

## Food safety: the farm to the fork approach

### 1. One Health – from the farm to the fork

For many years, the veterinarians of Europe have considered that animal health, animal welfare, public health and the environment are intrinsically interconnected. Good animal health is essential for good animal welfare and vice versa. Disease prevention and control will save animals from pain and discomfort but, in addition, animal health has a direct impact on public health: animals can act as a vector for disease transmission. They can also be a source of food-borne infections and zoonotic diseases, which can be transferred from animals to people and also from people to animals.

Risks arising from these interrelations between humans and animals have always been present. About 75% of the emerging diseases in humans over the past ten years originated from animals, and over 200 zoonotic diseases are recognised today. These numbers, and the occurrence of emerging or re-emerging diseases, clearly show the need for a multidisciplinary approach and a close cooperation between veterinarians and physicians, epidemiologists, biologists and the other related professions. Accurate and effective risk assessment and risk management requires data to be sourced and collated from a wide variety of sources. The veterinary profession in Europe fully embraces the concept of '**One Health**'. We take our responsibility very seriously, and aim to strengthen the links with the human public health sector, in order to protect and improve animal and public health on a global scale.

Veterinary Public Health is defined as "the sum of all contributions to the complete physical, mental and social well-being of humans through an understanding and application of veterinary medical science" (WHO). By this definition, every veterinarian contributes to public health, whether by the provision of healthcare for pets, protection of animal welfare, biomedical research or by ensuring adequate standards of animal production and food safety.

Veterinary Public Health has an impact on human health, by reducing the exposure to hazards arising from animals, animal products or their environment. Examples include zoonoses, vector borne infections and other communicable diseases, and veterinary medicinal products used in animals.

The role of veterinarians in Veterinary Public Health requires the profession to be competent in a number of fields, including, *inter alia*, the identification of food hazards, risk assessment procedures, food safety controls, system audit, laboratory testing methods and legal issues. By ensuring the control of zoonoses, the responsible use of

veterinary medicines, and the safety and wholesomeness of food from animal origin, veterinarians contribute significantly to human health. If this should fail, the health of large groups of people can be put at risk.

In all parts of the food chain – from **'farm to fork'** – veterinary input contributes towards ensuring the health and welfare of animals and the safety of consumers.

## **2. From the farm to the fork**

The 'farm to fork' approach to food safety is an holistic concept embracing all elements which may have an impact on the safety of food at every step of the food chain - from the farm to the table of the consumer. The phrase is used to encompass the production of all foods of animal origin, and also of non-animal origin, and can be applied not only to meat but also to milk, eggs, fish and other aquacultural products, as well as fruits and vegetables.

Applying this approach means that food safety is not solely a matter of end-product testing or inspection at the slaughterhouse or processing plant as has traditionally been the case. On the contrary this system, which has since the implementation of the EU hygiene package in January 2006 been considered a general principle of EU food safety policy<sup>1</sup>, emphasises the need for interaction between all participants in the entire food chain, from the animal feed manufacturer through to the individual consumer.

Communication throughout the food chain, from the farm to the consumer, is a critical element of this approach. However, communication must be two-way so that pertinent information goes from the farm of origin to Official Veterinarians at the point of control and is then fed back again. A good example of this is the **'Food Chain Information'** (FCI) which accompanies animals from the farm of production to the slaughterhouse and which also ensures that any findings identified during the inspection procedures performed at the slaughterhouse are reported back to the farm and to the field veterinarian and thus can be addressed at the farm level. Similarly, the results of investigations into the cause of food poisoning incidents must be communicated back down the production chain such that preventative actions may also be taken as appropriate.

