FACTFILE:
GCE NUTRITION & FOOD SCIENCE

VETERINARY MEDICINES

Rewarding Learning

Potential risks to food safety in relation to animal and plant health

Learning outcome

- Explain the potential risks to food safety in relation to animal health (veterinary medicines and animal feed) and plant health (pesticide residues and mycotoxins).

Potential risks to food safety in relation to animal health

Veterinary Medicines

Veterinary medicines are given to sick animals to treat an illness or infection. They include vaccines and antibiotics as well as sheep dips, flea treatments, wormers, creams and sprays for infected skin or hooves.

Very small amounts of veterinary medicines from treated animals can sometimes get into our food, in products such as meat, fish, eggs, honey and milk. These are called residues and are the leftovers from the medicine that was used to treat the animal. Not all animals have residues, but where they do they are usually at very low levels.

Potential risks to health

Antimicrobial resistance

Antimicrobials are used to treat infections caused by bacteria in animals however their overuse or misuse in veterinary medicine can result in bacteria resistance, rendering the treatment of infectious diseases in humans ineffective. Salmonella and campylobacter in particular show significant levels of resistance.

Cancer

Some of the hormones used by farmers to manipulate fat:meat ratios in cattle could pose a risk of cancer, with children being most at risk.

Congenital malformations

The drugs given to cattle may impact on human pregnancy and have a toxic effect on the developing embryo and foetus leading to congenital malformations. This has been observed in animals given veterinary medicines during early stages of pregnancy and there is a concern that this might transfer to humans.

Reducing the potential risks to food safety

Approval of veterinary medicines

Every veterinary medicine must be approved before it can be sold or used on animals in the UK. Veterinary medicines are assessed by the Veterinary Medicines Directorate (VMD) which involves the Food Standards Agency (FSA) in the approval process. Veterinary Medicines are also authorised and approved for use in the EU through the European Medicines Evaluation Authority (EMEA). In this case the data is assessed by the Committee for Medicinal Products for Veterinary Use (CVMP).

Setting limits

An Agreed Maximum Residue Limit (MRL) is calculated for every veterinary medicine. MRL is the maximum concentration of a residue that is legally permitted or acceptable in or on a food.

Monitoring and regulation of veterinary medicine residuals
Once on the market veterinary medicines continue to be highly regulated with national and European legislation in place to govern their use.

In the UK farm animal medicines are covered by legal requirements regarding record keeping of all veterinary medicines used in food-producing animals. On the farm this is achieved by an animal medicines record book and the keeping of records for a minimum of 5 years for traceability.

Foods are checked regularly as part of the government's surveillance programme (National Residues Control Plan) to make sure that any residue present is at a safe level. These checks show that in the UK residues of veterinary medicines are rarely found and where they are, they are almost always at low levels that are not a threat to human health. If food is found to have residues over the legal limit recognised by the UK they are not allowed to be sold. If the food has already been distributed, the FSA works with food businesses to remove them from the food chain.

The withdrawal period
The responsibility for ensuring food from animals does not contain residues above the statutory limit is shared by all those involved in the animal medicine sector. Vets, professional keepers of animals, including farmers, all have a role to play in minimising the potential health risk to food safety and safeguarding our food.

To make sure food is safe to eat a legally defined amount of time must pass before treated animals can be slaughtered for their meat or their products can be collected eg. milk or eggs. This is because veterinary medicine residues can still be there even when the vet has given the animal the correct dose. This period of time is called the withdrawal period. This adds a safety measure and ensures that animals recently treated with veterinary medicines do not enter the food chain.

Animal feed

Safe animal feed is important for the health of the animals, the environment and for the safety of our food. What food producing animals are fed has implications for the composition and quality of the livestock and livestock products eg. milk and eggs.

Public food safety concerns relating to animal feed arise historically from links between animal feedstuffs and Bovine Spongiform Encephalopathy (BSE) in cattle. In the 1990s BSE infected meat entered the food chain and was associated with the variant Creutzfeldt-Jakob Disease (CJD) in humans. Mammalian meat and bone meal in the animal feed was linked to the spread of BSE and resulted in its ban from all farm animal feed in the EU in 2001.

Potential risks to health

Mycotoxins
Mycotoxins can cause a variety of adverse health effects and pose a serious health threat to both humans and livestock. The adverse health effects of mycotoxins range from acute poisoning to long-term effects such as immune deficiency and cancer.

The European Food Safety Authority (EFSA) has carried out risk assessments on mycotoxins in animal feed considered to pose a potential risk to human health. Overall food of animal origin only contributes marginally to the total human exposure to mycotoxins.

