A GUIDE TO

GOOD AGRICULTURAL PRACTICES (GAP) FOR

LIVESTOCK PRODUCTION

A Guide to Good Agricultural Practices (GAP) for

Livestock Production

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This good agricultural practices (GAP) manual presents a set of guidelines which promote best practices in livestock farming. The principal aim is to minimize the risk of contamination of foods by bacteria and other microbial pathogens, pests and chemicals during the primary production activities.

The compilation of this manual is the result of the collective efforts of several people.

Thanks to Dr. Richard Harrison and Claudette McKenzie for their foresight and vision in seeing the need for farmers to have relevant easy-to-understand information at their fingertips.

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Don McGlashan
Director General
Ministry of Agriculture & Fisheries

ACRONYMS

VSD - Veterinary Services Division

GAPs - Good Agricultural Practices

HACCP - Hazard Analysis and Critical Control Point

RADA - Rural Agricultural Development Agency

ABIS - Agriculture Business Information System

NEPA - National Environment and Planning Agency

FIFO - First in first out system

OIE - World Organization for Animal Health

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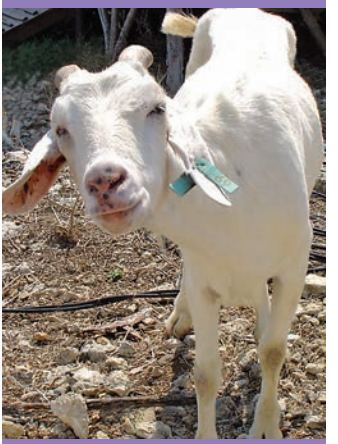
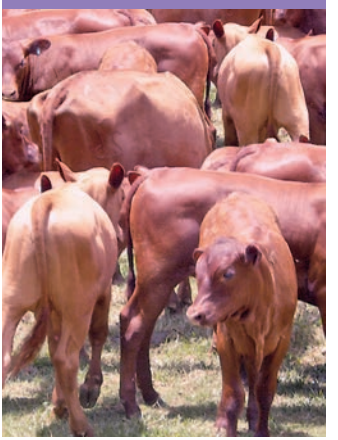
Livestock Production

INTRODUCTION





Food Safety is a global public health concern and societies have become more conscious about the foods they eat and the impact of these foods on their health. Food Safety can only be assured with a 'farm to fork' approach, which is the new international concept. This means safe food begins on the farm where it is produced. As such, the agricultural sector is driven to develop the primary production aspect of the food chain to meet international standards for safe food.

Good agricultural practices (GAPs) are recommendations for the care and management of farm animals. It identifies the hazards – biological, chemical and physical – associated with livestock production, from site selection through storage and the activities required to prevent or minimize their occurrence. The implementation of GAPs will:

- Minimize the contamination of foods at the primary production level, resulting in fewer food-

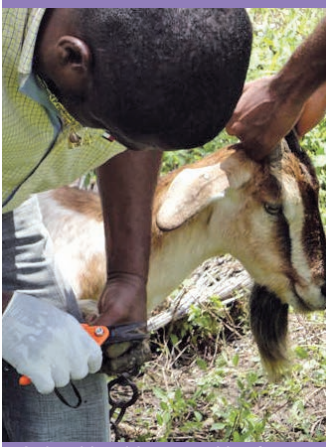
borne-related illnesses;

- Provide assurance of safe food which will increase access to markets both locally and internationally;
- Improve profitability for farmers; and
- Protect the environment from pollution originating from the agricultural source.

Given the increased incidences of zoonotic diseases in the livestock industry – Bovine Spongiform Encephalopathy ('Mad Cow Disease'), Avian Influenza etc. – good agricultural practices must be employed throughout the stages of production. Where a food safety incident occurs, it must be possible to determine the source of the problem and to take appropriate action. The ability to trace animals at least one step forward and one step back from the current holding is recommended (Source OIE GAP 2009).

This manual is intended to assist Jamaican livestock producers in the development of a farm plan to help in the management of your operation(s). It is a tool to identify at each step of the production chain what practices need to be employed to address selection of good livestock, animal health and welfare, workers' health, hygiene, environmental and social

Meat cuts



Animal health care - Hoof trimming

economic issues in livestock production. It is supported by the following local legislations:

1. The Animals (Diseases and Importation) Act and Regulations,1948
2. The Aquaculture, Inland and Marine Products and By-Products (Inspection, Licensing and Export) Act and Regulations
3. The Meat, Meat Products and Meat By-Products (Inspection and Export) Act, 1999
4. The Keeping of Animals Act and Regulations
5. The Apiculture Act and Regulations
6. The Public Health Act and Regulations
7. The National Resources Authority Act
8. The Fertilizer and Feed Stuffs Act
9. The Pesticides Control Act
10. The Cruelty to Animals Act
11. The Food and Drugs Act and Regulations
12. The Pound Act
13. The Endangered Species (Protection, Conservation and Regulation of Trade) Act
14. World Organization for Animal Health (OIE) Codes

Carcasses awaiting inspection

Milking process

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SCOPE

The principles in this document apply to the handling and welfare of all livestock species in primary production as well as animal products at the farm level (milk, eggs etc.). They are not applicable to processed/manufactured foods.

The guidelines are applicable to both local and export market trade initiatives at all the critical points along the production chain from "farm to the market". The document does not apply to processors or the food-service industry.

Inspection at the terminal.

OBJECTIVES

The document sets out guidelines for good agricultural practices (GAPs) for livestock production:

- It outlines the steps necessary to promote animal health and welfare through the utilization of good husbandry practices and biosecurity in all livestock operations.
- It provides a national standard for livestock production in fulfilment of trade and international requirements with regards to food safety and quality.
- It allows for varying methods of control to prevent contamination of feed stuffs and products of animal origin

It outlines the steps necessary to promote animal health and welfare through the utilization of good husbandry practices and biosecurity in all livestock operations.

GOOD AGRICULTURAL PRACTICES

Selecting livestock

In general, selecting livestock for production is dependent on the farmer's purpose and type of operation. Farm animals, including poultry, are utilized either for meat, milk or eggs. For some species the value of their hides (skins) also provides an economic spin-off following slaughter.

Selecting livestock for production can be viewed within two main categories:

1. Selecting breeding stock
   - Group of animals from particular breeds and populations identified with desirable traits or characteristics used for the generation of offspring and the improvement of these traits.
2. Selecting market animals
   - Animals reared and fed for the purpose of sale of their meat, products and by-products to the market trade.

Some operations combine both facets, but a greater majority of operators are in the production of market animals. Whatever the operation, there are basic standards which when considered will help in

In general, selecting livestock for production is dependent on the farmer's purpose and type of operation.

For some species the value of their hides (skins) also provides an economic spin-off following slaughter.

Farm animals, including poultry, are utilized either for meat, milk or eggs.

guiding the selection of breeding stock:

- Source of stock or animals
- Condition of animals
- Conformation and type
- Performance traits
- Herd recording and animal identification

Selecting meat-producing animals

Meat-producing animals are selected on the basis of their ability to grow and lay down muscle. Characteristics such as early maturing, weight for age, average daily gain, wean weight, slaughter weight, and dressing percentage become important to the selection process.