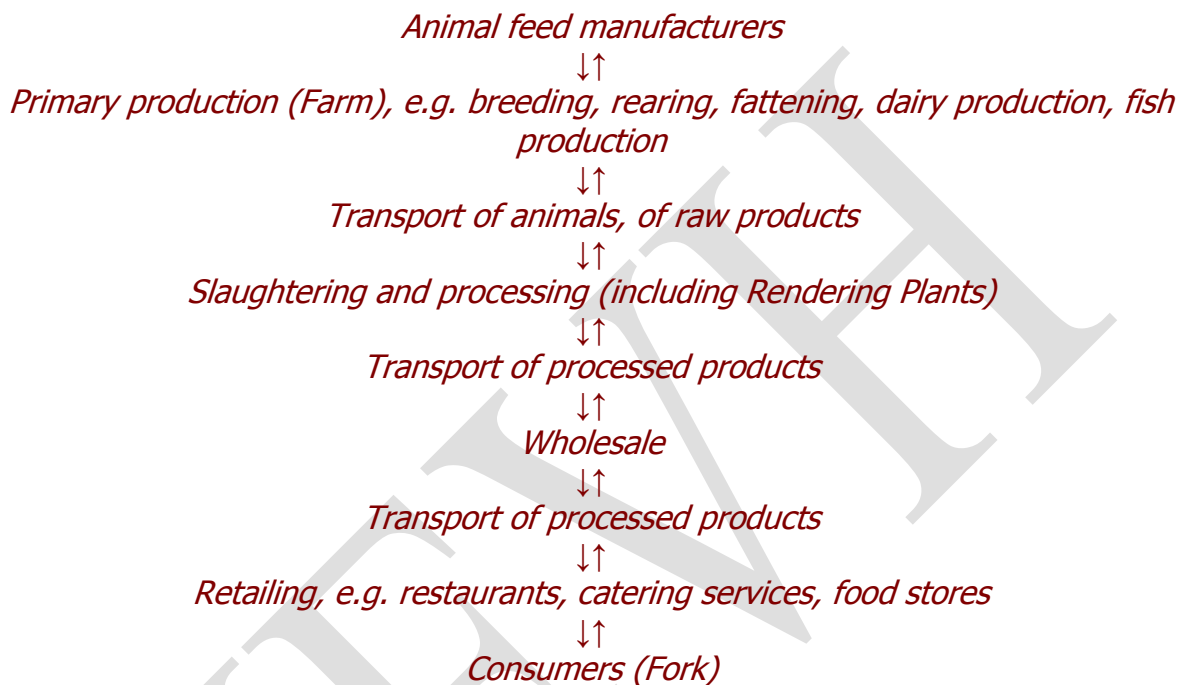
The 'farm to fork' approach to food safety enables food safety controls to be applied in the most effective manner and with optimal use being made of all official resources. This approach requires systems which enable full traceability of food products, from the place of production to the consumer, backed up by effective communication of all pertinent information throughout the food-chain.

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<sup>1</sup> [http://ec.europa.eu/food/food/foodlaw/principles/index\\_en.htm](http://ec.europa.eu/food/food/foodlaw/principles/index_en.htm)

The 'farm to fork' approach to food safety is the only way to optimise inspection of foods of animal origin in order to ensure that the most appropriate corrective actions are taken and the highest possible level of food safety assurance is delivered to the consumer.

### **The food-chain: 'farm to fork'**



### **Key principles of food safety**

- The FVE fully embraces the concept of 'One Health' and its emphasis on the interconnections between animal health and human public health.
- The veterinary profession, working as part of a multi-disciplinary team, is essential for bringing this concept into reality.
- Animal health and animal welfare are areas in which veterinarians and farmers should play a key role in setting standards.
- It is the responsibility of farmers to comply with these standards.
- Veterinarians have the expertise needed for monitoring and ensuring compliance with these standards.
- Assurance of food safety demands an holistic 'from farm to fork' approach.
- In order to maintain transparency within the food chain, traceability of feed, animals and products of animal origin is essential.
- Inspection and audit systems in the food industry should be risk-based.

### **3. Primary production**

The 'farm to fork' approach to food safety requires the implementation of specific measures at all levels of the food chain from primary production through to the individual consumer. In adopting this approach European General Food Law has established the basic principle that those primarily responsible for ensuring compliance with food law, and the safety of food generally, is the food and feed business operator (FBO) at every step of the food chain<sup>2</sup>.

#### **Traceability of feed**

Amongst the many measures required by this approach, full traceability of animal feed from the very start of the chain is critical. This means that each batch of animal feed must be fully identified and that records of the distribution route, from the manufacturer to the farm, must be maintained throughout. This enables early alert and intervention when feed contamination is detected, allowing, in particular, rapid identification of farms or animals that may have received contaminated feed.

The same applies to individual feed ingredients, as contamination may occur well before ingredients are supplied to, and mixed by, the feed manufacturer.

#### **Animal Identification and registration**

A reliable system of animal identification and registration is an essential part of traceability and should be harmonised across the EU and applied uniformly. It has to be secure, clearly visible, easy to apply and yet any attempt to tamper with the system must be readily detectable. Also, farms and farmers must be individually registered and identified similarly. Any identification and registration system should be maintained by the Central Competent Authority, operated on a national basis, fully auditable and be able to be accessed for those involved throughout the chain as required.

