (e.g. animals at pasture). |
| Feed materials | Any products of vegetable or animal origin, in their natural state, fresh or preserved; any products derived from the industrial processing of such products or organic or inorganic substances which are intended for oral animal feeding, either directly or in a compound feed. |
| Feed passage | An area separated from ruminant livestock by a feed barrier. Farm equipment can be driven along this |

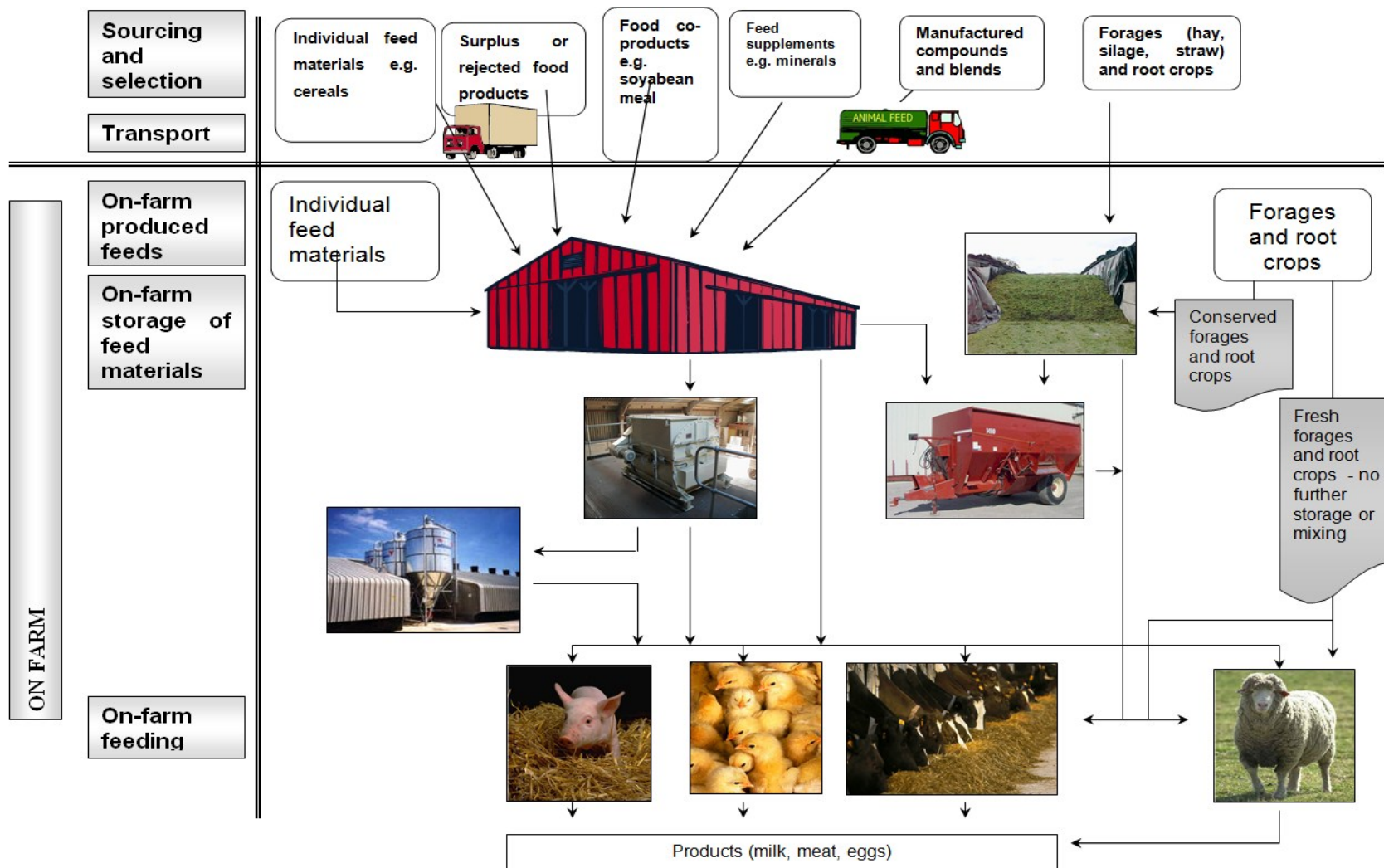
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| | passage to discharge feed which livestock can eat from behind the barrier. |
| Feed Supplements | Complementary compound feed used to supplement the ration where it is lacking in particular nutrients e.g. minerals. |
| Feeder wagon | A mixing wagon in which feed is mixed and then delivered by chute into troughs or otherwise cast in front of the penned animals, usually cattle. These wagons are generally restricted to single farm use. See complete diet. |
| FEMAS | Feed Materials Assurance Scheme |
| Forage | Sometimes referred to as roughage. High fibrous crops such as grass, grass or maize silage, hay, whole crop wheat, eaten mostly by ruminants. |
| GAP | Good Agricultural Practice. |
| GMP | Good Manufacturing Practice. |
| HACCP | Hazard Analysis and Critical Control Points. |
| Hazard | The potential to cause harm |
| Herbage | Green plant material, e.g. grass. |
| Home grown | Grown on the livestock producer's own farm. |
| Home mixer | Person who mixes feed ingredients, which may be home produced and/or purchased feeds materials, additives etc. on the premises at which they are to be fed, i.e. a person who practices on-farm |

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| | mixing. |
| Hopper | Container with a hole and dispensing mechanism at the base for storing and dispensing compound feeds. |
| Integrators | Poultry or pig producers who make their own feed, keep their own stock and run their own meat processing factory or egg packing plant |
| Licks | Liquid feeds (which may contain additives) in a dispenser which the livestock access by licking. |
| NFU | National Farmers Union |
| Meal | Fine or coarsely ground compound feed for livestock. |
| Medicated feed | A complete compound feed which is ready prepared for marketing which contains one or more veterinary products for curative or preventative action against animal disease. |
| Molasses | A dark syrup, a by-product remaining after the extraction of sugar from cane or beet. |
| Mobile mill | A lorry-mounted facility for milling grain and/or mixing and mix unit feed materials and additives. The mobility of these units means that mixtures can be tailored to meet the needs of specific livestock groups on individual farms, using the feed materials available. |
| Mycotoxins | Toxic substances which are produced by |