Selecting milk-producing animals

Milk producing animals are selected on the basis of their ability to produce milk efficiently, complete full lactations (specific to specie), have moderate dry periods (length depending on specie), and being able to display viable estrous within 60 days post partum. Dairy animals are characteristically leaner in conformation and type than meat animals, but they are still well developed with strong udder attachment, good udder capacity, wide pelvic area, and good barrel capacity.

The boer -meat producing goat.

Jamaica Hope -milk producing cow.

Livestock Production

Where animals are maintained for breeding, fertility, weight and age at first service, services to conception, interval between parturition, lifetime production and weaning rate are additional selection criteria.

Poultry

The poultry industry with its strategy of vertical integration has determined and set the trends with respect to breeds or commercial strains of birds used both in the broiler and layer industry.

Their breed selection has been based on the latest production efficiencies being achieved in the industry within the United States of America, where all breeding and market stock are sourced.

Broilers are selected on high feed-conversion efficiency, weight at six weeks and liveability. Layers are selected on peak egg production, egg weight, times to first egg and peak production.

Imported fresh or frozen semen, ova and embryos should be from known and reliable sources, and records indicating safe health status and accredited by the competent authority of the country of origin accompanied by the appropriate health certification should be available.

Broilers are selected on high feed-conversion efficiency, weight at six weeks and liveability.

Layers are selected on peak egg production, egg weight, times to first egg and peak production.

Local Breeds and Populations of Farm Animals *(Appendix 4)*

MEAT ANIMALS

Sheep

- St. Elizabeth (page 44)
- Dorper (page 43)
- Barbados Blackbelly (page 43)
- Katahdin (page 44)

Goats

- Jamaica Native (page 46)
- Boer (page 45)
- Nubian (page 45)
- Alpine (page 46)

Cattle

- Jamaica Red Poll (page 47)
- Jamaica Brahman (page 47)
- Jamaica Black (page 48)

Pigs

- Large White (page 52)
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- Duroc (page 53)

DAIRY PRODUCTION

Cattle

- Jamaica Hope (page 48)
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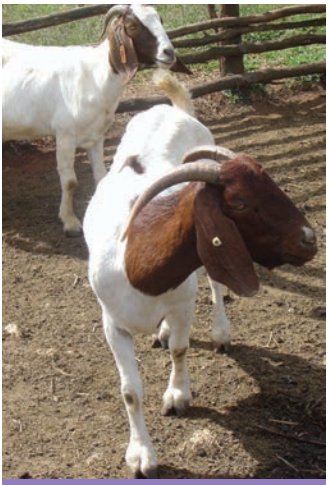
BROILER PRODUCTION

Poultry

- Bovan Brown (page 54)
- Bovan White (page 54)
- ISA Brown (page 54)
- Lohmann Brown (page 54)
- Lohmann White (page 55)
- Shaver White (page 55)



The boer

The Dorper

Jamaica Black

Livestock Production

EGG PRODUCTION

Layers

- Cobb (page 55)
- Ross (page 55)
- Hubbard (page 55)

RABBIT PRODUCTION

- New Zealand (page 50)
- Flemish (page 50)
- Checkered Giant (page 50
- Chinchilla (page 51)

LOCATION

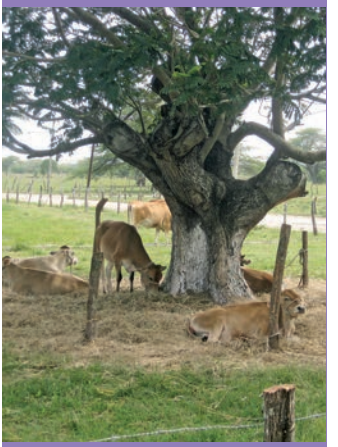
- Farms should be located in areas free from industrial and other pollution and sources of contamination and infection. If there are concerns, test the soil and water for contaminants (microbial and chemical)

- Livestock should be sited on gently sloping land where feasible or practical to afford adequate drainage/safety of livestock.

- Infrastructures, including pastures and pens, should be strategically located so as to prevent contamination of the environment through waste overflows into natural resources such as watersheds, rivers, canals, etc.

- Shade (natural or artificial) must be provided for all pastures and pens.

Livestock should be sited on gently sloping land where feasible or practical to afford adequate drainage/safety of livestock.



Shade (natural or artificial) must be provided for all pastures and pens.

- Livestock farms should not be located in residential areas.

- Livestock farms should not be located in areas where potentially hazardous chemicals can affect the animals and the safety of the animal products.

PREMISES

Buildings and Facilities

- Buildings should be designed to prevent access to pests and environmental contaminants.

- Floors, walls and ceilings should be built with durable materials that are waterproof and washable to allow for easy cleaning/ sanitizing.

- Floors must be adequately sloped to allow for proper drainage.

- Adequate ventilation must be provided to prevent and/or remove the build-up of dust, odour, heat and contaminated air in food-handling facilities.

- Drains and sewage systems must be built with proper traps and ventilation.

- Adequate lighting (natural or artificial) should be provided to allow proper cleaning and

Floors, walls and ceilings should be built with durable materials that are waterproof and washable to allow for easy cleaning/ sanitizing.

A simple well ventilated goat house.

disinfection of farm buildings so as to prevent the buildup of dust, odour or heat which will lead to spoilage of animal products or the spread of pathogens.

- Buildings should be safe for both workers and animals.

ANIMAL HOUSING

- Construction materials should not emit toxic vapour which could danger animals or in any way contaminate animal products.
- Provide adequate space, light, ventilation, dry and hygienic conditions based on the type of animal production. Ensure that farm layout and building construction provide for adequate separation of animals by production group as necessary.
- Building material used should be durable and waterproof to allow for cleaning and disinfecting.
- Birthing facilities should be located at the nearest point of supervision.
- Floors should be constructed using 'non-slip' material that allows for easy cleaning. Points of loading/offloading should be conveniently situated near to animal housing and be easily accessible by road.

Building material used should be durable and waterproof to allow for cleaning and disinfecting.

Floors should be constructed using 'non-slip' material that allows for easy cleaning.

- Ensure that buildings and perimeter fences are constructed so that contact with other livestock and wild animals is minimized.
- Maintain adequate separation between clean and contaminated materials (e.g. feed and manure).
- Animals of different species must be housed separately.
- Maintain an appropriate population density for the species and age group in question, either by following locally enforceable measures or by obtaining appropriate advice from recognized experts.

All equipment/machinery in food-processing areas should be smooth, corrosion-resistant and easily cleaned.

EQUIPMENT

- Equipment and utensils that contact food should be made of materials that will not contaminate or damage the food.
- All equipment/machinery in food-processing areas should be smooth, corrosion-resistant and easily cleaned.
- The layout of the equipment should facilitate easy cleaning, sanitizing, maintenance and inspection.

Machinery/equipment with moving parts should have protective guards.

All equipment should be maintained in good working condition.

- Equipment requiring calibration should be serviced and calibrated according to manufacturer's recommendations.

- Machinery/equipment with moving parts should have protective guards.
- All equipment should be maintained in good working condition

- Documentation must be kept of (equipment) maintenance schedules. A written preventative maintenance programme should be in place.

Storage facilities, pallets, containers and packing crates must be cleaned and sanitized before use.

STORAGE

General storage:

- Ensure that animal feed are not contaminated by animals or their faeces and from any environmental sources during primary production and storage.

- Ensure that storage conditions maintain the quality of the products (chemicals, feed, and medications) by following the directions of the manufactures.

