



**Ministry of Agriculture**  
**Quarantine Import Export Inspection and Certification**  
**Directorate**



**Feedlot Health Management and Biosecurity**  
**Guidelines**

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## **Acronyms**

ECTAD: Emergency Centre for Transboundary Animal Diseases

FAO: Food and Agriculture Organization of the United Nations

TADs: Transboundary diseases

FMD: Foot and Mouth Disease

CBPP: Contagious Bovine Pleuropneumonia

PPR: Peste des Petits Ruminants

°C: Degree Celsius

hrs: hours

NaOH: Sodium hydroxide

LSD: Lumpy skin disease

cm: Centimeter

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## **Foreword**

This technical document entitled “Feedlot Health Management and Biosecurity Guidelines” is a combined and revised version of the two separate Guidelines and Standard Operating Procedures that were developed from 2008 to 2010 by the then Ministry of Agriculture and Rural Development in collaboration with the Ethiopian Sanitary and Phytosanitary and Livestock and Meat Marketing Program under the title “Feedlot Health Management Guidelines and Biosecurity Guidelines”.

This technical document is revised and developed by the Ministry of Agriculture in collaboration with the FAO-ECTAD Ethiopia, “Improving Sanitary Capacity and Facilitating Export of Livestock and Livestock Products from Ethiopia Project”. The main goal of the project is to increase exports of meat and livestock to benefit Ethiopian livestock producers and exporters and to promote national economic development.

This document is intended to provide guidance for feedlot operators how to maximize profitability of their feedlot operations by applying better animal health management and biosecurity measures that will help to prevent possible introduction and transmission of diseases in to and within their facilities and controlling them when they occur before they cause serious economic losses.

At this point, the Quarantine Import Export Inspection and Certification Directorate of the Ministry of Agriculture would like to thank the FAO-ECTAD Ethiopia, Improving Sanitary Capacity and Facilitating Export of Livestock and Livestock Products from Ethiopia Project, for providing the necessary technical and financial support required for reviewing, updating and publishing this guidelines document.

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## **Part I: General**

### **1. Introduction**

Feedlot is a confined area with watering and feeding facilities where livestock are held and completely hand or mechanically fed for the purpose of production. This includes any adjoining or nearby area where such livestock are, tended, loaded and unloaded; the animal wastes from the feedlot are accumulated or treated pending removal or disposal and facilities for feeding such livestock are maintained or in which the feed is stored, handled or prepared.

A feedlot is an extremely sensitive production system which runs up considerable costs for animal purchase, feed, personnel, etc. The economic success of a feedlot operation is dependent upon whether or not the daily gains of the animals cover their maintenance costs per day, and above all whether or not a profit can be returned. Success therefore heavily depends on excellent management, a favorable economic climate, and relative freedom from unfortunate events such as disease epidemics.

Therefore, the main prerequisite for the successful running of such an operation is that the animals gain weight from the day they arrive, and that there is neither stagnation nor any loss of weight because of disease or poor management practices. Apart from this, the value of individual animals is so high that total losses must be excluded. For this reason, the animal health service is responsible for not allowing diseases which reduce daily weight gains or cause mortalities in animals. Outbreaks of disease with high morbidity and a high mortality rate must not occur under any circumstances.

International trade in livestock and livestock products continues to be seriously hindered by presence of trans-boundary animal diseases as these diseases once transmitted to importing countries have the capacity to spread rapidly and cause substantial socioeconomic and human health impacts. To ensure a sustainable and safe livestock and livestock products export trade, exporting countries are required to abide by sanitary and phytosanitary requirements set in international animal health standards. This requires implementation of standard animal health measures along the different stages of the livestock feedlot operations. For this to happen, feedlot

operators that want to finish their animals for the purpose of export need to know, understand and be committed to comply with the regulatory requirements set for the purpose of minimizing economic losses at feedlot facilities as well as promoting the livestock export trade.

### **1.1 Objective**

The objective of this guidelines document is to outline basic health management and biosecurity requirements that can be used as reference guide for feedlot operators and their employees in establishing and running viable feedlot business operations.

### **1.2 Scope**

The scope of application of this guidelines document is limited to feedlot operations that finish cattle, sheep, goat and camel for export purposes.

## **2. Definition of terms**

**Pre-purchase inspection:** Is an animal health screening process conducted at livestock markets by feedlot operator employees to exclude diseased animals from entering the feedlot operation

**Feedlot:** is a confined yard area with watering and feeding facilities where livestock are held and completely hand or mechanically fed for the purpose of production

**Biosecurity:** means a set of management and physical measures designed to reduce the risk of introduction, establishment and spread of animal diseases, infections or infestations to, from and within an animal population.

**Feedlot veterinarian:** refers to a veterinarian who is a full-time employee of a feedlot operation to manage and oversee the overall feedlot health and production related activities.

chemical disinfectants

**Disease surveillance:** refers to the regular health inspection and production data analysis and interpretation activities conducted at feedlot facilities to detect early any abnormal signs of disease conditions or drop in the performance of feedlot animals so as to make appropriate measures.

**Pests:** refers to insect or small animal population such as nuisance and disease-causing flies that affect the health and productivity status of feedlot animals.

**Triggers:** refers to events that signify an unusual animal health situation such as high rate of mortality, morbidity, drop in daily weight gain etc that need immediate action are happening within the feedlot facility

**Trans-boundary animal diseases:** are those epidemic diseases which are highly contagious or transmissible and have the potential for very rapid spread, irrespective of national borders, causing serious socio-economic and possibly public health consequences

**Holding ground:** It is a facility owned and managed by private company where animals purchased from nearby markets are assembled for a short period of time to enable the clients and the traders to complete the consignment

**Sanitation:** refers to all processes and principles which are applied to ensure that micro-organism count is kept at a safer or lower level.