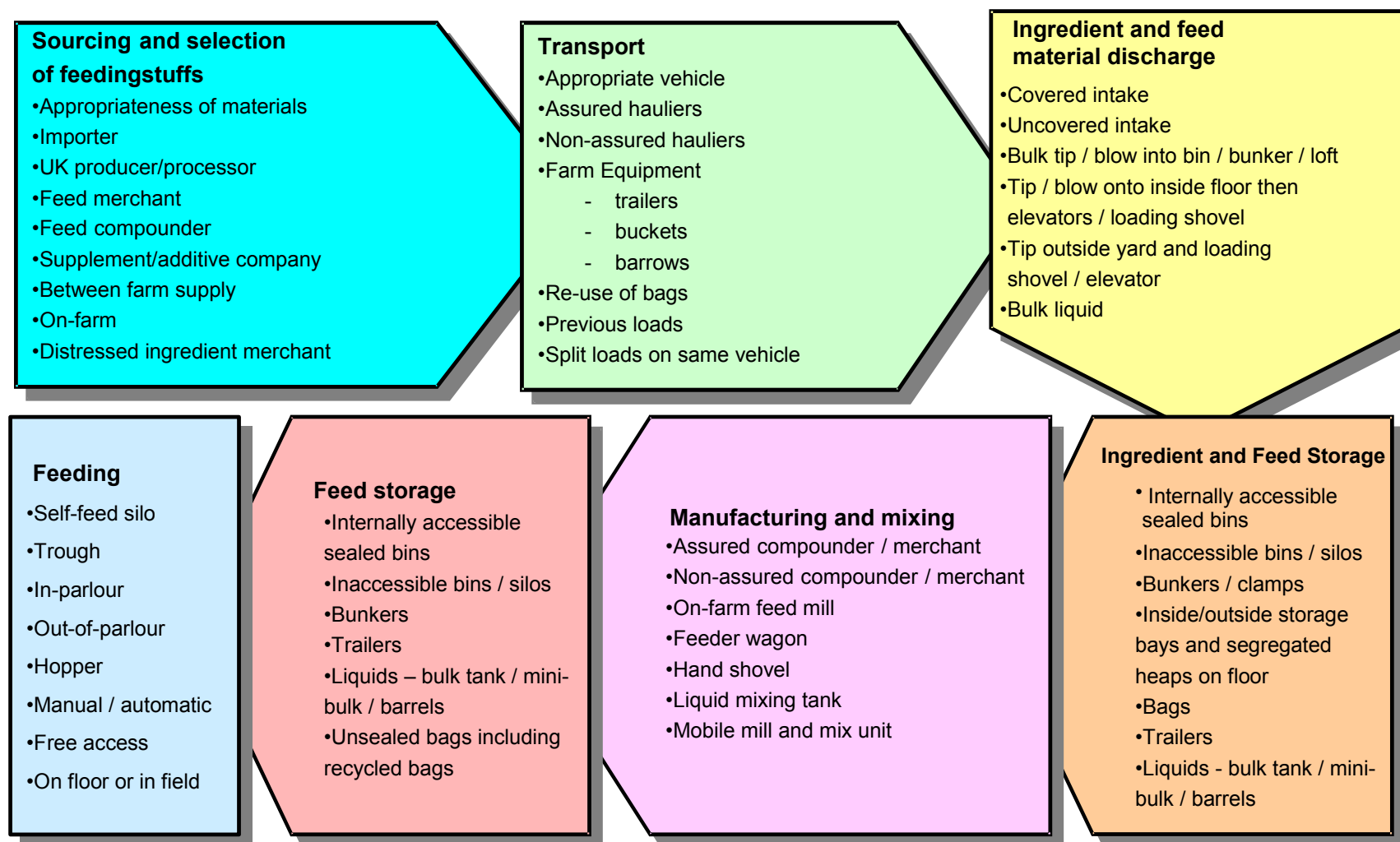
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| | certain moulds. |
| On-farm feeding | Feeding of livestock with purchased feedingstuffs and home-grown feed materials. |
| On-farm mixing | Mixing of ingredients which takes place at the same location as the livestock to which it is being fed. It may or may not include home-produced feeds. |
| Oral pastes | Method of applying nutrients in paste, applied onto the tongue of an animal. |
| PAP | Processed Animal Proteins |
| Pathogens | Micro-organisms, including viruses that cause disease. |
| Premix for medicated feedingstuffs | Any veterinary medicinal product prepared in advance with a view to the subsequent manufacture of medicated feedingstuffs |
| Premixtures | Mixture of additives, with or without a carrier, intended for mixing with feedingstuffs to produce a ration that meets the requirements of the livestock concerned. |
| Poly-chlorinated | Derivatives of biphenyl in which some of the hydrogen biphenyls atoms on the benzene rings have been replaced by (PCBs) chlorine atoms. |
| Pot ale syrup | A concentrated by-product of the primary distillation of whisky. |
| Raw materials | The same as 'feed materials' (see above).. |