- Design storage facilities to allow for proper cleaning and maintenance.

- Storage facilities, pallets, containers and packing crates

Adopt the FIFO (First In, First Out) system for stock rotation to avoid spoilage during storage.

must be cleaned and sanitized before use.

- Allow space between racks/pallets for packing and inspection purposes.
- All stored items must be protected against microbial contamination and spoilage.
- Product storage areas should be properly labeled.
- Adopt the FIFO (First In, First Out) system for stock rotation to avoid spoilage during storage.

Chemical storage:

- All chemical compounds should be stored in a separate location to prevent contamination of feed and livestock.
- Toxic substances (e.g. pesticides) must be stored in a separate locked room or cabinet away from product storage areas.

Cold Storage

- Cold-storage facilities must be carefully monitored and temperature logs recorded and maintained.
- Condensation from the refrigeration system must not come into contact with produce.

Toxic substances (e.g. pesticides) must be stored in a separate locked room or cabinet away from product storage areas.

Storage areas and containers must be kept clean and dry and appropriate pest-control measures performed.

- Refrigeration rooms should be stocked according to the manufacturer's recommendations.

Feed Storage:

- Feed must be stored separately from chemicals and other products.
- Storage areas and containers must be kept clean and dry and appropriate pest-control measures performed.
- Medicated and non-medicated feed that is intended for different groups or species of animals must be stored and labeled to reduce the risk of feeding to non-target animals.

PEST CONTROL

A documented pest-control programme

- Pest-control programme must be established and should include a site plan showing selected locations of bait stations.
- Appropriate pest and vermin control measures must be applied, which may include the use of barriers (such as nets or fencing), or the use of approved pest/vermin population control measures.

The use of approved biological agents against insect pests can be explored to avoid or reduce the use of pesticides guided by agricultural agencies.

Facilities such as animal houses and milking parlors should be cleaned and disinfected at least once a day.

- The use of approved biological agents against insect pests can be explored to avoid or reduce the use of pesticides guided by agricultural agencies.

SANITATION

- A written sanitation programme should be in place and must indicate the areas to be cleaned, cleaning procedure, frequency of cleaning, the cleaning agents used and person assigned.

- Equipment or utensils used for handling non-edible material should not be used for handling edible food materials.

- Facilities such as animal houses and milking parlors should be cleaned and disinfected at least once a day.

- Ensure that equipment and instruments used in animal husbandry are suitably cleaned and disinfected between each use.

  Coolers and churns must be washed and sanitized after milk collection.

  Drains must be cleaned regularly to prevent build-up of wastes, pathogens and odours.

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Garbage containers must be emptied and cleaned daily to prevent contamination/pest infestation.

Garbage containers must be emptied and cleaned daily to prevent contamination/pest infestation. These containers must be strategically placed to prevent product contamination.

WASTE DISPOSAL

- Have an appropriate waste disposal system to minimize the risk of environmental pollution.

- Contact appropriate local environment protection and planning agency or the local solid waste agency and acquire the required permit where applicable.

  The waste-disposal procedures in such system must be documented and communicated to all employees. Areas designated for storing waste must be cleaned and disinfected to prevent build-up of pathogens and pests.

- Areas for waste disposal (burial) must be clearly defined and located at an appropriate distance from the farming areas and guided by the relevant local agency

- Procedures for disposal of expired drugs and pesticides and their containers must be disposed off according to

Bio-digester

Livestock houses must be scraped regularly to prevent waste accumulation.

- Facilities for emptying pits must be constructed and maintained in effective working order. Equipment used for applying waste to land must be calibrated for proper and even application.
- Soil testing must be done annually (for chemical and microbial contaminants) on fields where animal waste has been applied.
- Pig farm operators may install/construct biogas digester for treating pig waste.
- Litter/fodder must be stored in a roofed area that is protected from rain and wind. Ensure that any bedding or litter is regularly renewed and that used bedding or litter is disposed of safely.
- Stored litter must be sampled and tested to determine microbial and nutrient content.
- Litter may be used in a fertilizer programme, but this must be done according to a field-specific management plan.

  Do not dispose of animal waste in rivers and gullies.
- Dead animals must be disposed in a manner approved by competent authority.

Special protective equipment are worn for disposal of animals during emergencies i.e. 'bird flu'.

Dead animals must be disposed in a manner approved by competent authority.

regulatory requirements and documented.

- Systems using organic materials for fertilizer purposes must take into consideration relevant treatment methods as well as specific holding times before animals are allowed on to treated pastures.
- Run-off water must be diverted from feed lots, loafing pens and animal waste facilities (preferably through grassed areas whereby use can be made of the nutrients).
- Livestock houses must be scraped regularly to prevent waste accumulation.
- Manure stored in open-air stacks must be placed on concrete or compacted clay pads, covered with plastic tarpaulins for protection.
- Operators of medium and large dairy farms should construct slurry tanks/pits to facilitate effective disposal of waste.
- Drains should be constructed to channel liquid waste, such as 'wash water' and milk waste, to the slurry pits for subsequent further usage.

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Soil testing must be done annually (for chemical and microbial contaminants) on fields where animal waste has been applied.

DISEASE PREVENTION AND CONTROL

Biosecurity Plan – Prevent disease entry

- Purchase of new animals should be accompanied with the following information: previous owner name/breeder, address of previous owner/ breeder, address of previous farm, animal identification, and animal health record.

- Keep newly arrived animals separate and isolated from resident stock for no less than 14 days or an appropriate period to monitor them for diseases and infestations in order to prevent transmission of such conditions.

- Acquire animals (including breeding stock) only from sources with a known, safe health status, and where possible with supporting health certificates/ records from licensed veterinarians.

- Erect a gate at the entrance of the farm and secure boundaries/ fencing.

- Establish appropriate measures to prevent contamination by vehicles entering and traversing the property.

Erect a gate at the entrance of the farm and secure boundaries/fencing.

Acquire animals (including breeding stock) only from sources with a known, safe health status and where possible with supporting health certificates/records from licensed veterinarians.

- Minimize contact between livestock and professional or other visitors, and take all hygienic measures necessary to reduce the possible introduction of pathogens and contaminants.

Herd Health Management

- Establish an identification system that allows for traceability from birth to slaughter.
- Develop a herd health management programme in consultation with a licensed veterinarian.
- Notify the Veterinary Services in the Ministry of Agriculture of suspected reportable diseases.
- Ensure the overall health of livestock through good nutrition and stress reduction.
- Maintain an appropriate population density for the species and age group in question, either by following locally enforceable measures or by obtaining appropriate advice from recognized experts.
- Inspect animals and animal facilities daily.
- Isolate sick animals to minimize the spread of disease.

Develop a herd health management programme in consultation with a licensed veterinarian. At the first signs of illness seek veterinary assistance.

Keep written records which identify the animals treated and the treatment administered.

- Seek veterinary assistance at the first signs of illness.
- Keep written records which identify the animals treated and the treatment administered.
- Comply with regulations concerning restrictions on animal movements.
- Maintain the hygiene and safety of the facilities.