**Hygiene:** refers to a condition that includes the concepts of “clean” and “safe” (in other words the absence of harmful organisms or substances).

**Disinfection:** The process or act of destroying pathogenic microorganisms.

**Flight zone:** is the distance within which a person can approach an animal before it moves away.

**Animal welfare:** means the physical and mental state of an animal in relation to the conditions in which it lives and dies.

**Regulatory authority:** refers to the federal authority in charge of regulating the establishment and operations of import-export livestock quarantine facilities of the country

### **3. Animal welfare and handling**

#### **3.1 Welfare principles**

Animal welfare is the physical and mental state of an animal in relation to the conditions in which it lives and dies. An animal experiences good welfare if the animal is healthy, comfortable, well nourished, safe, is not suffering from unpleasant states such as pain, fear and distress, and is able to express behaviors that are important for its physical and mental state.

Good animal welfare requires, among other things, disease prevention and appropriate veterinary care, shelter, management and nutrition, safe environment, humane handling and humane slaughter or killing.

The general principles for the welfare of animals in livestock production systems include:

- Animals chosen for introduction into new environments should be suited to the local climate and able to adapt to local diseases, parasites and nutrition.
- The physical environment, including the walking surface, resting surface, etc., should be suited to the species so as to minimize risk of injury and transmission of diseases to animals.
- The physical environment should allow comfortable resting, safe and comfortable movement and the opportunity to perform types of natural behavior.
- Social grouping of animals should be managed to allow positive social behavior and minimize injury, distress and chronic fear.
- For housed animals, air quality, temperature and humidity should support good animal health.
- Animals should have access to sufficient feed and water, suited to the animals' age and needs.
- Diseases and parasites should be prevented and controlled as much as possible through good management practices. Animals with serious health problems should be isolated and treated promptly or killed humanely if treatment is not feasible or recovery is unlikely.
- The handling of animals should not cause injury, panic, lasting fear or avoidable stress.
- Owners and handlers should have sufficient skill and knowledge to ensure that animals are treated in accordance with these principles.

### **3.2 Livestock handling**

Knowing how to handle livestock will minimize the impact of unnecessary stressful conditions to animals and prevent handlers from injuries. Handlers should understand the behavior and instincts of the animals so they can intuitively predict animal behavior and thus reduce stress on them. Animal handlers should be experienced and competent in handling and moving farm livestock, and understand the behavior patterns of animals and the underlying principles necessary to carry out their tasks.

Livestock behave in various ways, depending on circumstances and, to a large extent, species. The behavior of individual animals or groups of animals will vary, depending on their breed, sex, temperament and age and the way in which they have been reared and handled. Most domestic livestock are kept in groups and follow a leader by instinct. Animals which are likely to harm each other in a group situation should not be mixed. The desire of some animals to control their personal space should be taken into account in designing facilities.

Domestic animals will try to escape if any person approaches closer than a certain distance. This critical distance, which defines the flight zone, varies among species and individuals of the same species, and depends upon previous contact with humans. Animals reared in close proximity to humans i.e. tame have a smaller flight zone, whereas those kept in free range or extensive systems may have flight zones which may vary from one meter to many meters. Animal handlers should avoid sudden penetration of the flight zone which may cause a panic reaction which could lead to aggression or attempted escape.

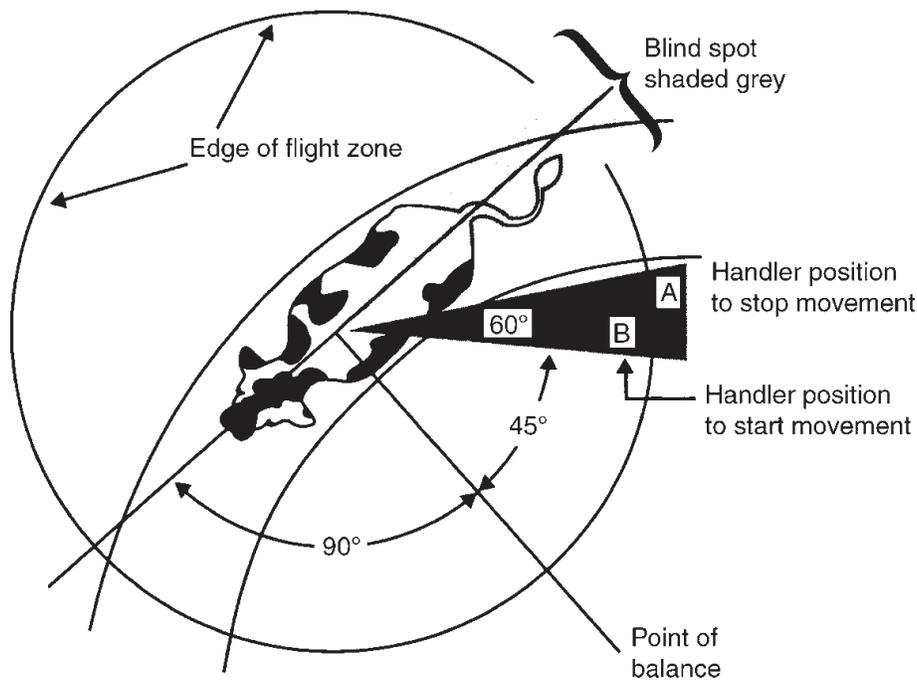


Fig. 1. An example of a flight zone for cattle

*Animal handlers* should use the point of balance at the animal's shoulder to move animals, adopting a position behind the point of balance to move an animal forward and in front of the point of balance to move it backward.