All animals should be recorded onto a farm register, which must be updated every time an animal, or a group of animals, enters or leaves a farm holding or establishment. This information can also be stored in a computerised database to facilitate the monitoring and tracing of animal movements for both animal health and food safety purposes.

#### **Animal Health and 'Herd Health Plans'**

Safe food is produced from healthy animals: animal welfare is a key component of animal health. To achieve optimal animal health and welfare 'Herd Health Plans' should be introduced at farm level. These are plans intended to improve the health of the herd and protect food safety by focusing on good husbandry practices, responsible use of

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<sup>2</sup> [http://ec.europa.eu/food/food/foodlaw/responsibilities/index\\_en.htm](http://ec.europa.eu/food/food/foodlaw/responsibilities/index_en.htm)

veterinary medicinal products and feed additives, preventative healthcare and the prevention of epizootics and zoonotic diseases.

A Herd Health Plan should include details of agreements between the farmer and the private veterinary practitioner who carries out the routine animal health visits to the holding as part of a formal 'health visitation scheme'.

Many pathogens can be transferred from animals to man by direct contact or through vectors such as food. This makes the effective interaction between herd health and epidemiological surveillance schemes essential. Herd health surveillance schemes must therefore encompass an element of pathogen prevalence monitoring. This should, in particular, cover zoonoses that may be transferred to man and other animal diseases relevant to improving herd health.

It is recognised that control of some food-borne pathogens is best achieved at the level of primary production. A good example of this is the use of vaccines in poultry to reduce the carriage of Salmonella by broilers during their production phase, thus improving the health status of the poultry sent for slaughter for food.

The Community **Animal Health Strategy**<sup>3</sup>, which provides the framework for animal health and welfare measures within the EU, is based on the principle of "*prevention is better than cure*". Greater focus on precautionary measures, disease surveillance and controls and research, in order to reduce the incidence of animal disease and minimise the impact of outbreaks when they do occur, is the main aim of the strategy.

### **Animal welfare**

Public health, animal health and animal welfare are intrinsically interrelated. As an example, if animals are stressed they are more likely to develop diseases, which may require veterinary treatment and may also lead to the animal excreting pathogenic organisms. This, in turn, may increase the risk of the presence of residues of veterinary medicinal products in animal products and the increases the risk of the development of antimicrobial resistance.

As a key influence on animal health status and food safety, animal welfare must form an important component of herd health surveillance programmes. There is also a clear need for regular routine visits to farms during which veterinarians may monitor animal welfare and record welfare parameters.

In addition, the labelling of the final product should contain details of the breeding and husbandry methods employed in the keeping of the animals, including details as to their welfare.

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<sup>3</sup> [http://ec.europa.eu/food/animal/diseases/strategy/index\\_en.htm](http://ec.europa.eu/food/animal/diseases/strategy/index_en.htm)

## **4. Veterinarian – Farmer**

### **Evolving role of veterinarians**

Over the last 40 years, the focus of veterinary input has moved from the production of animals and animal products to the production of food, often with a specific market or consumer in mind. The focus of veterinary medicine has shifted accordingly from the individual animal, to whole herd health and, since the mid 90's, to public health. The role of veterinarians has thus evolved towards preventative medicine, control of food-borne zoonoses, prudent use of veterinary medicines, residue control and pharmacovigilance in order to protect public health as well as ensuring good animal health and welfare.

Together with their traditional role, the role of the veterinarian is becoming more geared towards providing information and advice on general public health, animal health, animal welfare and environmental issues, such as the correct use of medicines, especially in respect of antibiotic usage and withdrawal periods, environmental contamination, good hygienic practice and sustainable livestock production. The veterinarian has an important role to play as part of an expert team giving advice to the farmer.

### **Independence**

Audit by independent bodies is essential to verify compliance with the objectives of the 'farm to fork' approach. Such independent bodies require the knowledge and skills of veterinarians to audit the food safety, animal health and welfare aspects of assurance schemes.

### **Record keeping and computerised databases**

Farmers, veterinarians, technicians and all those involved on the farm must keep records of their activities. Critically, the medical history of the animals must be recorded as such information is important for the protection of public health. Ideally these records should be gathered in a computerised database for further reference and the information should also be made available to those further down the chain.

Therefore, whenever an animal is delivered to a slaughterhouse, or when milk, eggs or farmed fish are delivered to a collecting centre, the Official Veterinarian should immediately be able to retrieve the history of the animal, milk or eggs and the relevant farm of origin. The inspection procedures can then be adapted in the light of this data, enabling a risk-based approach to be adopted and optimal allocation of the available resources.