Veterinary Products

- Establish a working relationship with a veterinarian to ensure that animal health and welfare and disease notification issues are addressed.
- Be aware of and comply with restrictions on medicines or biologicals for use on livestock.
- Use veterinary products strictly in accordance with the manufacturer's instructions or veterinary prescription/ instructions.
- Use antimicrobials only in accordance with regulatory requirements and other veterinary and public- health guidance.
- Keep detailed records of the origin and use of all veterinary products, including batch

Keep veterinary products in a secure area under the appropriate storage conditions.

Keep detailed records of the origin and use of all veterinary products.

numbers, dates of a dministration, doses, individuals or groups treated and withdrawal times. Treated individuals or groups should be clearly identified.

- Keep veterinary products in a secure area under the appropriate storage conditions.
- Ensure that all treatments or procedures are carried out using instruments that are appropriate and correctly calibrated for the administration of veterinary products.
- Dispose of used instruments (including needles) and expired medication in a bio-secure manner so that they do not pose a food-safety hazard.
- Keep all treated animals on the farm until the relevant withdrawal times have expired (unless the animals leave the farm for veterinary treatment) and ensure that products from these animals are not used for human consumption until the withdrawal periods have elapsed.
- Ensure that all handling or treatment facilities are safe and appropriate to the species, facilitate correct and calm handling and restraint, and that

Ensure that all handling or treatment facilities are safe and appropriate to the species,

Ensure that the nutritional needs of the animals are met.

they are constructed to prevent or minimize the likelihood of injury.

ANIMAL WELFARE

Farmers should aim to provide the five freedoms (listed below) to animals in their care:

1. Freedom from thirst , hunger and malnutrition
2. Freedom from discomfort
3. Freedom from pain, injury and disease
4. Freedom from fear
5. Freedom to engage in relatively normal patterns of animal behaviour.

Freedom from thirst, hunger and malnutrition

- Ensure that the nutritional needs of the animals are met.
- Provide good-quality water in adequate quantities to animals every day.

Freedom from discomfort

- Provide adequate housing with adequate ventilation
- Design and construct the house to ensure that it is free from hazards that could cause injury
- Prevent overcrowding by maintaining the appropriate stocking density

Pastures should have adequate shade to protect animals from adverse weather conditions.

Isolate and treat sick or injured animals promptly in consultation with a licensed veterinarian

Ensure that the nutritional needs of the animals are met.

- Pastures should have adequate shade to protect animals from adverse weather conditions.

Freedom from pain, injury and disease

- Have an effective herd health management programme
- Inspect animals daily. Isolate and treat sick or injured animals promptly in consultation with a licensed veterinarian
- Animals must never be handled in ways that will cause them unnecessary pain, suffering or excitement
- Animals to be milked must be treated calmly. Dairy cows should be milked at regular times each day.

Freedom from fear

- Ensure that staff responsible for handling animals is adequately trained and competent so that animals are handled with care and patience, having regard for their natural instincts.

Freedom to engage in relatively normal patterns of animal behaviour.

- Husbandry practices should support normal patterns and animal behaviour.

Ensure that staff responsible for handling animals is adequately trained and competent so that animals are handled with care and patience, having regard for their natural instincts.

Husbandry practices should support normal patterns and animal behaviour.

Animals to be milked must be treated calmly. Dairy cows should be milked at regular times each day.

- Maintain animals in appropriate social groupings where possible to reduce undue stress and encourage normal social behaviour.

WATER QUALITY

- Clean drinking water must be made available in adequate amounts at all times.
- Drinking troughs or containers should be routinely cleaned to prevent the growth of algae and other microbes.
- Avoid contamination of drinking water with chemicals, animal faces/waste.
- Drinking water must be stored in clean containers and be free from pesticides or other chemicals.
- Ensure that only water of known and acceptable biological and mineralogical (physiochemical) quality (i.e. fit for animal consumption) is used for watering stock.
- Troughs located in pastures should be covered to avoid contamination and exposure to sunlight and rain.
- Drinking water should be tested at least once per year at the

Drinking water should be tested at least once per year at the point of use from the source.

Ensure that only water of known and acceptable biological and mineralogical quality is used for watering stock.

Acquire feed from suppliers who follow recognized good manufacturing practices.

point of use from the source. The recommended tests include:

- Total coliform bacteria e.g. faecal coliform
- Chemical contaminants e.g. pesticides
- Heavy metals e.g. lead, copper

See Appendix 2. Drinking Water Quality for Livestock for other tests.

FEED/FEEDING SYSTEM

- Acquire feed from suppliers who follow recognized good manufacturing practices.
- Ensure that nutritional levels are adequate to promote animal health, growth and production and that animals are fed adequate portions, according to their type and stage of development.
- Manage the feed chain (transport, storage, and feeding) in such a way as to protect feed from contamination (biological, chemical, and physical hazards) and minimize deterioration.
- Use feeds as soon as possible and, if applicable, in accordance with label instructions

Manage the feed chain (transport, storage, and feeding) in such a way as to protect feed from contamination (biological, chemical, and physical hazards) and minimize deterioration.

- Keep records of all feeds and dates of acquisition and feeding; where possible the animals/ groups of animals fed should be clearly recorded.
- Record ingredients and mixing protocols of self-mixed feeds, as well as dates of feeding and animals fed, as specified above.
- Design mixture protocols for self-mixed feeds so as to minimize contamination and prevent the inclusion of undesirable feed components. Where necessary, expert assistance should be sought.
- Ensure that changes to feeding regimes are, wherever possible, gradual, and that the regimes are safe and follow acceptable feeding practices.
- Remove twine from baled forages before these are fed to animals, to avoid death from ingestion or entanglement.
- Animals on pasture must have access to high quality feed and in sufficient quantities.
- Avoid overstocking/overgrazing which could lead to environmental degradation.
- Prevent animal access to places where feeds are stored and to

Animals on pasture must have access to high quality feed and in sufficient quantities.

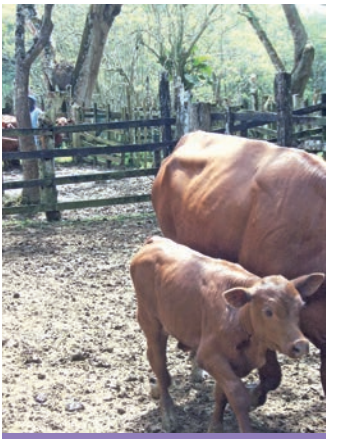
Feeding systems and containers should be cleaned regularly.

places where hazardous chemicals are stored.

- Feeding systems and containers should be cleaned regularly.

CORRALS

- Build corrals in a central location, on firm, dry land, preferably flat areas, with easy access and well positioned in relation to pastures.
- The corral should be built to accommodate the size of the herd to be worked on. It should include, at least, an offloading pen, holding lane, sheltered chute, a scale, a squeeze chute, sorting pens and loading platform.
- The offloading bay should be gently sloping to avoid slippage.
- Corrals should be properly maintained easily cleaned and sanitized, and kept dry to avoid health hazards.
- The processing area and chutes must be sheltered and well ventilated. They should be functional and sturdy and, most important, safe for people and animals.
- Avoid protruding splinters, screws and other hardware.



Corrals should be functional and sturdy and, most important, safe for people and animals

Corrals should be properly maintained easily cleaned and sanitized, and kept dry to avoid health hazards.