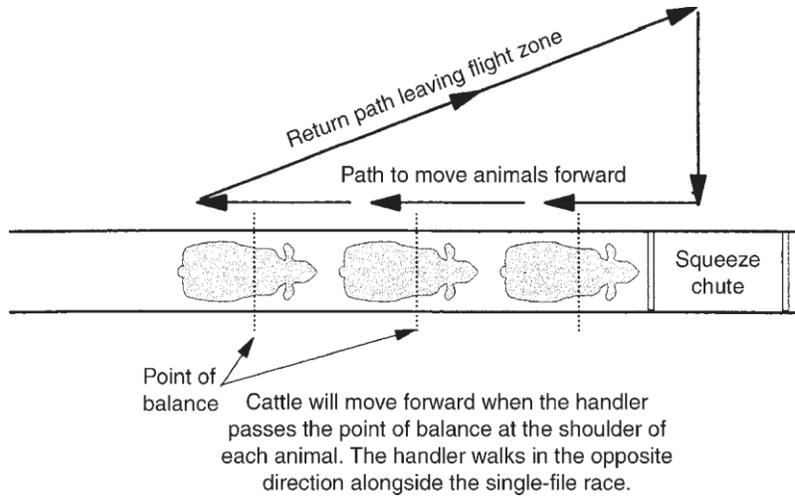


Fig. 2. Handler movement pattern to move cattle forward

Domestic animals have wide-angle vision but only have limited forward binocular vision and poor perception of depth. This means that they can detect objects and movements beside and behind them, but can only judge distances directly ahead. To prevent them from becoming afraid of distractions outside confines, the holding pens, crowd races, inspection crushes and gates should have solid sides. Although most domestic animals have a highly sensitive sense of smell, they react in different ways smells. Strange smells, may cause animals to become unsettled and excited. This is noticeable in animals, which are strangers to each other or to surrounding conditions. Pre-mixing of these animals will reduce tension and fighting amongst strangers.

Animals which are unaccustomed to frequent contact with humans, such as ranched or extensively raised stock, will not allow people to approach or touch them easily. These animals will require more elaborate loading ramps, pens and handling races than tame ones. People loading extensively raised animals need to understand the psychology of the animal in order to prevent injury to either the animal or themselves. On the other hand, those animals raised intensively and animals living in close contact with humans are generally tamer and easier to handle.

Ruminant animals can discriminate between different colors. The ruminant eye is most sensitive to *yellow-green and blue light*. Livestock, particularly cattle are very sensitive to light contrast. This causes them to hesitate at and shy away from gates, and changes from wet to dry or

concrete to metal floors. Therefore, lighting should be even and diffuse and harsh contrasts of light and dark should be avoided. Animals have a tendency to move from a darker to a lighter place. Extra, indirect lighting may help in moving animals in pens. Adding a light to illuminate a race entrance or removing a lamp to eliminate a sparkling reflection will often improve animal movement. Animals will shy at moving things, as well as darkness and they may refuse to enter a dark place.

All species of animals may hesitate and refuse to move when they see things in the race that scare them, such as sparkling reflections, dangling chains, moving people or equipment, shadows or water dripping. A calm animal will stop and look right at the distraction that scares it. If air is blowing towards the animal this should be changed. If animals hesitate, the distraction that causes this should be removed instead of increasing the force used to move them. Rapidly moving objects scare animals. Forcing them to quickly approach a vehicle, pen or building may cause them to panic.

Domestic animals can hear over a greater range of frequencies than humans and are more sensitive to higher frequencies. They tend to be alarmed by constant loud noise and by sudden noises, which may cause them to panic. Reducing noises from equipment and people will improve animal movement, reduce stress and the risk of injury. People should not yell, whistle or make loud noises. Clanging and banging of equipment will unsettle animals and can be reduced by installing rubber stops. Hissing air is one of the worst noises that should be eliminated.

### **3.2.1 Relevance of humane livestock handling practices**

Livestock handling during loading, transport to the market, quarantine stations or slaughterhouses, off-loading, holding and moving for slaughter involve recurrent operations that may lead to unnecessary suffering, injury and loss of production of animals. There are many advantages to improving conditions for livestock destined for export. These will have the benefit of improvements in livestock productivity, quality, welfare and personnel safety. Improving animal welfare is necessary not only to reduce suffering of animals but also to satisfy the requirements of different governments and trading partners, who are becoming more concerned with welfare of food animals. Moreover, better conditions of livestock operations will also improve safety of personnel who work in the livestock and meat export value chain.

### **3.2.2 Principles for livestock handling**

The first principle of livestock handling is to avoid getting the animal excited. Following rough handling, it takes up to 30 minutes for an animal to calm down and return to normal. Animal handling facilities should be well-built and functional and designed to ensure ease of handling and prevention of injury of animals.

All structures where livestock walk, such as gates, fences and chutes, should be regularly checked to prevent bruises, falls and crippling injuries. Sharp edges with a small diameter, such as angle irons, exposed pipe ends, a protruding bolt, nail or piece of metal should be eliminated in livestock processing establishments.

The following principles should be followed when trekking, loading, transporting, unloading, holding of animals at the deferent stages of the livestock export trade value chain:

- Never beat animals with a stick, rods, pipe, whip or stone, and avoid painful procedures such as tail twisting, etc.
- Never throw or drop or drag animals by body parts such as their tail, head, horns, ears, limbs, etc.
- Animals should have adequate access to feed and water.
- Stock pens and other enclosures used for feeding, watering, and resting should have sufficient space for all animals to lie down at the same time.
- Prior to moving animals, inspect the fences, pens, and working facility to ensure proper care and ease of handling. Make all necessary repairs and remove protruding bolts, nails, etc.
- Look for all surfaces which have tufts of hair or shiny surfaces since they are bruise points and need to be avoided.
- Handle animals gently and humanely at all times to avoid injury or extra stress.
- Keep animals calm in the crowd areas, so that they will be calm coming into the facility. Move them slowly and quietly.
- Refrain from yelling, screaming, or making sudden movements near animals.
- Animal handling staffs should be trained on importance and methods of implementing humane handling practices for animals.
- Maintain a clean and dry environment and ensure sufficient ventilation to minimize exposure of animals to dust and toxic gasses e.g. ammonia etc.