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| Ruminant | A mammal e.g. cattle or sheep, possessing a rumen. The rumen is one of four 'stomachs' within which microflora aid the digestion of fibrous plant materials. |
| Silage | Ruminant feedingstuff made by the anaerobic fermentation of high-moisture forage crops (e.g. grass, maize etc.) that is stored anaerobically |
| Silo | Storage facility for silage or other feed materials. |
| Slurry | Liquid manure from livestock, stored in tanks or lagoons and used as fertilizer. |
| Specified feed additive | coccidiostats, histomonostats and non-antibiotic growth promoters. |
| TASCC | Trade Assurance Scheme for Combinable Crops. |
| Top dressing | A feeding practice whereby a pre-mix or complementary feed is spread on top of other feed materials - medicated pre-mixes cannot be top dressed – VMD has asked for definition to be clarified. |
| Total mixed ration | See complete diet |
| UFAS | Universal Feed Assurance Scheme. |
| UKFFPA | United Kingdom Former Foodstuffs Processors Association |
| VMD | Veterinary Medicines Directorate. |
| Zootechnical feed additive | Quasi-medicinal substances such as certain growth feed additive promoters. |

Annex I - Flow Diagram Illustrating the Sourcing, Storage and Mixing of Animal Feeds



Annex II - On-farm mixing Chart to Aid On-farm Identification of Key Components Involved in Each Major Process Step¹⁰



¹⁰ (N.B. This is not an exhaustive list; e.g. large mills will have many more process steps)

Annex III – Identifying Hazards Associated with On-farm Feeding and Relevant Control Measures

This table is not intended to be an exhaustive list of all hazards to be found on-farm

N.B. Please read down columns, not across

| Process Step | Possible Hazards and/or Quality Failures | Control measures | Control limits | Monitoring procedures | Corrective action |
|---|--|--|--|---|---|
| 1. Sourcing and selection of feedingstuffs | <p>Product out-of-specification due to incorrect processing or manufacture or poor ingredient selection.</p> <p>Mould and microbial spoilage due to poor harvesting and / or storage conditions e.g. fusarium (pink), ergot.</p> <p>Contamination with other materials during handling or storage.</p> <p>Ingredients containing undesirable substances or other unwanted contaminants such as pesticide residues, heavy metals, etc. which can endanger animal health or, because of their presence in livestock products, human health, as listed in Schedule 7 of the</p> | <p>Purchase from assured suppliers and/or membership of a suitable assurance scheme (e.g. UFAS/TASCC/ACCS).</p> <p>Contractual terms and obligations.</p> <p>Obtain written warranty from non-assured suppliers.</p> <p>Ensure non-assured suppliers work within current legal limits and have a monitoring system in place.</p> <p>Ensure non-assured producers have suitable storage facilities.</p> | <p>Products pass visual inspection.</p> <p>If necessary test samples for/or request proof of compliance with legal limits for undesirable substances.</p> <p>Zero for prohibited substances.</p> | <p>Check paperwork confirms assured status.</p> <p>Ensure warranty updated at least annually.</p> <p>Check paperwork for compliance with legal limits e.g. grain passports.</p> | <p>Reject unsatisfactory/contaminated product or notify supplier that product accepted but not satisfactory for the future.</p> <p>Legal disposal of contaminated feed. If necessary change supplier.</p> |

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| | Feedingstuffs Regulations 2000 (as amended). | | | | |
| 2. Transport | <ul style="list-style-type: none"> • Contamination of bulk deliveries from previous loads due to inadequate cleanout. • Contamination within split loads. • Spoilage (due to unsheeted loads exposed to rain, vermin, birds). • Broken bags leading to product spoilage. • Use of dirty farm vehicles. | <ul style="list-style-type: none"> • Purchase from assured suppliers/hauliers. • Insist that lorries carry details of the previous 3 loads and have evidence of cleanout between loads. Obtain written assurances. • Use dedicated farm vehicles or undertake regular and thorough cleaning. | <ul style="list-style-type: none"> • Issue list of prohibited materials to non-assured suppliers/hauliers. | <ul style="list-style-type: none"> • Check paperwork to confirm previous 3 loads and/or assured status. • Check lorry adequately sheeted/covered to protect against rain or bird droppings. | <ul style="list-style-type: none"> • Reject loads visibly spoiled or notify supplier that product accepted but not satisfactory for the future. • If necessary, change haulier or vehicle. |
| 3. Receipt and Handling | <ul style="list-style-type: none"> • Exposure to elements (wind, rain). • Exposure to other contaminants such as debris, farmyard manure, chemicals, other feed materials. | <ul style="list-style-type: none"> • Discharge facilities should be clean and preferably covered. Co-mingling with other materials should be prevented. | Facilities (floors, bays, bins, silos) must be clean prior to receipt. | <ul style="list-style-type: none"> • Visual assessment by staff and cleanout as necessary. • Maintain records of cleaning schedules. | <ul style="list-style-type: none"> • Arrange temporary storage while area/bin is cleaned out. |
| 4. On-Farm Storage of Feed Materials and Mixed Feeds | <ul style="list-style-type: none"> • Exposure to rain and/or damp conditions. • Spoilage due to condensation and mould growth. • Access by rodents, birds, cats and other pests. • Cross contamination with other feed | <ul style="list-style-type: none"> • Weatherproof storage facilities. • Pest control procedures in place. • Effective segregation of different feed materials, mixed feeds and feed materials, and of mixed feeds particularly when stored on floors. | <ul style="list-style-type: none"> • All reasonable steps to prevent any type of contamination or deterioration. | <ul style="list-style-type: none"> • Storage areas checked by staff before filling to ensure clean and suitable. • Regular checks to ensure that any leaks/loss of containment are controlled. | <ul style="list-style-type: none"> • Reject and dispose of any spoiled or contaminated feedingstuffs posing a threat to animal or human health. • Assess safety implications of any admixture of feedingstuffs and handle appropriately. |