TRANSPORTATION OF ANIMALS

- All vehicles transporting animals must be washed and disinfected prior to use.
- Animals should be transported early in the morning or late in the evenings to avoid over-exposure to sun.
- Non-slip ramps should be provided with side guards for the safe loading of livestock

  Due care should be exercised when loading, in transit and unloading to avoid injury.
- Animals must be allowed adequate space and headroom to stand in natural position:
- always separate animals of different species/class, and
- Provide adequate ventilation for all animals.
- Vehicles transporting animals should be equipped with safe footholds (sand beds) spread with bedding to avoid slippage.
- Animals must be fed and watered before being transported.

Animals should be transported early in the morning or late in the evenings to avoid over-exposure to sun.

Animals must be fed and watered before being transported.

- It is the responsibility of the transporter, or any person having their livestock transported to ensure that animals are fit for travelling. Sick/injured animals (inability to stand, fractures, impending death, hernias or uterine prolapse, exhaustion) or those in advanced stages of pregnancy should not be transported without the prior permission from a licensed veterinary inspector.

- Animals being transported should be accompanied by the required movement documentation.

PERSONNEL

Personnel Hygiene

- Establish good hand-washing procedures.

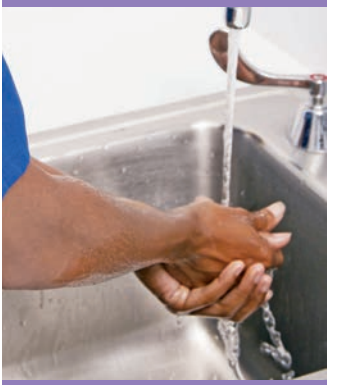
- Harvesting workers should have access to hand-washing stations.

- All workers must have easy access to clean, well-maintained toilets.

- Staff doing field work should be provided with facilities for showering and changing of clothes.

- Hand-washing stations/facilities should exist in the same ratio as

Hand-washing stations/ facilities should exist in the same ratio as toilets. Liquid soap, single-use towels and potable water should also be provided.



Establish good hand-washing procedures.

All workers must have easy access to clean, well-maintained toilets.

toilets. Liquid soap, single-use towels and potable water should also be provided.

- If portable toilets are used, they must be serviced regularly, and the sewage disposed of by qualified service providers. Lunch rooms/changing rooms and toilets should be located away from food-handling areas. Smoking, eating and drinking must be restricted to designated areas. Provide storage area for personal property.

- Sick workers should be prohibited from handling/harvesting produce.

- Persons with open cuts should not be allowed to work in food production/handling areas unless the cuts are properly covered to prevent contamination.

- Pets/wild animals should be discouraged in harvest areas.

Personnel Welfare and Safety

- Employees must be informed about the terms and conditions of their employment.

- Remuneration should be commensurate with work and responsibility.

Lunch rooms/changing rooms and toilets should be located away from food-handling areas.

If portable toilets are used, they must be serviced regularly, and the sewage disposed of by qualified service providers.

- Children must not be employed.
- Working conditions should not be detrimental to the physical and mental health of the workers.
- Produce-handling facilities should be designed to allow for comfortable working positions.
- Drinking water must be provided in sufficient quantity for all employees.
- Equipment/material used for sanitizing and cleaning should be provided for use in these areas exclusively.
- Employee accommodations must be safe, well-ventilated.

Drinking water must be provided in sufficient quantity for all employees.

Equipment/material used for sanitizing and cleaning should be provided for use in these areas exclusively.

Employee Training

- Ongoing training should be conducted with farm workers in the relevant farming procedures from approved teaching programmes (on-farm food -safety self-assessment plan, food agricultural practices in livestock areas, animal handling and welfare)
- Farmers and farm managers should be properly trained in personal hygiene and sanitation.
- Keep records of all training conducted.

TRACEABILITY

- Farmers must be registered with the competent authority.
- Animals and animal products should be traceable to the farm of origin.
- An identification system should be in place for effective tracing of animal products and by-products Identification of animals may be on an individual (cattle, sheep, goats or pigs) or group (poultry, fish) basis.
- Farmers' cooperative group's products must be traceable to the group
- Farmers must maintain movement records.
- Maps of production areas should be prepared for local agencies to assist in national planning

assorted tools and tags used in identifying livestock


Application of ear-tags

RECALL PROCEDURES

- Farmers and butchers should have a programme/system in place to ensure that every animal or flock on or leaving the farm is effectively identified.
- This programme should allow the farmer or purchaser to trace the source of livestock and its products to the farm site(s) and


Pig with ear-tags

other inputs involved in primary production.

- The programme should provide information on the origin of incoming material(s) at the farm and processing sites in case there is suspected contamination.

- The farmer's information should be linked with processors' information so that such system can trace products from the distributors to the field. Information that should be included are farm identification, animal or flock identification, date of removal or sale of livestock or products, type of transportation, the date of slaughter and the person(s) who handled the products from the primary production site to the processing establishment.

- Take immediate action (reduce, eliminate or prevent any further occurrence of the contaminant) if animal products that have been voluntarily recalled are linked to farm as the source of the contaminant.

Establish an appropriate animal identification system.

RECORD KEEPING

- Establish an appropriate animal identification system.
- Keep movement records of animals entering and leaving the farm. Records must establish traceability from farm to fork. Therefore, include the identification number of the animal, dates and destinations.
- Keep records of animal populations in facilities/on farms, births, deaths and animals purchased.

  Keep and maintain records of all livestock, feed acquisition, breeding programmes -semen or embryos used on the premises, breeding dates and outcomes and feeding plans to name a few of the records.
- Maintain records of all inspections conducted.
- Establish an HACCP (Hazard Analysis Critical Control Point) plan where appropriate.
- Record the use of medications and the withdrawal period.

Keep and maintain records of all livestock, feed acquisition, breeding programmes -semen or embryos used on the premises, breeding dates and outcomes and feeding plans to name a few of the records.

APPENDICES

Appendix 1- Water quality for Livestock

Dairy Cattle

Milk is composed of nearly 87% water. An adequate supply of quality water for dairy cattle is extremely important. Farmers typically provide cows with free access to fresh water at all times. The water requirements of lactating cows are closely related to milk production, moisture content in the feed and environmental factors such as air temperature and humidity. The cow's peak water intake generally occurs during the hours of greatest feed intake.

Table 1 identifies water use by major growth stage of dairy animal and breaks down the estimated water consumption of a milking cow by its level of milk production

Table 1. Water Consumption by Dairy Cattle
http://www.omafra.gov.on.ca/english/engineer/facts/07-023.htm

Dairy Cattle Type	Level of Milk Production (kg milk/day)	Water Requirement Range (L/day)	Average Typical Water Use (L/day)
Dairy calves (1-4 months)	-	4.9-13.2	9
Dairy calves (1-4 months)	-	14.4-36.3	25
Milking cows	13.6	68-83	115
	27.7	87-102	115
	36.3	144-136	115
	45.5	132-155	115
Dry cows	-	34-49	41

Beef Cattle

Water requirements of beef cattle are closely tied to whether the animals are lactating, the moisture content of their feed ration and environmental factors such as air temperature and relative

humidity. *Table 2* provides average daily water requirements of beef cattle.