### **3.2.3 Handling cattle**

The most reliable technique for handling cattle is to make use of the animal's predictable instinctive behavior which occurs when cattle flight zones are penetrated. All cattle have a flight zone - the circle of safety around an animal. Understanding the underlying principles of the flight zone reduces stress on cattle and minimizes accidents to handlers. The rule of thumb when working in the flight zone is that the animals will move away if a person penetrates the zone. As such, handlers can approach the animal from different angles and positions to affect different movement in the cattle.

- To move an animal forward – the handler needs to approach the animal just behind its shoulder.
- To move an animal backward – the handler needs to approach the animal just in front of its shoulder.
- To make an animal turn right or left –the handler needs to approach the animal head-on. When the handler moves to the left of the animal, it will turn right. When the handler moves to the right of the animal, it will turn left.

Handlers must be careful not to get too close to the animal. If the flight zone is penetrated too deeply, some animals will panic and try to escape. Handlers also should avoid yelling while around the cattle as it can startle the animals. When cattle are moved together, a collective flight zone develops around the group.

When the handler penetrates the large zone, the herd moves together. Cattle like to see where they are going, so their heads are a good indicator of the direction in which they are going. When moving a herd, good handlers watch the heads of the cattle closely to anticipate where they animals are moving, allowing handlers to take action before a problem occurs.

In general, livestock handlers in quarantine facilities should give considerations to the following points while handling cattle:

- Handle cattle quietly but firmly and with adequate equipment
- Never to lose temper and needlessly upset an animal

- Animals separated from the group or placed in strange surroundings, may behave differently and be unpredictable. Consequently, extreme care must be taken when handling them.
- Prepare yards and equipment before begin operations.
- Always keep equipment, fences, yards, gates and sheds in good repair.
- Yards should be of adequate size and strength to match the animals being handled.
- Be continually aware of the position of stock in a stockyard. Never turn your back on cattle, and always be on alert for the possibility of large animals moving suddenly and crushing you against fences and other structures.
- When enlisting stock, stand to the side of the drafting gate. Animals may run you down in an attempt to get through.
- If attacked by a bull beyond the reach of safety, do not panic and run. Face the animal and move toward it. This way it is easier to out-manuever and possibly frighten the animal.
- Animals requiring attention should be well secured before being treated. Injuries incurred as a result of struggling animals constitute the majority of accidents involving stock.
- When treating bulls in a crush, never stand too close to their head. The animal may throw itself around and cause serious injury to anyone standing in close proximity.
- When working with stock, safety footwear with specially reinforced toe-caps and soles should be worn to prevent crushed feet.
- Be sure to be either out of kicking range or hard up against the animal's body, never mid-way between. This way, should the animal contact you, it cannot do so with any force.
- What so ever an animal may appear submissive, constant care should be exercised in handling, so that control is maintained over its actions at all times.
- An animal exhibiting signs of aggression should be immediately left alone, or the necessary safety precautions implemented i.e. isolation.

### **3.2.4 Handling of sheep**

Sheep have a high level of herding instinct and handling techniques should use this behavior to handle with minimal stress.

- ❖ A person must handle sheep in a reasonable manner.
- ❖ A person handling sheep must not:
  - lift sheep off the ground by only one leg, or by the head, ears, horns, neck, tail or wool, unless in an emergency; or
  - throw or drop sheep, except to land on their feet from a height less than 1.5 meters; or
  - strike, punch or kick sheep in an unreasonable manner; or
  - drag sheep that are not standing by only one leg, except in an emergency to allow safe handling, lifting, treatment or humane killing; or
  - drag sheep by only the ears, or tail; or
  - drag sheep by mechanical means, except in an emergency, for the minimum distance to allow safe handling, lifting, treatment or humane killing.
- ❖ During assembling, sheep should be rested or allowed to slow if they show signs of laboured breathing.
- ❖ Sheep should be returned to feed and water as soon as possible after handling.
- ❖ Sheep should be moved quietly through yards with the minimum forcing.
- ❖ Care should be taken with gates to avoid injury to sheep.

### **3.2.5 Handling of goats**

Goats should be handled to take advantage of their natural herding behaviour when yarding and handling.

- ❖ A person in charge must take reasonable action, where goats have not adapted to confinement within a reasonable period of time.
- ❖ People handling goats should have an understanding of the flight zone and low stress stock handling methods.
- ❖ Drafting of goats into classes should be done as soon as possible.
- ❖ Goats should be grouped with others of the same class and where possible with others that they are already familiar with to minimize bullying and riding behavior.
- ❖ Goats should be caught and restrained with care.

- ❖ Goats should be picked up by supporting the whole body
- ❖ Horned goats may be restrained by holding the horn at its base, not at its tip, as this may cause the horn to break.
- ❖ Tails should not be twisted when moving goats.
- ❖ Goats should be returned to feed and water as soon as possible after handling.
- ❖ Goats should be restrained and isolated for the minimum time necessary. Goats isolated in a pen should be provided with a pen mate, unless isolated due to illness or quarantine, then they should be housed within sight and sound of other goats.
- ❖ The use of handling aids should be limited to the minimum needed to complete the task.
- ❖ After droving, goats should be provided with suitable conditions and given time to settle down before further handling takes place or before the onset of darkness.
- ❖ During droving, goats should be rested or allowed to walk slowly if they show signs of laboured breathing.
- ❖ Overcrowding of goats in races, pens or yards should be avoided.
- ❖ A person handling goat must not:
  - lift goats off the ground by only one leg, or by the head, ears, horns, neck, tail or fibre, unless in an emergency; or
  - drop goats, except to land on their feet from a height of less than 1.5 meters; or
  - strike, punch or kick goats; or
  - drag goats that are not standing by only one leg, except in an emergency to allow safe handling, lifting, treatment or humane killing; or
  - drag goats by only the ears, horns, or tail; or
  - drag goats by mechanical means, except in an emergency, for the minimum distance to allow safe handling, lifting, treatment or humane killing.