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| | ingredients <ul style="list-style-type: none"> • Contamination with other non-feed materials such as chemicals, fertilisers. • Air spoilage of moist feeds due to inadequate sheeting of clamps. • Contamination of mixed feeds with unprocessed feed materials. • Deterioration of feed materials due to poor stock rotation. • Feeds for different species and medicated and unmedicated feeds not adequately segregated. • Exposure to chemicals used for storage of silage and moist grains. | <ul style="list-style-type: none"> • Cleanout procedures between different types of feed. • Pest control programme. • Separate storage areas for feed and non-feed materials. • Proper stock rotation. • Effective consolidation and sheeting of clamped forages. • Cleaning of vehicles before entering storage area. | | | |
| 5. Feed Manufacture and Mixing | <ul style="list-style-type: none"> • Poor performance/ill health due to unsuitable feed design/formulation. • Variable performance and health due to: <ol style="list-style-type: none"> a) incorrect addition or weighing resulting in over and/or under supply of nutrients; b) incorrect feed formulation; | <ul style="list-style-type: none"> • Feed formulations produced/checked by someone with appropriate knowledge or skills. • Operators suitably trained. • Regular cleaning, maintenance and calibration of weighing, metering and mixing equipment. | <ul style="list-style-type: none"> • Feeds manufactured to intended formulation. • Feeds conform to expected (defined) physical, chemical and microbiological quality specifications. | <ul style="list-style-type: none"> • Records of actual additions checked against formulation targets. Understand the risks associated with various additives, read labels! • Sequence of mixing checked against intended sequence. • Cleaning, maintenance and | <ul style="list-style-type: none"> • Isolate any suspect batches pending analysis/investigation. • Dispose of any mixes posing a threat to animal or human health or likely to lead to unacceptable residues in animal products, e.g. feeds containing hazardous levels of veterinary drugs, |

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| | <p>c) inappropriate mixing time leading to variable nutrient supply to stock.</p> <ul style="list-style-type: none"> • Possible residues in animal products due to cross-contamination between batches leading to non-target animals consuming additives not licensed for those animals. • Health problems due to contamination e.g. microbial spoilage due to dirty plant. • Digestive upsets due to microbial contamination in liquid feeding systems. • Exposure to chemicals used in processing cereal grains. | <ul style="list-style-type: none"> • Annual mixer test and routine sampling and testing of feeds. • Records of intended and actual mixes. • Cleanout procedure between batches (may vary with mixer type) and validated cross-contamination control. • Appropriate mixing schedule. | | <p>calibration records checked against schedules.</p> <ul style="list-style-type: none"> • Samples of feed materials and mixes kept for defined period. A proportion to be tested and checked against formulation targets. | <p>contaminants, pathogens.</p> <ul style="list-style-type: none"> • Review procedures in the event of systematic failures. |
| 7. Feeding | <ul style="list-style-type: none"> • Performance and health problems (and possible death) due to stock being fed the wrong feed. • Stock over or under fed due to incorrect feed allocation. • Health problems (e.g. salmonella) as a result of unclean feeding facilities or contaminated | <ul style="list-style-type: none"> • Feeds clearly labelled and warnings where risks are high (e.g. medicated feeds). • Stock provided with adequate feeding space and clean water. • Maintenance and calibration of rationing tools e.g. weight of full bucket/scoop; and | <ul style="list-style-type: none"> • Action required if problems visible. | <ul style="list-style-type: none"> • Hoppers, troughs and floors clean prior to new feed deliveries and before new livestock placements. • Bagged and bulk feed clearly labelled to prevent confusion. • Records of grazing rotations. • Regular checks on non-mains water supplies and records | <ul style="list-style-type: none"> • Seek advice, if necessary, whenever stock gain access to the incorrect feed. Read relevant labels. • Seek veterinary or nutritional advice if animals show signs of ill health. • Isolate feed as appropriate. |

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| | <p>pastures.</p> <ul style="list-style-type: none">• Health problems due to 'old' feed residues in bins, hoppers, troughs as a result of disease transference.• Unclean or insufficient water leading to performance problems. | <p>other automated equipment.</p> <ul style="list-style-type: none">• Regular cleaning of feed hoppers, troughs and floors to prevent build-up of stale feed and other residues.• For grazing animals, use of grazing rotations to minimise manure contamination, parasite build-up. | | <p>to show that system is cleaned and maintained.</p> | |
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Annex IV – Legislative Controls

(The position as at December 2015)

Introduction

1. There are two main aspects of on farm feed which are controlled by legislation:
 - requirements for feed which the farmer has purchased or otherwise brought onto the farm; and
 - requirements covering the feed which the farmer has mixed.
2. The relevant legislation is found in Part IV of the Agriculture Act 1970 and in Regulations made under that Act and the European Communities Act 1972. Most of the controls implement EU measures.

Purchased Feed

3. The principal controls are set out in the Feed Additives Regulations (1831/2003), Feed Hygiene Regulations (183/2005), Marketing and Use of Feed Regulations (767/2009), and Undesirable substances in animal feed Directive (2002/32) . Purchased feed may be:
 - in the form of feed materials, which are mainly single ingredient products, and which may be fed directly to animals, or be mixed together, or mixed with materials produced on the farm itself (e.g. silage);
 - in the form of a compound feed which is a manufactured feed containing a mixture of feed materials. Compound feeds may be mixed and fed with other materials.
4. The legal obligations for purchased feed rests with the seller to the farmer, together with any manufacturer/importer/intermediary.
5. There are requirements in the Agriculture Act that the feed must be accompanied by information about its nature, substance or quality, together with safety information about correct storage, handling or use.