Table 2. Water Consumption by Beef Cattle
http://www.omafra.gov.on.ca/english/engineer/facts/07-023.htm

Beef Cattle Type	Weight Range (kg)	Water Requirement Range (L/day)	Average Typical Water Use (L/day)
Feedlot cattle: Backgrounder	181-364 (400-800 lb)	15-40	25
Feedlot cattle: Short keep	364-636 (800-1,400 lb)	27-55	41
Lactating cows with calves	-	43-67	55
Dry cows, bred heifers & bulls	-	22-54	38

Swine

The housing and feeding methods and growth stage will affect the drinking water requirements of pigs. *Table 3* gives a breakdown of drinking water consumption by weight range or level of maturity.

Table 3. Water Consumption by Swine
http://www.omafra.gov.on.ca/english/engineer/facts/07-023.htm

Swine Type	Weight Range (kg)	Water Requirement Range (L/day)	Average Typical Water Use (L/day)
Weaner	7-22	1.0-3.2	2.0
Feeder pig	23-36	3.2-4.5	4.5
	36-70	4.5-7.3	4.5
	70-110	7.3-10	9
Gestating sow/boar	-	13.6-17.2	15
Lactating sow	-	18.1-22.7	20

Horses

Horses typically consume 2-3 kg of water per kilogram of dry feed. They drink more in hot weather and while doing heavy work. See *Table 4*.

Table 4. Water Consumption by Horses
http://www.omafra.gov.on.ca/english/engineer/facts/07-023.htm

Frame size (weight	Water Requirement Range (L/day)	Average Typical Water Use (L/day)
Small (500 lb)	13-20	16.5
Medium (1,000 lb)	26-39	32.5
Large (1,500 lb)	39-59	49

Sheep

Grazing sheep, particularly in the hot, drier weather will increased their water intake. Table 5 provides an estimate of water consumed daily by different categories of sheep.

Table 5. Water Consumption by Sheep
http://www.omafra.gov.on.ca/english/engineer/facts/07-023.htm

Animal Type	Weight Range (kg)	Water Requirement Range (L/day)	Average Typical Water Use (L/day)
Feeder lamb	27-50	3.6-5.2	4.4
Gestating meat ewe/ram	80	4.0-6.5	5.25
Lactating meat ewe plus unweaned offspring	80+	9.0-10.5	10
Gestating dairy ewe/ram	90	4.4-7.1	5.75
Lactating dairy ewe	90	9.4-11.4	10.4

Chickens

The feed requirements of growing poultry are directly related to bird weight. Water requirements are related to feed consumption and to the air temperature. Over half of the water intake of poultry is obtained from the feed. Automatic watering equipment ensures poultry have free access to water at all times.

Table 6 presents an estimate of daily water consumption by other common classes of chickens. Again, temperatures have a major influence on the water consumption rate expected from these other poultry classes. Egg production level will also affect the water consumption of laying hens. It has been estimated that laying hens will drink about 4 kg of water per dozen eggs produced.

Table 6. Water Consumption by Chicken Classes Other Than Broilers
)http://www.omafra.gov.on.ca/english/engineer/facts/07-023.htm

Chicken Broiler Age (weeks)	Water Requirement Range[a] (L/1,000 birds/day)	
	21°C	32°C
1-4	50-250	50-415
5-8	345-470	550-770

Appendix 2- Water quality

Water Quality

The tolerance to minerals (total salts) in water supplies varies by animal species, with poultry being most sensitive, pigs moderately sensitive and ruminant animals least sensitive. In general, a total soluble salt content of less than 1,000 mg/L is considered a low level of salinity suitable for all types of livestock. Salt contents between 1,000 mg/L and 3,000 mg/L are satisfactory for all types of livestock but may cause watery droppings in poultry or diarrhoea in livestock not accustomed to this salt level. Salt levels above 3,000 mg/L are not recommended for poultry and are more likely to result in cases of livestock refusal. Salt levels above 5,000 mg/L are not recommended for lactating animals. Avoid levels above 7,000 mg/L for all livestock.

Table 1. Desired and potential levels of pollutants in livestock water supplies.

SUBSTANCE	DESIRED RANGE	PROBLEM RANGE
Total bacteria per 100 millilitres	<200	>1,000,000
Faecal coliform per 100 millilitres	<1	>1 for young animals >10 for older animals
Faecal strep per 100 millilitres	<1	>3 for young animals >30 for older animals
pH	6.8 to 7.5	<5.5 or >8.5
Dissolved solids, milligrams per litre	< 500	>3,000
Total alkalinity, milligrams per litre	< 400	>5,000
Sulphate, milligrams per litre	< 250	>2,000
Phosphate, milligrams per litre	<1	not established
Turbidity, Jackson units	<30	not established

Source

From the Agricultural Waste Management Field Handbook, pages 1 to 16. Based on research literature and field experience in the north-eastern United States.

Note

One milligram per litre (mg per L) is approximately equal to one part per million (ppm).

Table 2. FAO Guidelines for Levels of Toxic Substances in Livestock Drinking Water[1]

CONSTITUENT (SYMBOL)	UPPER (mg/L)	LIMIT
Aluminium (Al)	5.0	
Arsenic (As)	0.2	
Beryllium (Be)[2]	0.1	
Boron (B)	5.0	
Cadmium (Cd)	0.05	
Chromium (Cr)	1.0	
Cobalt (Co)	1.0	
Copper (Cu)	0.5	
Fluoride (F)	2.0	
Iron (Fe)	not needed	
Lead (Pb)[3]	0.1	
Manganese (Mn)[4]	0.05	
Mercury (Hg)	0.01	
Nitrate + Nitrite (NO_3-N + No_2-N)	100.0	
Nitrite (NO_2-N)	10.0	
Selenium (Se)	0.05	
Vanadium (V)	0.10	
Zinc (Zn)	24.0	

[1] Adapted from National Academy of Sciences (1972).
[2] Insufficient data for livestock. Value for marine aquatic life is used here.
[3] Lead is accumulative and problems may begin at a threshold value of 0.05 mg/L.
[4] Insufficient data for livestock. Value for human drinking water used.

Table 2. FAO Water Quality Guide for Livestock and Poultry Uses[1]

Water Salinity (EC) (dS/m)	Rating	Remarks
<1.5	Excellent	Usable for all classes of livestock and poultry.
1.5 – 5.0	Very satisfactory	Usable for all classes of livestock and poultry. May cause temporary diarrhoea in livestock not accustomed to such water; watery droppings in poultry.
5.0 – 8.0	Satisfactory for livestock	May cause temporary diarrhoea or be refused at first by animals not accustomed to such water.
	Unfit for poultry	Often causes watery faeces, increased mortality and decreased growth, especially in turkeys.
8.0 – 11.0	Limited use for livestock	Usable with reasonable safety for dairy and beef cattle, sheep, swine and horses. Avoid use for pregnant or lactating animals.
	Unfit for poultry	Not acceptable for poultry.
11.0 – 16.0	Very limited use	Unfit for poultry and probably unfit for swine. Considerable risk in using for pregnant or lactating cows, horses or sheep, or for the young of these species. In general, use should be avoided, although older ruminants, horses, poultry and swine may subsist on this type of water under certain conditions.
>16.0	Not Recommended	Risks with such highly saline water are so great that it cannot be recommended for use under any condition.