## **Biosecurity on farms**

Biosecurity measures are essential to prevent introduction and spread of animal diseases on farms and also between animal holdings. Good hygiene practices need to be in place and carried out by all personnel entering a farm or establishment. Some general strategies can be applied to all animals but additional measures may be needed to address the specific species and the relevant husbandry systems as well as the composition of the holding. The veterinarian normally attending the holding is best placed to establish and monitor biosecurity measures in close cooperation with farmers.

### **5. Transport and movement of animals**

The movement of animals must be recorded, not only when entering or leaving a farm, but throughout the journey from the holding of origin to the final destination point.

It is desirable for animal identification to be coupled with an electronic system and a computerised database to trace the origin and movement of animals, thus allowing easy and rapid tracing as required.

### **Animal health and welfare**

Monitoring and enforcement of animal health and welfare during transport has an important impact on public health. Movement of animals causes stress and stressed animals are more likely to excrete pathogenic organisms which, when meat is contaminated, pose a risk to human health. However, it is important to note that rather than transporting live animals over long distances, trade in carcasses is preferable and should be encouraged for reasons of food safety, animal health and welfare.

When transport is necessary, optimal loading densities and resting periods must be observed. Also, all personnel accompanying animals should have received satisfactory levels of training in the care and welfare of animals.

Transport of animals to the slaughterhouse is a critical step; not only from the animal health view-point but also with regards animal welfare. The farmer should thus be properly advised by a veterinarian about any condition that could render an animal unsuitable for transport.

Furthermore, hauliers involved in the transport of animals must be registered, together with their vehicles, and must meet the agreed standards for the transport of animals.

## **6. From processing to retail sale**

The 'farm to fork' approach is consistent with the introduction of modern inspection procedures to control the quality and the safety of our food. Hazard Analysis Critical Control Points (HACCP) is such a process which can be used as part of an overall food safety management system. It is a preventative approach to food safety control that can be applied throughout the food production chain to the point of sale to the consumer. It is intended to achieve the highest possible level of consumer protection.

Under the HACCP system, food operators must identify all food safety hazards which could reasonably be expected to occur in their processes and products. For each specified hazard, the point at which this hazard can be controlled, reduced or eliminated must be identified. Next, a determination must be made to control each hazard within set limits, how plant personnel will monitor these limits, and what the operatives will do when deficiencies are subsequently identified. HACCP plans are all very specific to the type of product and to the relevant production facility. Records of all checks performed should be kept under the food business operator's responsibility.

The HACCP system encourages the principle of self-checks and clarifies responsibility. It is, however, recognised that HACCP procedures might be difficult to implement in small establishments. To assist with this point within EU Regulations it is suggested that Codes of Good Practice should be developed by the various sectoral groups. Veterinarians could have a key role in ensuring that these codes are closely followed by carrying out, for example, regular routine audit and, when appropriate, sampling.

Like slaughterhouses and food processing facilities, food wholesalers, distributors, retailers, as well as restaurants and catering businesses, must also follow Codes of Good Practice and HACCP procedures. This is of particular importance for food retail outlets as experience indicates that cross-contamination often occurs at this point. Measures must therefore also be taken at this level to guarantee that the strictest hygiene rules are observed and that food is not contaminated by inappropriate action. This will involve licensing after inspection by the competent authorities and the proper training of staff.

## **7. Meat inspection**

The delivery of official controls in fresh meat slaughter and processing establishments requires the Official Veterinarian to carry out meat inspection, audit of the food business operation and enforcement tasks.



Meat inspection at the slaughterhouse has two components: inspection of live animals before slaughter (*ante mortem* inspection) and inspection of carcasses and offal after slaughter (*post mortem* inspection).

The main purpose of ante-mortem inspection by veterinarians is to determine if animals are suffering from any condition which might adversely affect human health. Only animals which are clean, healthy and which are free from stress and residues of veterinary medicinal products or environmental contaminants should be presented at the slaughterhouse for food production. Veterinary ante-mortem inspection is therefore also very important for the protection of animal welfare and for the detection of diseases of animal health importance. Ante-mortem and post-mortem inspection are essential components of animal health surveillance systems.

The involvement of practising veterinarians in the inspection process attending animals on the farm of origin can deliver increased value to the ante-mortem inspection process. These veterinarians will naturally have a better knowledge of the animals and of their farm of origin than the Official Veterinarian who, by the very nature of ante mortem inspection, will normally inspect these animals only once prior to slaughter. . A clear example of good practice is in the delivery of an official farm visitation scheme which permits the designated veterinarian to audit a farm's herd health plan in full cooperative partnership with the farmer.