6. It is illegal to sell to the farmer, for use as a feed, any product which contains any ingredient deleterious to the animal, or to humans through consumption of animal products. Deleterious means harmful. As well as this general prohibition there is also a short list of materials specified in the Marketing and Use of Feed Regulations which are prohibited from use in compound feeds. The list includes such things as faeces, sawdust treated with wood protection products and waste water. However, the ban on the use of processed animal protein which includes mammalian meat and bone meal, is contained in animal health legislation.
7. It is illegal to use a feed containing prohibited substances. There is a defence, if the farmer can show all reasonable precautions were taken and due diligence exercised to avoid such feed being used.
8. The Undesirable Substances Directive also contain maximum permitted limits in feed for a range of undesirable substances (contaminants). These include heavy metals (lead, arsenic) and aflatoxin. Selling feed contravening this requirement to the farmer, or use by the farmer, can lead to legal proceedings. The same defence is available as in the case of prohibited substances.
9. A section in the Agriculture Act makes it illegal to sell to the farmer any material for use as a feed which is found to be unwholesome or dangerous to the animal, or to humans through consumption of animal products.
10. There is also a requirement that all feed materials sold shall be sound, genuine and of merchantable quality.
11. In the case of feeds and feed materials sold to the farmer, the enforcement officer has the power to enter the premises and take samples of the material for analysis. The seller is liable for anything found to be wrong with the feed. The inspector also has the power to inspect and sample any other product used for feed. The samples can be tested for any of the prohibited materials or levels of undesirable substances. In case of an illegal finding the farmer could face legal proceedings. In these circumstances the farmer will be expected to have taken steps to ensure compliance (possibly having tests carried).

On-farm mixing

12. Where the farmer mixes feed materials together (with or without compound feed), to produce feed for the animals, control is on the ingredient materials as described above.

(Amending paragraphs 13, 14, 15(i), 15 (ii) of original report)

13. If however, the farmer mixes into the feed materials, medicines or specified feed additives, then the premises needs to be approved by the VMD for this activity. The premises must also be approved or registered if compound feeds containing these or any additives are mixed.
14. The requirement for premises to be approved or registered for these mixing activities with regard to certain feed additives is found in Article 10 of Regulation (EC) No. 1831/2003 on feed hygiene. As regards veterinary medicines, the requirements are currently contained in the Veterinary Medicines Regulations 2013, which implement Directive 90/167 into UK law. There are also separate registration requirements under the TSE Regulations for using certain derogated protein products to mix in non-ruminant feed.
15. The activities that require farm premises to be either approved or registered can be conveniently divided into two categories as follows:
 - (a) on-farm mixers wanting to incorporate medicinal premixes or specified feed additives into feed –either directly or via premixtures or complementary feedingstuffs. These must be approved by the VMD in order to do so.
 - (b) those farms which are only using non-zootechnical additives (e.g. vitamins and trace elements). These may only be mixed into final feeds on premises registered with the local authority and subject to inspection by their inspectors. Some of these will already be in premixtures or complementary feeds.
16. Farms where new activities requiring approval are to be carried out must obtain that approval before the activity is commenced. Farms requiring registration for the activities they carry out must make a written declaration that the methods of producing feeds comply with the quality assurance requirements laid down in the Directive. Registered farms will then be included in a rolling inspection programme where the systems in place are checked against the Directive requirements.

Quality Control Requirements.

17. Council Directive 95/69/EC established the conditions and arrangements applicable to certain categories of establishments and intermediaries in the animal feed sector, to enable them to exercise their activities. That Directive also established conditions for the approval of establishments producing certain substances listed in Council Directive 82/471/EEC of 30 June 1982 concerning certain products used in animal nutrition. Under the EU Feed Hygiene Regulation (183/2005), there is a system for the approval and registration of feed business establishments (premises) that manufacture, market, distribute or use animal feeds, including feed additives. Whilst Regulation 183/2005 formally repealed Directive 95/69/EC certain provisions of that Directive continue to be relevant pending further provisions being put in place by the Commission.

Animal by-products legislation (amending paragraphs 20-24 of original report)

18. The requirements for the use and disposal of animal by-products are found in EU Animal By-Products (ABP) Regulations (EC) No 1069/2009 & 142/2011. The implementing domestic legislation is the Animal By-products (Enforcement) (England) Regulations 2013, with parallel legislation being applicable in Scotland, Wales and N. Ireland.

19. The ABP Regulations categorise animal by-products into three categories:

- category 1 - e.g. carcasses of BSE suspects, Specified Risk Material (SRM), ruminant carcasses from which SRM has not been removed at the time of disposal; catering waste from means of transport operating internationally (i.e. which has come from outside the EU);
- category 2 - e.g. carcasses of animals with diseases other than BSE, carcasses of animals which were not slaughtered for human consumption (including such ruminant carcasses where the SRM has been removed), manure and gut contents etc.; and
- category 3 - material fit for human consumption. This includes products of animal origin or foodstuffs containing products of animal origin that are no longer intended for human consumption for commercial reasons or due to manufacturing or packaging defects that do not pose a risk to public or animal health.

20. The ABP Regulations then determine how each category can be treated, used and disposed of, according to risk.

21. The main provisions of the ABP Regulations relating to feed for farm animals include:

- only Category 3 material can be used in feed for farm animals and then only after satisfactory processing in an approved ABP plant and subject to further controls within the ABP Regulations and the Transmissible Spongiform Encephalopathies (TSE) Regulations.
 - processed material of Category 3 origin (low risk material fit, but not intended, for human consumption) is generally called processed animal protein, except where this involves products such as milk, milk products, eggs, egg products, blood products, hydrolysed proteins, dicalcium and tricalcium phosphate, gelatine, collagen, etc.;
 - specific requirements for the processing or treatment of certain derived products or processed animal proteins, which may be used in farm animal feed, under circumstances dictated by the controls in both the TSE and ABP Regulations are included in the regulations for processed animal proteins; blood products; rendered fats and fish oils; milk, colostrum and their products; gelatine & hydrolysed proteins; dicalcium phosphate of animal origin; tricalcium phosphate of animal origin; collagen and egg products;
 - the feeding of farmed animals with catering waste or feed material containing catering waste is prohibited this includes waste from domestic kitchens ('kitchen scraps');
 - the feeding of terrestrial animals (other than fur animals) with processed animal protein derived from the bodies or parts of animals of the same species is prohibited;
 - the feeding of farmed fish with processed animal protein derived from the bodies or parts of bodies of farmed fish of the same species is prohibited; and
 - the feeding of farmed animals with herbage, either directly by grazing or by feeding cut herbage, from land to which organic fertilisers or soil improvers, other than manure, have been applied is prohibited unless the cutting or grazing takes place after the expiry of a waiting period which ensures adequate controls of risks to public and animal health and is at least 21 days (60 days in the UK for pigs).