### **3.2.6 Handling of camels**

The following points need to be considered while handling camel:

- Although normally placid, when frightened or aggressive they will chest butt, spit or kick out sideways with back feet
- Walking with arms outstretched will normally suffice to guide their movements.
- To handle individual camels, put one hand around the base of the neck, while placing the other on the rump.

- Do not roughly handle the camel. They are generally regarded as having weak necks and thus prone to injury in that region.
- If halter led, do not jerk the halter with undue force.
- When traveling on vehicles, they will generally sit down once the vehicle starts to move.

#### **4. Overview of feedlot operation**

To ensure safe livestock and livestock products trade and meet international standards, animal health measures must be applied along the different stages of feedlot operations. This shows emphasis need to be given where and which animals to purchase based on the local and individual animals' health status.

The current national export feedlot operations system is structured in such a way that:

- Animals are sourced from low disease risk areas
- Purchased animals are segregated for few days in identified holding areas
- Animals are moved to feedlot facilities for high level care and finishing
- Finished animals are moved to main quarantine stations for final health inspection and certification for export.

#### **5. Sourcing feedlot animals**

To minimize the risk of disease introduction in to the feedlot facilities, identification of purchase areas and conducting pre-purchase inspection of animals are two of the most important animal health measures that should be applied before purchasing is done. These activities are to be carried out primarily by the private veterinarian in charge of feedlot animal health services.

##### **5.1 Identify livestock purchase areas**

Endemic transboundary diseases such as FMD, CBPP, PPR and others have serious economic consequences if introduced to feedlot facilities. As much as practicable, the possibility of disease introduction through purchased animals should be minimized. For this to happen, feedlot operators/veterinarians should apply the following procedures:

- List down the administrative areas (zone, woreda) from which the operator is interested to source animals
- Find out and map the seasonal livestock movement pattern of the identified potential livestock source areas
- Find out livestock trade routes and major livestock markets found in the identified administrative units that are accessible for livestock purchase
- Maintain regular contact with public and private veterinarians working in each one of the designated purchases woreda and zone animal health services for presence of disease outbreaks
- Review the disease outbreak data by the type of disease reported and analyze its potential level of risk for disease dissemination in to the feedlot
- Make decision which areas to avoid for livestock purchase and for how long
- Ensure the purchasing team is heading to recommended areas to purchase animals

## **5.2 Pre-purchase inspection of animals**

Pre-purchase inspection will serve to identify and reject non-compliant animals from purchasing and moving them into holding grounds. Pre-purchase inspection will be carried out by an animal health personnel representing the feedlot operator under a close supervision and guidance of the feedlot veterinarian. The pre-purchase inspector should be trained by the feedlot veterinarian and/or the public animal health service on recognition of healthy and diseased animals.

Pre-purchase inspection involves visual and physical evaluation of the animal to identify any conditions that may indicate disease or any physical abnormalities that may compromise their weight gain performances. During pre-purchase inspections animals showing signs of diseases or visible physical injuries will be identified and excluded from purchase.

### **5.2.1 Signs of healthy animals**

The inspector should know the following are signs that indicate healthy conditions in animals:

- ❖ They have good body condition and have a shiny appearance of their hair coats.
- ❖ They are well muscled and the ribs and pelvic bones are not prominent.
- ❖ They have clear, bright and moist eyes
- ❖ The muzzle is slightly moist and cool.

- ❖ They have a smooth and flexible skin free of any lumps, loose scabs, flakes or debris.
- ❖ The mucous membrane around the conjunctiva and inside the mouth is pink in colour, smooth and it glistens.
- ❖ They walk in balanced rhythms with the head swaying or nodding slightly in time with the animal's movement.
- ❖ When standing, the animal is comfortable on all four feet.
- ❖ In the absence of a physical exertion, the movement of breathing in and out should be silent. However, the respiration rate can also increase following exercise or an increase in environmental temperature or humidity.

### **5.2.2 Major signs of disease**

The inspector should look for the following general signs which indicate that an animal may have a condition or disease that renders it to be unfit purchase. In general, the signs of a disease or disease condition are grouped into the following broad categories, namely, body movement, body condition and signs on the body's surface.

#### **A. Abnormal body movement**

Some examples of the signs associated with body movement, action and position include:

- ❖ Lameness or limping
- ❖ Stiffness and pain
- ❖ The animal may appear extremely nervous or restless, excessively anxious or upset, or stagger or circle.
- ❖ Animals may have muscle tremors or shivering, hold their head to one side, or have any number of abnormal gaits.
- ❖ Animals may strain and assume abnormal body positions such as straining, arching of the back, tucking in of the abdomen (stomach), and extending the neck and tail.

#### **B. Abnormal body condition**

The inspector may also see animals with signs associated with abnormal body condition that may include:

- ❖ Animals that are extremely thin and weak: the inspector may see animals that are thin and weak due to chronic disease problems. Remember that thinness alone may not be an abnormal sign since some animals may be very thin as a result of underfeeding but remain bright, alert, have a good appetite, and show no other abnormal signs. These animals should not be rejected from being purchased.
- ❖ Respiratory distress such as labored or rapid breathing. These signs are commonly seen in animals with lung disorders such as pneumonia. Coughing and sneezing are other signs associated with pneumonia and other respiratory disorders.
- ❖ Animals may exhibit pain. Pain may be manifested by signs such as groaning, grunting, or grinding of teeth.
- ❖ Animals may have difficulty drinking and swallowing or appear to be blind.