Appendix 3- Local Breeds and Populations of Farm Animals

Common Breeds/Populations of Sheep in Jamaica

Dorper

Barbados Blackbelly

Livestock Production

St. Elizabeth

Katahdin

Common Breeds/Populations of Goats in Jamaica

Boer

Nubian

Alpine

Native

Common Breeds/Populations of Cattle in Jamaica

Jamaica Red Poll

Jamaica Brahman

Livestock Production

Jamaica Black

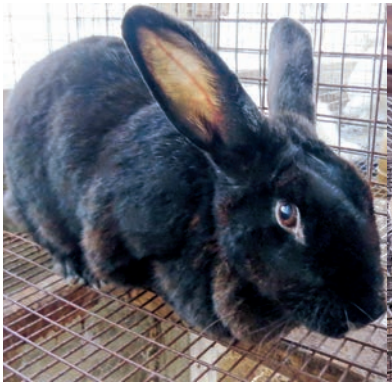
Jamaica Hope

Livestock Production

Holstein

Jersey

Common Breeds/Populations of Rabbits in Jamaica



New Zealand black

New Zealand red

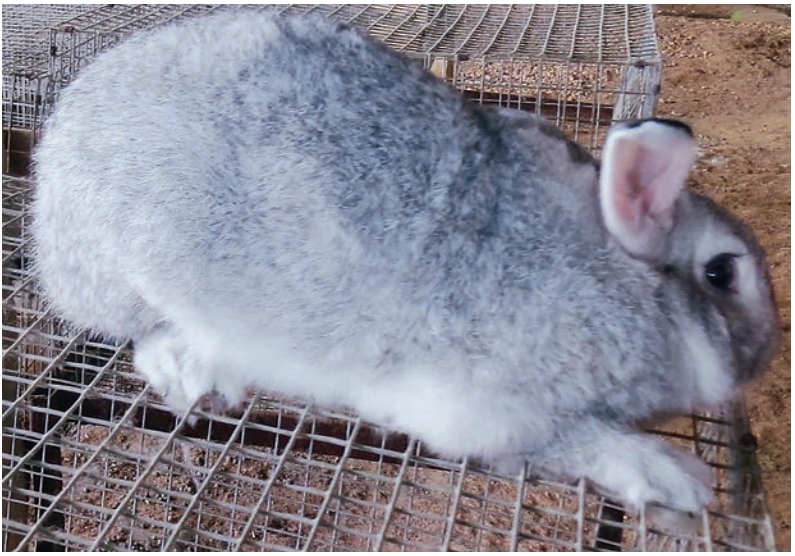
Flemish white

Flemish grey

Checkered giant

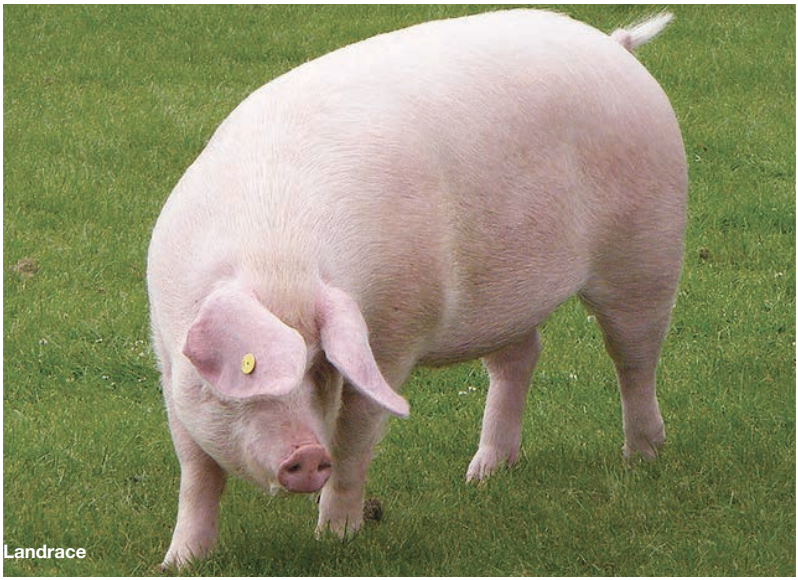
A Guide to Good Agricultural Practices (GAP) for

Livestock Production

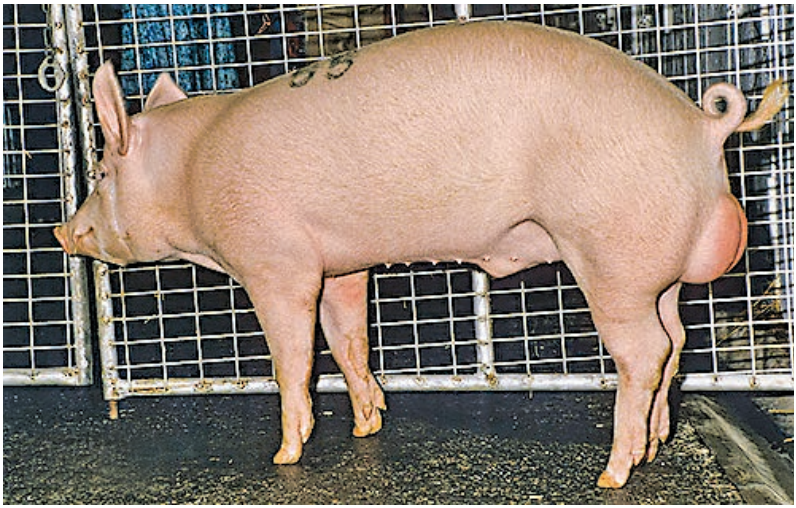


Chinchilla

Common Breeds/Populations of Pigs in Jamaica



Landrace



Large W hite

Duroc

Common Populations of Poultry (Layers) in Jamaica

Bovan Brown

Bovan White

Lohman Brown

Isa Brown

Lohman White

White Shaver

Common Populations of Poultry (Broilers) in Jamaica

Cobb

Hubbard

Ross

Appendix 5- Notifiable Diseases in Jamaica

Under the Animal (Diseases and Importation) Act

Avian (Birds)

Infectious Laryngotracheitis
Newcastle Disease (Fowl Pest/Plague)
Psittacosis (Ornithosis)
Avian Influenza

Goat & Sheep

Blue Tongue
Mange Ovine (Sheep Scab)
Variola Ovine

Bovine (cattle)

Contagious Bovine Pleuropneumonia
Epivag (Infertility)
Foot and Mouth Disease
Haemonrrhagic Septicaemia
Lumpy Skin Disease
Paralytic Rabies (Bat transmitted)
Rinderpest
Sweating Sickness
Three-day Sickness (Ephemeral Fever)
Trichomoniasis
Variola Vaccinia
Vesicular Stomatitis
Vibriosis

Multiple species

Anthrax
Brucellosis
Cochliomyia hominivorax (Screwworm)
East Cost Fever (Theileriasis)
Heart Water Fever
Infectious Keratitis
Leishmaniasis
Leptospirosis
Malignant Catarrhal Fever Virus
Pneumonia
Rabies
Rift Valley Fever (Enzootic Hepatitis)
Trypanosomiases
Tuberculosis

Livestock Production

Equine

African Horse Sickness
Epizootic Lymphangitis
Equine Encephalomyelitis
Equine Piroplasmosis
Glanders and Farcy
Sarcoptic Mange

Zoonotic

Leptospirosis
Rabies
Trypanosomiasis
Brucellosis
Bovine Spongiform Encephalopathy

swine

Atrophic Rhinitis
Aujeszky's Disease
Malignant Catarrhal Fever Virus
Pneumonia
African Swine Fever (Malta Fever)
Swine Erysipelas
Swine Fever (Hog Cholera)
Teschen Disease
Vesicular Exanthema