22. Catering waste is defined as: 'all waste food, including cooking oil originating in restaurants, catering facilities and kitchens, including central kitchens and household kitchens'. The ban on feeding catering waste includes both cooked and uncooked foods and applies whether or not any of these have come into contact with meat or meat products.

23. Kitchen scraps cannot be fed to animal. Kitchen scraps are every item of food that come from the domestic kitchens including non-meat based materials such as vegetable peelings. However, vegetable material originating outside the kitchen, which has not entered the kitchen, and which has not come into contact with material of animal origin in a dwelling house e.g. vegetables grown in domestic gardens may be fed.

24. Bakery products (such as bread, cakes, pastry, biscuits), pasta, chocolate, sweets and similar products such as breakfast cereals can be used in feed for farm animals, which:

- have undergone processing as defined in Article 2 (1)(m) of Regulation (EC) No. 853/2004 (Hygiene of Foodstuffs) or in accordance with the Implementing Regulation. Under the Hygiene of Foodstuffs Regulation, 'processing' means any action that substantially alters the initial product, including heating, smoking, curing, maturing, drying, marinating, extraction, extrusion or a combination of those processes;
- is composed of or contain one of the following Category 3 foodstuffs no longer intended for human consumption: milk, milk-based products, milk-derived products, eggs, egg products, honey, rendered fats, collagen and/or gelatine of non-ruminant origin. Foodstuffs containing rennet can also be used; and
- do not contain, and have not been in contact with raw eggs, meat, fish, and products or preparations derived from or incorporating meat or fish.

25. In addition, all necessary precautions must have been taken to prevent contamination of the material with products not eligible for feed use, such as meat, fish and products containing them.

Transmissible Spongiform Encephalopathies Legislation (Amending paragraphs 25-29 of original report)

26. The Community-wide TSE Regulation (999/2001), which came into force on 1 July 2001, aimed to provide a secure legal basis for the full range of Community measures against Transmissible Spongiform Encephalopathies (TSEs). Most of its provisions, including transitional measures relating to it were already in force under UK legislation, but for the sake of clarity and completeness, most existing TSE-related legislation was consolidated into one set of Regulations, adjusting the requirements where necessary to take into account EC and national measures.

27. The regulation and controls have evolved during the period since then. A recent regulatory change has seen a relaxation to enable the use of non-ruminant processed animal protein in feed for aquaculture animals, in line with the stated goal of the TSE Roadmap 2, a strategy paper produced by the EU for TSEs for the period 2010-2015, “to review certain measures of the current total feed ban, when certain conditions are met”.
28. The domestic implementing regulations in the UK are the Transmissible Spongiform Encephalopathies (England) Regulations 2010 and equivalent regulations in Scotland, Wales, and Northern Ireland.
29. There are Guidance Notes available for the Animal Feeding section of the Regulations on the feed ban section of the Defra BSE web site at:
<http://www.defra.gov.uk/ahvla-en/files/AG-ABP-01.pdf>.
30. Listed below is a summary of the current EU controls.
31. Ruminant and non-ruminant farmed animals must not be fed the following prohibited derived products, either directly or in feed:
- processed animal protein (with specific exemptions); and
 - collagen and gelatine from ruminants, e.g. beef gelatine (including in surplus food).
32. Ruminants must not be fed any animal protein - or any feedingstuff which contains animal protein - except the following permitted proteins (also permitted for non-ruminant feed), when sourced and processed in accordance with the Animal By-Product (ABP) Regulations:
- milk, milk-based products and colostrum;
 - eggs & egg products;
 - collagen & gelatine derived from non-ruminants;
 - hydrolysed proteins derived from parts of non-ruminants or from ruminant hides and skins; and
 - fishmeal is permitted only for use in milk replacer powder for feeding to unweaned ruminants in liquid form but it must not be fed to weaned ruminants.

33. The following derived products may be used for feeding to non-ruminant farmed animals only, subject to authorisation requirements:

- fishmeal;
- blood products from non-ruminants;
- dicalcium phosphate and tricalcium phosphate of animal origin. (Mineral-derived versions are permitted for all livestock and are the most commonly used – feed labels not specifying ‘animal origin’ can be taken to be of mineral origin); and
- processed animal protein derived from non-ruminants may be used for feeding aquaculture animals. Aquaculture animals means any ‘aquatic animal’ at all its life stages, including eggs and sperm/gametes, reared in a farm or mollusc farming area, including any aquatic animal from the wild intended for a farm or mollusc farming area. ‘Aquatic animal’ is also defined in the ABP Regulation and includes specified species of fish and shellfish.

Future Legislation (New paragraph after paragraph 31 of original report)

Official Feed and Food Controls

34. The Commission published a proposal in March 2013 to update the Regulation on Official Feed and Food Controls. Official controls are those activities undertaken by Member States and their designated enforcement authorities for verifying compliance of businesses with feed and food legislation (e.g. inspections and sampling and analysis). The aim of the proposal is to create a more comprehensive and integrated approach for control systems across the agri-food chain by expanding the scope of the current Regulation to include plant health, plant reproductive materials and plant protection products. The proposal also includes plans to extend the scope of mandatory charging to cover all official controls with exemptions in place for micro-businesses.

35. At the time of publication negotiations are ongoing. Transition periods for any significant changes to the current rules will be 3 years from the date the new Regulation comes into force.

Regulation on the production, placing on the market and use of medicated feed and repealing Directive 90/167/EEC

36. In September 2014, the European Commission adopted a pair of proposals on veterinary medicinal products and medicated feed.