### **C. Abnormal signs on the body's surface**

- ❖ Injuries and fractures are included
- ❖ Abnormal growths, swellings, and enlargements such as hernias.
- ❖ A variety of skin lesions including a roughened, dry, or dehydrated hair coat.
- ❖ superficial ulcers, sores, blisters or vesicles, particularly around the feet or around the mouth. There are several diseases that may cause these signs, including Foot-and Mouth Disease
- ❖ The colour of exposed membranes of the body, such as the gums or the eyes, may be an indication of a disease condition. The membranes may appear reddened, or very pale, or may have a yellowish colour to them.
- ❖ Abnormal body discharges or abnormal odours. Abnormal discharges can include excessive salivation, discharge from the nostrils, diarrhea, blood.

## **Part II: Feedlot health management practices**

### **1. Operations at holding ground**

Livestock holding ground is a facility owned and managed by a private company where animals purchased from nearby market places are assembled for a short period of time to enable the clients and the traders to complete the consignment. The following activities are to be conducted on holding grounds:

- ❖ Assemble animals purchased from nearby markets
- ❖ Provide sufficient feed and water to animals

- ❖ Provide identifications (by using ear tags or other similar methods approved by the regulatory authority) for those animals that were not identified before
- ❖ Inspect animals for signs of disease and isolate them if found affected
- ❖ Provide necessary treatments such as for internal and external parasites.
- ❖ Record all animal health interventions and keep records
- ❖ Use standard livestock transport trucks and transport the animals to the feedlot facilities

## **2. Operations at a feedlot site**

Feedlot is the final stage along the chain of activities conducted to produce healthy and well-conditioned slaughter animals that satisfy international trade and consumer requirements. Although basic animal health care and disease prevention activities are to be conducted during the initial stages of the feedlot operation starting from identification of purchase areas, pre-purchase inspection and treatments at holding grounds, the mere confinement of large number of animals in a relatively small area by itself demands implementation of a well-planned disease prevention and control interventions. For this to happen, the role and responsibilities of the various actors involved in the day to day activities of the feedlot operation along with the major animal health management interventions are presented below.

### **2.1 Role and responsibilities**

#### **2.1.1 Role of regulatory authority**

The federal regulatory authority has the following role and responsibilities:

- Introduce national guidelines and standards required for establishment and operation of feedlot facilities to interested individuals and companies
- Assess and evaluate site selection and construction activities of feedlot facilities and issue operational license when found satisfactory
- Organize different short-term training programs for feedlot operators and their employees
- Conduct scheduled visits to feedlot facilities to monitor and supervise their technical operations
- Issue movement permits to feedlot animals to move them to the main export quarantine station after they complete their fattening cycle

#### **2.1.2 Role of feedlot operators**

Feedlot operators should ensure that site selection and construction are carried out in accordance with the provisions outlined in specified national guidelines. The basic needs of the animals with

regard to ventilation, drainage, and manure removal are met. Walking surfaces should be level, non-slip, and all surfaces should ideally be cleanable and if possible washable. As a general principle, closed and all-in all-out systems are recommended.

Feedlot operators should give emphasis to:

- ❖ Ensure that facilities and equipment are properly designed and maintained to prevent physical injury.
- ❖ Ensure that all handling or treatment facilities are safe and appropriate to the species in question, facilitate correct and calm handling and restraint, and that their construction is such that the likelihood of injury is minimized.
- ❖ Purchase animals only from areas with known health statuses
- ❖ Ensure that animals are handled and transported in accordance with national guidelines
- ❖ Ensure availability of sufficient clean water and feed materials before introducing cattle
- ❖ Employ a veterinarian who can provide overall guidance and professional assistance on feedlot animal health and improved husbandry practices
- ❖ Recruit other necessary human resource and get them properly trained on basic animal health, feeding, welfare, and sanitation issues
- ❖ Provide all required working apparel, equipment, drugs and other required inputs that are to be used for execution of feedlot activities
- ❖ Comply with regulations concerning restrictions on animal movements.
- ❖ Ensure, wherever necessary, that newly arrived animals are given time to adapt to new feeding regimes, are not overcrowded, and that their health is regularly monitored.
- ❖ Ensure continuously monitoring of the health status of animals kept in the feedlot; isolation of sick animals; and provision of care and further investigation of identified animals
- ❖ Ensure that equipment and instruments used in the feedlot are suitably cleaned and disinfected between each use.
- ❖ Ensure effective disposal of dead animals so that other animals cannot come into contact with carcasses and that carcasses do not contaminate the drinking water and feeds.
- ❖ Be aware of and comply with restrictions on veterinary medicines or biological products for use in livestock.

- ❖ Ensure storage, handling and use of veterinary medicines and biological products in accordance with the manufacturer's instructions.
- ❖ Ensure maintenance of detailed records of the origin and use of all medicines and biological products, including batch numbers, dates of administration, doses, individuals or groups treated and withdrawal times.

### **2.1.3 Role of feedlot employees**

The following are the major activities that need to be conducted by feedlot personnel:

- Unload the animals at appropriately constructed and designated unloading area located within the feedlot facility without much excitement
- Upon entry to the feedlot, weigh each one of the animals
- Keep similar groups that were together while they were in the holding ground.
- Provide feed and clean water to the animals
- Inspect regularly all areas of the feedlot particularly the delivery of feed and water, the general well-being of livestock, and any unusual characteristics of each feeding pen based on the specific time schedule set for the feedlot and record the findings
- Monitor the feed consumption and weight gain patterns on a regular basis and record for further analysis
- When animals showing signs of sickness or injury are found, isolate and provide them with the required care
- Report any disease incident immediately to the veterinarian in charge and seek his professional guidance
- Ensure that all treatments or procedures are carried out using instruments that are appropriate, correctly calibrated, kept clean and sanitized.
- Ensure all treated animals stay in the feedlot until the relevant withdrawal times have been met and certified by the veterinarian
- Ensure cleanliness and sanitary status of the feedlot on daily basis
- Monitor the adherence of feedlot employees to the dressing code and feedlot operational guidelines while they are on duty

- After finishing their stay in feedlot facility and before leaving the feedlot premise for slaughter or export purposes, acquire the necessary supportive documents required to accompany the lot on its way to slaughter abattoirs, quarantine stations or port of shipment.
- Keep records of animals leaving the feedlot as well as their destination and date of dispatch.