Prions
Prion diseases or transmissible spongiform encephalopathies (TSEs) are a family of rare progressive neurodegenerative disorders that affect both humans and animals. Prion diseases like BSE have been linked to animal feedstuffs but strict controls since 1996 have been put in place to prevent prions from entering the food chain.

Dioxins
Contaminated animal feed can introduce dioxins into the food chain. Dioxins are highly toxic and can cause reproductive and developmental problems, damage the immune system, interfere with hormones and also cause cancer.

Reducing the potential risks to food safety

Legislation
European legislation on animal feed provides the framework for ensuring that animal feedstuffs do not present a risk to food safety and human health.

It covers rules on the circulation and use of feed materials, requirements for feed hygiene, rules on undesirable substances in animal feed, legislation on genetically modified feed and the conditions for the use of feed additives.

Regulation and controls
The FSA is the central authority responsible for official feed controls within the UK. Local authorities in Great Britain and the Department of Environment, Food and Rural Affairs (DEFRA) are the enforcement authority delivering the official controls.

Businesses that manufacture or sell animal feed must be registered or approved and must comply with FSA approved industry assurance schemes in respect of facilities, storage, personnel and record keeping. Official controls include inspection of feed establishments, monitoring of assignments of imported feed, sampling of feed materials and manufactured feed along with composition and labelling requirements.

Potential risks to food safety in relation to plant health

Pesticides
Pesticides are chemicals used in agriculture to protect crops against insects, fungi, weeds and other pests. Farmers and growers use pesticides to do various things including: protecting crops from insect pests, weeds and fungal diseases while they are growing, protecting harvested crops while they are stored and safeguarding human health by stopping food crops being contaminated by fungi.

Potential risks to health
Pesticides are potentially toxic to humans. They may induce adverse health effects including cancer, effects on reproduction, immune or nervous systems.

There is some concern about risks to health from mixtures of residues. However the Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT) concluded that the risk was small and that children, pregnant and breastfeeding women are unlikely to be more affected by the 'cocktail effect' than most other people.

Reducing the potential risks to food safety

Authorisation and approval
Potential risks to food safety are minimised by robust evaluations of new pesticides before they are given approval for sale and use in the EU. Without such authorisation it is illegal to market, store or use the product in the UK. A substantial amount of scientific and technical data must be provided to demonstrate that the product poses no unacceptable risk to health.

The Chemicals Regulation Directorate (CRD), a Directorate of the Health and Safety Executive (HSE) is responsible for registration and approval of plant protection products, including pesticides.

Legislation
Under the terms of EU regulation 1107/2009 a pesticide must obtain authorisation before being launched into the UK market and scientific and technical data must demonstrate no unacceptable threat to food safety and human health. This always includes data on the potential of the pesticide to cause cancer and damage human reproduction.

Monitoring
Pesticides are reviewed regularly and if at review there are any areas of concern then more data may be sought or the approval may be modified or withdrawn.

Pesticide residues in food and drink in the UK are monitored through an official surveillance programme conducted by the CRD and overseen by DEFRA Expert Committee on Pesticide Residues in Food (PRiF).

If the surveillance indicates a concern then a risk assessment is carried out by CRD and any follow up action is taken, overseen by PRiF. The FSA advises PRiF on surveillance and checks CRD risk assessments of high residue findings to ensure that food safety is maintained. The FSA will work with local authorities to withdraw affected foods from the market.

Mycotoxins

Mycotoxins are a group of naturally occurring chemicals produced by certain moulds. They can grow on a variety of different crops and foodstuffs including cereals, nuts, spices, dried fruits, apple juice and coffee, often under warm conditions (FSA 2018).

Potential risks to health

Mycotoxins can have a variety of effects on health. They can damage DNA and there is evidence to link mycotoxins with liver cancer. Other health effects include: kidney damage, gastrointestinal disturbances, reproductive disorders and suppression of the immune system.

Reducing the potential risks to food safety

Setting limits

For most mycotoxins a Tolerable Daily Intake (TDI) has been established which estimates the quantity of a mycotoxin which someone could be exposed to over a lifetime without it posing a risk to health.

Legislation

Strict limits for mycotoxins found in foodstuffs are set out in EU legislation. The legislation applies to specific foods. Some imported foods, particularly those from third world countries where the risk from aflatoxin contamination is high, have special import conditions. This further improves consumer safety and minimises potential risks.

Advice and guidance

The FSA provides advice and guidance to the industry, including farmers, to advise them on storage of crops to reduce the contamination of cereals with mycotoxins thus reducing the likelihood of foodstuffs exceeding the EU legal limits.

Suggested activities:

1. Debate the use of veterinary medicines in food production.

2. Investigate a recent food scare involving either animal or plant health.

3. Discuss the pros and cons of the use of pesticides in food production.