37. The proposed medicated feed Regulation will repeal and substitute the outdated Directive (90/167/EEC) on the manufacture, placing on the market and use of medicated feed. Medicated feed is an important route for administering veterinary medicines to animals. The new proposal aims to harmonise the production standards and marketing of medicated feed in the EU at an appropriate safety level, and to reflect technical and scientific progress in this area.
38. The proposed rules will continue to ensure that medicated feed can only be manufactured from specifically authorised veterinary medicines and by approved manufacturers. AMR will be tackled through a number of measures such as limiting the amount of medicated feed that can be supplied at any one time, introducing strict limits of carry-over from a batch of medicated feed to a batch of non-medicated feed and the length of time a medicated feed prescription will be valid for.
39. The scope of the proposal explicitly includes medicated feed for pets, so that pets – especially those with chronic diseases, can be treated more easily with innovative medicated pet food.

Annex V - Feed Materials

Forages

1. Forages consist predominantly of grass-derived material fed either in its fresh state as grazed grass or preserved as silage or hay. The use of forage maize, ensiled to produce maize silage, has increased steadily in recent years and now accounts for about 10% of all silage made (expressed on a dry matter basis). There has also been an increase in the amount of whole-crop cereals, cut at an immature stage and ensiled prior to feeding.
2. Although widely diverse in their composition and nutritional value, a characteristic of forages is their relatively high fibre content. This makes them unsuitable as feed for non-ruminants because the fibre is largely indigestible, but they are a major source – and in some situations the only source – of essential nutrients for ruminants.

Origin

3. Almost all forages are fed on the farm where they are grown. Exceptions to this are grass hay, artificially dried grass and cereal straws, which may be traded and transported many miles from the farms on which they are grown to where they are used.

The Use of Forages On-farm

4. There are two major objectives in making hay or grass silage. The first is to remove excess herbage from pasture following its rapid growth in the spring, thereby allowing the land to be grazed subsequently without wastage of surplus grass. The second objective is to conserve the material in such a way that it provides a relatively low cost but nutritious feed for cattle and sheep when grass is not available. To produce grass hay, it is necessary to reduce the moisture content to <16% to avoid mould development during storage. Difficulties in achieving this consistently under UK conditions, coupled with improvements in silage making, have seen a reduction in the amount of hay produced in favour of grass silage. To ensure a stable fermentation, the grass is stored in clamps or bags and sealed with plastic sheeting to maintain anaerobic conditions. To improve fermentation, an additive may be applied at the time of harvest. The majority of additives consist of acids or acid salts, enzymes or bacteria.
5. For low-production stock, e.g. non-lactating dairy cows and store cattle and sheep, forages may be the sole feed provided. In most situations, forages – either as fresh or conserved – can provide all the nutrients required. In some areas of the country grass may be deficient in certain trace elements, and the deficiency may be remedied by providing the necessary nutrients as in the

form of supplementary concentrate feeds, feed blocks or licks, or with the use of rumen boluses.

6. When the quality of the forage, or the amount available, is insufficient to meet the nutritional requirements of more productive stock, additional forages or supplementary concentrate feeds may be given, the latter in the form of straights, blends or compound feeds. For animals that are at grass, concentrates are usually fed as discrete meals (e.g. in the parlour at milking time for lactating animals, in troughs for housed animals or in the fields for grazing cattle and sheep). For cattle and sheep on silage-based diets, concentrate feeds may also be fed as discrete meals, although there is increasing trend towards mixing silages and concentrate feeds.

Concentrate feeds

7. Concentrate feeds are derived from cereals or by-products (co-products) which mainly originate from different processes in the human food industry. Despite large differences between them in their form, composition and nutritional value, they share a common origin in that many of them are derived from high quality raw materials that have been selected to meet the demands of human food production or industrial processes. The majority are derived from traditional industries such as brewing, baking, sugar extraction, cereal processing and cheese making, and have been used as feeds for livestock for many years. Others are derived from newer industries, including the production of convenience food and drinks.

Origin

8. Many by-products of the human food processing industries are traded on a global basis. As a result, feeds originating from as far afield as Asia including the Indian sub-continent, Africa and North and South America are used on UK farms. Most of these will be low moisture feeds. Largely due to costs of transport and storage, most of the high moisture feed are produced in the UK or EU, although cane molasses is a notable exception.

The Use of Co-products On-farm

9. Co-products make a major contribution to meeting the energy, protein, mineral and vitamin requirements of farm livestock. A number of them also have particular characteristics, such that their inclusion in the diets of livestock can result in improvements in feed intake, feed utilisation or the composition of the milk, meat or eggs being produced. Their use as animal feeds also obviates the need to dispose of these products in other ways, e.g. to landfill with consequent environmental benefits.
10. While some of these feeds are the result of complex processing others (such as vegetable by-products) undergo little or no processing. The way in which

these feeds are used is largely determined by their nutritional value, moisture content, storage characteristics and consistency of supply and composition.

11. Many of the low moisture feeds, and in particular those derived from cereals, oilseeds and sugar processing industries, have very high nutritional value and consistent composition. They are widely used in agriculture, both in the manufacture of compound feeds and blends, and for feeding to livestock directly. Soya bean and rapeseed meals are the major sources of protein for both ruminants and non-ruminants (pig and poultry). Co-products such as maize gluten feed and molassed sugar beet pulp are staple feeds in many ruminant livestock production systems, and may be the only 'concentrate' feed used to supplement home-grown forages for some cattle and sheep.
12. Feeds originating from confectionery, bakery and bread products typically consist of rejected material (e.g. misshapen and broken biscuits and confectionery, or foods that have passed their 'sell by' date) or material produced as a result of over-production. Because these products frequently originate from more than one production line or manufacturer, and in varying proportions, their composition can be highly variable. They generally consist of flour, sugars, oil and flavouring and therefore are both highly nutritious and palatable. These products may be dried for use (at inclusion levels that would not normally exceed 5-8%) in the manufacture of compound feeds, or fed directly to livestock either as single feeds or mixed with other concentrates as total mixed rations.
13. The co-products of vegetable processing are predominantly used for ruminants and pigs, and to minimise costs of transport and storage tend to be used on farms within close proximity of their production. They may be fed as single feeds or mixed on-farm with other feeds to produce total mixed rations. Because the composition and feed value can be highly variable, they are generally fed to less productive stock.
14. Liquid feeds (e.g. molasses, pot ale syrup, by-products of cheese manufacture) are syrups which have generally been concentrated by a process of evaporation. On farm, they may be fed directly to stock, or included in total mixed rations of forages and concentrates. Cane molasses in particular is widely used in the production of compound feeds, where it both provides nutrients and enhances palatability. Because of the nature of the product, inclusion rates do not normally exceed 10%.
15. The majority of high moisture and liquid feeds will be fed to livestock on farm. They are most suitable for feeding to ruminants or in wet feeding systems for pigs.