#### **2.1.4 Role of feedlot veterinarian**

The feedlot operation needs to have its own personnel trained on basic animal health services delivery practices so that he/she can manage doing some activities under the guidance and supervision of the feedlot veterinarian. A feedlot veterinarian should be employed by feedlot operator to conduct activities that will ensure optimal animal health and production status in feedlot animals. The feedlot veterinarian is therefore expected to do, among other things, the following:

- Assist the feedlot operator in identifying potential areas where livestock can be sourced
- Maintain close contact with veterinary personnel of identified livestock source areas and collect information on livestock disease status of the areas
- Regularly analyze disease information data and guide the feedlot operators where to send the livestock purchasing team to buy animals
- Ensure pre-inspection personnel are part of the livestock purchase team and appropriate measures taken to exclude diseased animals from purchase
- Provide technical guidance on humane handling of purchased animals during loading, transporting and unloading
- Ensure animals are properly identified while they are in holding grounds
- Supervise animals kept in holding grounds are well managed, properly identified, treated as may be required
- Ensure that animals are properly loaded from holding grounds; transported and unloaded in the feedlot
- Train feedlot personnel in areas of basic animal health care, feeding, sanitation, welfare and bio-security issues on a regular basis and monitor their competency.
- Ensure the availability of appropriate animal health equipment and tools that will be used for disease diagnosis, sampling, drugs and vaccines administration etc

- Develop appropriate treatment and vaccination protocols that the feedlot personnel should follow in their routine practices
- Ensure and supervise animals are vaccinated for diseases for which the specific importing country requires that may include diseases such as Anthrax, Blackleg, Foot and Mouth Disease, Contagious Bovine Pleuro-Pneumonia, Pasteurellosis etc as may be required.
- Ensure and monitor animals are treated for diseases such as internal and external parasites.
- Examine sick animals; make reasonably accurate diagnoses and ensure administration of rational therapy based on established treatment protocol.
- Perform necropsies when death occur and training feedlot personnel to do disease monitoring and care provision.
- Regularly examine, analyze, and interpret animal health and production data and make recommendations in a written report.
- Supervise the cleanliness, disinfection and waste disposal status of the feedlot
- Work closely with the federal regulatory inspectors in all aspects of animal health and husbandry practices of the feedlot
- Request the federal regulatory inspectors in charge for getting health certificates and movement permits before animals are transported to the main export quarantine station.
- Make the necessary prior arrangements with the main export quarantine inspectors and/or operators for making a reservation for animals to be quarantined.
- Ensure animals are transported to the main export quarantine station with dedicated transport
- Submit reports regularly to the relevant regulatory authority using the reporting formats distributed by the regulatory authority

## **2.2 Specific activities**

### **2.2.1 Training**

The federal regulatory authority should periodically assess the needs of feedlot stakeholders and provide the necessary training for their employees. Therefore, feedlot operators, in consultation with the feedlot veterinarian in charge, should be aware of available training programs that may be required for the successful operation of their businesses and actively seek and use available relevant training opportunities for themselves and their employees.

### **2.2.2 Hygiene and disease prevention**

Measures aimed at preserving cleanliness, preventing pathogen build-up and breaking possible pathways of transmission are essential in the management of any modern feedlot enterprise, regardless of the species or the production system. Therefore, precautions should aim at:

- ❖ Maintaining the hygiene and safety of all facilities through application of regular cleaning and sanitary procedures.
- ❖ Reduce contact between healthy animals and potentially infected animals through timely isolation and treatment.
- ❖ Ensure workers remain healthy, appropriately dressed and implement hygienic working procedures.
- ❖ Take all appropriate measures to prevent contamination by vehicles entering and traversing the feedlot.
- ❖ Minimizing contact between livestock and visitors, and taking all hygienic measures necessary to reduce the possible introduction of pathogens and contaminants.
- ❖ Ensuring availability of balanced feed rations and clean water supply to livestock
- ❖ Owners or managers of feedlots should use chemical disinfectants (for tyre and foot baths) and cleansers strictly in accordance with the manufacturer's instructions, ensuring that disinfected or cleaned surfaces and facilities are properly rinsed

### **2.2.3 Feeding and watering**

Livestock should have their appetites satisfied. Dry feeds normally contain about 10% moisture. Feed mixtures should contain sufficient digestible energy, protein and minerals to allow for the healthy growth of different classes of stock. Requirements vary with age, growth rate so the quality and digestibility of the ration must be adjusted to supply the needs of the animals within the limits of appetite. Diets should be formulated with reference to tables of nutritional data on feeds and tables showing the requirements of different species and classes of livestock.