Post-mortem inspection of carcasses and offal by visual inspection, palpation and incision has a long history in the detection of pathological findings with food safety significance. Since most meat-safety hazards of current concern are pathogenic micro-organisms that cannot be detected by conventional inspection techniques (e.g. Salmonella, Campylobacter, Verotoxigenic E. coli) the role of post-mortem inspection in protecting public health has diminished. However, conventional inspection continues to have an important role in animal disease surveillance and animal welfare. The detailed procedures to be applied should be determined on the basis of risk assessment using the Food Chain Information provided by the supplier of the animals.

### **Food Chain Information (FCI)**

Food Chain Information is an important component of the 'farm to fork' approach to food safety introduced by the EU Food Hygiene Regulations. Information about the health status of animals consigned for slaughter can be used by the slaughterhouse operator to make decisions about accepting animals and about specific slaughter and processing arrangements. Food Chain Information must, in addition, be transferred to Official Veterinarians at the point of slaughter, who can use it to make decisions about ante-mortem and post mortem inspection based on an assessment of food safety risks from the history of the farm of origin. Following slaughter, inspection results can then,

accordingly, be passed back to the designated veterinarian at the farm of origin to inform animal health management decisions and improve overall herd/flock health.

## **8. Traceability and Controls**

Once food - and in the earlier production stage the feed - has been processed, each single unit has to be identified by a lot, or batch number, so that each product can be traced back to its source of origin and be withdrawn from the market if deemed necessary. Traceability also enables retail operators to provide consumers with accurate and targeted information on the origin of products. All food business operators must be registered and individually identified to facilitate full traceability.

### **Food business operator controls and official controls**

Spot checks, in line with the principles of HACCP and guided by the data supplied by any centralised database, must be established in all places where food is processed, stored or sold. These checks, which are the responsibility of the food-operators themselves will, for example, focus on detection of cross contamination during storage and on the correctness of labelling and storage.

Although food operators bear the primary responsibility for the safety of products which they place on the market, the verification of food business operators' compliance with food safety and public health legislation is ultimately a task for the National Central Competent Authority. Auditing of the HACCP and self checks procedures, put in place by food business operators, therefore remains the responsibility of the Central Competent Authorities and is subjected to third party audit by the EU Food and Veterinary Office

The Competent Authorities are also responsible for drawing up their 'Multi-annual National Control Plan' which describes the control procedures, for putting the national legislation into effect and for ensuring that this legislation is enforced appropriately.

## **9. Consumers**

### **Consumer responsibility**

The 'farm to fork' approach to food safety is intended to deliver the highest level of consumer protection. However, the individual consumer is a key component of this approach. Whatever the advantage of this approach, consumers are ultimately responsible for correct storage, handling and cooking of food. The safest food can be rendered unsafe if stored, handled or cooked in an inappropriate fashion.

## **Consumer education**

Consumer education is necessary in order to communicate the basic principles of food storage, handling and preparation and to reinforce consumers' own responsibility in relation to the safety of food.

## **Consumer information and choice**

The 'farm to fork' approach can also meet consumers' interests and concerns, not merely from a health perspective but also by delivering traceability and providing information about animal welfare, ethical and environmental considerations.

As a result of the 'farm to fork' approach, consumers can expect to be provided with essential and accurate information on food constituents and the method of production. This information, which should be presented in a concise and clear manner, allows consumers to make informed choices. Carefully considered and coherent labelling has, therefore, an important role to play.

## **10. Conclusions**

By integrating feed manufacturing, production, transport, processing and distribution stages, the 'farm to fork' approach to food safety aims to increase the wholesomeness and safety of food in order to achieve the highest possible level of food safety and consumer protection.

Wholesome safe food of animal origin can, however, only be produced from healthy animals kept in hygienic conditions and in husbandry systems that cause them minimal stress, combined with the responsible use of veterinary medicinal products. The 'farm to fork' approach to food safety can, therefore, only be successful if the health and welfare of animals are fully integrated into this approach.

The veterinary profession has a central role to play in giving credibility to such a system. Veterinarians are present at every link in the chain and have the knowledge and expertise to audit the standards of animal health, animal welfare and public health from the farm to the fork.

Veterinarians also have an important role in cooperation with human medical experts in the prevention, investigation and tracing of hazards which pose a risk to public health.