Quality Control in the Use of By-products as Feeds for Livestock

16. Legislation and codes of practice related to the use of feeds on farms are described in the main report and Annex V.
17. In addition to legislative controls, a number of Codes of Practice for the manufacture, transport, storage and handling of feed materials and compound feeds have been, or are being developed in the UK and the EU. At farm level, Codes of Practice for the safe storage, handling and feeding of feed materials have been published. Examples of these (although not an exhaustive list) are the NFU Code of Practice for On-Farm Mixers Producing Finished Feeds, National Dairy Farm Assured Scheme for milk producers, Lion Quality Code of Practice for egg producers, UK Register of Organic Food Standards (amended 2000) and Soil Association Scheme for organic farmers. Defra have issued a Code of Practice for the control of salmonella on farms. In addition to these, a number of Quality Assurance Schemes have been introduced by supermarkets and other organisations e. g. Freedom Food (RSPCA), Farm Assured British Beef and Lamb, Farm Assured British Pigs.

Annex VI - Useful reference documentation produced by ACAF

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| Regulation (EC) No 1069/2009 of the European Parliament and of the Council laying down health rules as regards animal by-products and derived products not intended for human consumption and repealing Regulation (EC) No 1774/2002 (Animal by-products Regulation) | http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:300:0001:0033:EN:PDF |
| Regulation (EC) No 183/2005 Of The European Parliament and of the Council laying down requirements for feed hygiene | http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2005:035:0001:0022:EN:PDF |
| Regulation (EC) No 2160/2003 Of The European Parliament And Of The Council on the control of salmonella and other specified food-borne zoonotic agents | http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:325:0001:0015:EN:PDF |
| Commission Regulation (EU) No 51/2013 amending Regulation (EC) No 152/2009 as regards the methods of analysis for the determination of constituents of animal origin for the official control of feed | http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:020:0033:0043:EN:PDF |
| Regulation (EC) No 767/2009 of the European Parliament and of the Council on the placing on the market and use of feed | http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:229:0001:0028:EN:PDF |

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| Regulation (EC) No 852/2004 of the European Parliament and of the Council on the hygiene of foodstuffs | http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2004:139:0001:0054:en:PDF |
| Regulation (EC) No 882/2004 of the European Parliament and of the Council on official controls performed to ensure the verification of compliance with feed and food law, animal health and animal welfare rules | http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2004:165:0001:0141:EN:PDF |
| Council Directive 90/167/EEC laying down the conditions governing the preparation, placing on the market and use of medicated feedingstuffs in the Community | http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31990L0167&from=en |
| Regulation (EC) No. 999/2001 laying down rules for the prevention, control and eradication of certain transmissible spongiform encephalopathies. | http://ec.europa.eu/food/fs/bse/bse36_en.pdf |
| Advisory Committee on Animal Feedingstuffs | http://acaf.food.gov.uk/ |
| Agriculture in UK 2013 | https://www.gov.uk/government/collections/agriculture-in-the-united-kingdom |
| Agriculture in UK 2013 | https://www.gov.uk/government/statistics/agriculture-in-the-united-kingdom-2013 |
| Animal Plant Health Agency - guidance note on feed controls in the transmissible | https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/398007/TSE-feed- |

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| spongiform encephalopathies regulations | controls.pdf |
| APHA | https://www.gov.uk/government/organisations/animal-and-plant-health-agency |
| British Society of Animal Science | http://www.bsas.org.uk/ |
| Defra | https://www.gov.uk/government/organisations/department-for-environment-food-rural-affairs |
| Earned Recognition - FSA | http://www.food.gov.uk/sites/default/files/multimedia/pdfs/earnedrecog.pdf |
| EU commission website – Animal Nutrition | http://ec.europa.eu/food/food/animalnutrition/index_en.htm |
| FARMA | http://www.farma.org.uk/ |
| FEMAS | https://www.aictradeassurance.org.uk/femas/documents/femas-standards/ |
| FSA | http://www.food.gov.uk/ |
| Good Agricultural Practices | http://www.ciwf.org.uk/education/good-agricultural-practice/?gclid=CMTv4MXch8gCFQsHwwod-ogArQ |
| Good Manufacturing Practices | https://www.gov.uk/guidance/good-manufacturing-practice-and-good-distribution-practice |
| HGCA - Grain storage guide for cereals and oilseeds | http://cereals.ahdb.org.uk/media/178349/g52_grain_storage_guide_3rd_edition.pdf |
| Managing the safe receipt of animal feeds | https://www.nfuonline.com/aic-safe-deliveries-to-farms-leaflet/ |
| NAAC | http://www.naac.co.uk/ |
| Red tractor | http://www.redtractor.org.uk/ |
| TASSC | https://www.aictradeassurance.org.uk/tascc/documents/codes-of-practice/ |

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| UFAS | https://www.aictradeassurance.org.uk/ufas/documents/ufas/ |
| UK FFPA | https://www.agindustries.org.uk/sectors/animal-feed/ukffpa/ |
| VMD website | https://www.gov.uk/government/organisations/veterinary-medicines-directorate |