Dogs & Cats

Rabies

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Glossary

Alcohol test kit: *a test used to determine the bacterial count and keeping quality of milk.*

Algae: *a group of plants which contain chlorophyll (a material produced which give the leaves of plants a green colour).*

Animal husbandry: *the agricultural practice of breeding and raising livestock.*

Antibiotic: *a chemical substance produced by bacteria which has the capacity to prevent the growth of or to kill other bacteria.*

Antibiotic Test Kit: *a test used to determine the level of antibiotic residues in milk.*

Antimicrobial: *an agent that kills bacteria and reduces their multiplication or growth.*

Avian influenza: *a highly contagious disease caused by the Influenza A virus, affecting fowl, turkeys, pheasants and some wild birds.*

Biogas Digester: *equipment that can turn organic waste into usable fuel.*

Biological: *refers to all the activities which take place on a farm before the crops are sold.*

Biosecurity: *a set of preventative measures designed to reduce transmission of infectious disease, parasites, pests and invasive alien species.*

Bovine Spongiform Encephalopathy (BSE/Mad Cow Disease): *A disease of cattle caused by a prion, which leads to nervous signs (example, abnormality in gait, inability to walk) and is most often fatal. It emerged as a new disease of cattle in the United Kingdom in the 1980s as a result of feeding contaminated meat meal to cattle as a protein supplement.*

Breeding: *the mating and production of offspring by animals.*

Calibrate: *to mark (a gauge or instrument) with a standard scale of readings.*

Carcass: *the dead body of an animal.*

Castration: *the removal of the gonads (testicles) in male animals.*

Clean: *to make an object free of dirt, marks, or mess, especially by washing, wiping, or brushing.*

Condensation: *this occurs when water collects as droplets on a cold surface when humid air is in contact with it.*

Contaminate: *to make impure by exposure to or addition of a poisonous or polluting substance.*

Composting: *to make an object free of dirt, marks, or mess, especially by washing, wiping, or brushing to use decayed organic material as a plant fertilizer.*

De-beak: *to remove part of the beak in domestic fowls to prevent them from injuring other fowls.*

Disinfect: *to rid of bacteria and viruses that can be harmful to man or animals by chemical means.*

Dispose: *to get rid of by throwing away or to destroy.*

Ear cropping: *the term used to describe a cosmetic, surgical procedure in which one third of the ear flap is removed in certain animals, such as dogs, sheep, and goats.*

Effluent: *liquid waste or gas out flowing from a natural body of water, or from a human-made structure.*

Embryo: *an unborn offspring in the process of development.*

Expire: *cease to be valid, typically after a fixed period of time.*

Food safety: *a scientific discipline that describes the handling, preparation and storage of food in ways that prevent food borne illness.*

Foot and mouth disease (FMD): *An extremely contagious, acute viral disease of all cloven-footed animals (cattle, sheep, pigs, goats etc). It is characterized by lameness, fever, vesicular lesions in the mouth and around the coronets (junction between the skin and the hoof). The spread of the disease can be rapid and the virus is very resistant so that the infection is readily transmitted on inanimate objects (example footwear).*

Fracture: *the cracking or breaking of a hard object or material, e.g. a bone.*

GAPs (Good Agricultural Practices): *These are "practices" that address environmental economic and social sustainability for on-farm processes and result in safe and quality food and non-food agricultural products.*

HACCP (Hazard Analysis Critical Control Point): *A systematic procedure used to identify, evaluate and control specific hazard(s), in certain agriculture, such as food production, which is important for food safety*

Hazard: *a biological, chemical or physical agent in food or the condition of food with the potential to cause an adverse health effect.*

Hernia: *the protrusion of a portion of an organ or tissue through an abnormal opening.*

Hormone: *a chemical substance produced in the body that controls and regulates the activities of certain cells or organs. .*

Incineration: *the act of burning something completely and reducing it to ashes.*

Infection: *the invasion and multiplication of microorganisms (such as bacteria and viruses) in body tissues, causing disease.*

Infestation: *a parasitic attack or substance on the skin and/or body parts caused by insects, mites or ticks.*

Inspection: *The examination of establishments, of animals and food, and their management and production systems in order to verify compliance with the legal requirements.*

Isolate: *to separate completely from other animals.*

Legislation: *the act or process of making laws.*

Medication: *a drug or substance used to treat animals.*

Medicine: *any drug or remedy used to treat disease and maintain health.*

Microbial: *refers to or comes from a microbe (bacteria).*

Milk churn : *a tall round metal container with a lid, used to carry milk from farms.*

Mineralogical: *refers to the level of minerals in a substance.*

Nutrient: *a substance that provides nourishment essential for growth and the maintenance of life.*

Ova: *refers to eggs or the female reproductive cells.*

Pallet: *a portable platform on which goods can be moved, stacked, and stored, especially with the aid of a forklift.*

Pasture: *land covered with grass and other low plants suitable for grazing animals.*

Pathogen: *any disease-producing agent.*

Pesticides: *a substance or mixture of substances used for preventing, destroying, repelling or controlling insects or other organisms harmful to plants or to animals.*

Pest: *a destructive insect or animal that attacks crops, food or livestock.*

Pollution: *the introduction into the environment of a substance or thing that has harmful or poisonous effects.*

Primary Production: *means primary products of the soil, stock farming, hunting and fishing.*

Prescription: *an instruction written by a veterinarian that authorizes an animal to be issued with a medicine or treatment.*

Recall: *a voluntary action by a manufacturer or distributor to protect the public from products that may cause health problems or possible death. A recall is intended to remove food products from commerce when there is reason to believe the products may be adulterated or misbranded.*

Refrigeration: *the process of cooling or freezing (e.g. food) for preservative purposes.*

Regime: *a system or planned way of doing things.*

Residue: *Small amounts of chemicals that remain after application to crops, animals, water or soil.*

Sanitize: *to make clean and hygienic.*

Selection: *the action or act of carefully choosing an animal as being the best or most suitable.*

Semen: *the male reproductive fluid, containing sperms in suspension.*

Slaughter: *the killing of animals for food.*

Slurry tanks/pits: *a special tank that stores a combination of cow manure and water or water from washing the milking parlor until it is ready to be applied to the land as fertilizer for plants.*

Spoilage:the process in which food deteriorates to the point in which it is not edible to humans or its quality of edibility becomes reduced.

Tail docking: *a term used to describe the amputation of the tail in some animals, such as sheep, horses and dogs.*

Traceability: *refers to the completeness of the information about every step in the process of the food chian.*

Transmission: *the spread of a disease from one person or animal to another.*

Uterine prolapse: *the downward displacement of the uterus so that the cervix is either within or outside the vaginal opening. In some cases the whole uterus can be seen outside the vaginal opening.*

Ventilation: *the process or act of supplying a house or room continuously with fresh air.*

Vermin: *these are undesirable animals and birds that are believed to be harmful to crops, farm animals, or game, or that carry disease, for example rodents.*

Withdrawal time: *describes the time needed after drug administration to any food animal where drug residues may be found in marketed meats, eggs, organs, or other edible products.*

Zoonotic disease: *any disease(s) caused by infectious agents that can be transmitted between animals and humans and vice versa*

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