Owners or managers of feedlots should:

- Acquire feed materials from reliable sources and areas that are believed not having recognizable risk of contamination with disease causing agents

- Manage the feed supply chain (transport, storage, and feeding) in such a way as to protect feed from contamination with biological, chemical, and physical hazards and minimize deterioration.
- Ensure that water of acceptable quality for animal consumption is used for watering stock.
- Keep records of all feed types purchased and dates of acquisition and feeding; where possible the animals/groups of animals fed should be clearly recorded.
- Self-mixed feeds should have their ingredients and mixes recorded, as well as dates of feeding and animals fed as specified above.
- Where on-farm manufacture of feeds is practiced, ensure that nutritional levels are adequate to promote animal health, growth and production and follow procedures designed to minimize contamination and prevent the inclusion of undesirable feed components.
- Ensure that changes to feeding regimes are, wherever possible, gradual, and that the regimes are safe and follow acceptable feeding practices specified for the species of animals to be fed.
- Daily feed consumption should be monitored and stale or spoiled feed should be removed daily.
- Shy feeders should be removed to pens with a lower stocking density and / or fed a higher roughage diet.
- Prevent animal access to places where feeds are stored and to places where hazardous chemicals are stored.
- Ensure that antibiotics are not used in feed for growth promoting purposes in the absence of any public health safety assessment and recommendations.
- Ensure that ruminant protein is not fed to ruminants.
- Regularly inspect and, when necessary, clean and disinfect feeding and watering facilities such as drinkers and troughs.
- Ensure that effluents are managed in such a way that drinking water sources are not contaminated.
- Ensure that when feed additives are used, that manufacturer's instructions as to dosage levels and withdrawal periods are followed, and that records of usage of such feed additives are kept.

#### **2.2.4 Diseases to focus in feedlots**

Different diseases may occur in feedlot facilities. The major ones that need emphasis include the following:

**Infectious diseases:** Feedlot livestock are vulnerable to a range of infectious diseases. Livestock should be vaccinated for such endemic diseases for which they are susceptible and for those required by customers within days after they arrive in feedlot facilities. Appropriate and effective drugs need to be identified, stocked and administered when specific diseases that need therapeutic interventions occur.

**Nutritional diseases:** All ruminants, when confined and fed, have special dietary requirements that must be observed to maintain good rumen function – this ensures good animal health and maximizes production. Because feed is the major portion of the cost per unit of body weight gain, it is imperative that the diet be least-cost and at the same time provides the nutrients that will allow optimum growth and finishing. Most of the emphasis in feedlot nutrition has been on developing least-cost diets that will support a maximum growth rate without any deleterious effects. The precise specifications of the diets may be the responsibility of the nutritionist but the feedlot veterinarian frequently must evaluate the quality of the feed delivery system. This means checking to determine if the livestock are fed on time, is the feed mixed properly, is the feed intake intermittent because of inclement weather or muddy ground surfaces.

Specific nutrient deficiencies are said to be extremely rare in large feedlots but may occur in a small farm feedlot that prepare their own feedlot diet with little or no attention to the necessity for supplementation of home-grown feeds. The nutritionally related diseases of well-managed feedlot livestock are few but may be the cause of large economic losses when they occur. They include:

- Carbohydrate engorgement (grain overload or D-lactic acidosis);
- Ruminant tympany or feedlot bloat;
- Feeding errors, for example, accidental incorporation of an excessive amount of a feed additive or the sudden unintended changes in the ingredient composition of the diet.

**Acidosis:** Acidosis occurs in ruminants when they are introduced to grain too quickly or changed from one grain to another. In this situation, the rumen does not have time to adapt and excessive lactic acid is produced. Sub-clinical acidosis can cause reduced feed intake and production while

more extreme cases can result in lameness (laminitis) and even death. *The best way to prevent acidosis is to feed sufficient roughage and gradually introduce grain to the ration.*

**Feedlot bloat:** Bloat can occur for several reasons in feedlots, but is usually associated with a nutritional imbalance, such as too much high-quality alfalfa hay, or as a result of acidosis. It's important to ensure sufficient roughage in the diet, remembering that high quality alfalfa hay does not always constitute roughage.

**Lameness and foot rot:** Lameness and foot rot can be a problem if the feet of feedlot animals are damaged. Preventing muddy conditions through maintenance of the pen surface and good drainage in the pens (especially around water troughs) is essential to ensure feet problems and lameness are reduced.

**Parasitic diseases:** Most internal and external parasites that can cause disease in feedlot animals can be effectively controlled during their stay in holding grounds.

**Feedlot flies:** Flies are a problem in many feedlots, due to the abundance of available food and breeding medium (dung). They can pose a problem due to their number and annoying behavior which can result in agitation and reduced feed intake. Flies also have disease carrying potential. It is recommended that feedlot operators should develop and implement an integrated pest management program to control nuisance flies on their feedlots. Integrated pest management program programs should incorporate cultural, biological and chemical methods to provide cost-effective fly control with minimal insecticide usage. The effective implementation of an integrated pest management program for nuisance flies in feedlots can lead to improved animal welfare and production gains.

### **2.2.5 Use of veterinary drugs and vaccines in the feedlot**

**Treatment protocols:** The veterinarian must specify procedures for the clinical management of sick livestock and provide a standard protocol that outlines specific treatments for disease syndromes, including drug dosages, treatment intervals, routes of administration, and withdrawal times. The effectiveness of the treatment protocol should be regularly evaluated by determining the response rates for the various treatment regimens. The failure of feedlots to use regular, competent veterinary supervision and to analyze treatment protocols often leads to the

use of many different drugs indiscriminately, which results in an over expenditure for treatment and often an increase in the case fatality rate.

**Use of antibiotics:** Antibiotics are used in livestock production to treat disease. Antibiotics are one type of antimicrobial or medications that fight bacterial infections in both humans and animals. Antimicrobials made for cattle are used to help an animal regain or maintain superior health and produce safe meat. In addition to being an important and necessary tool in protecting animal health and well-being, antimicrobials may also be added to the feed of food producing animals to increase feed efficiency, as well as preventing infections.

The antibiotics use in feedlot facilities should give emphasis to the following points:

- Use on those antibiotics that the Federal Veterinary Drugs Administration and Control Authority has approved for their use in the country
- Follow the manufacturers instruction to determine the withdrawal time
- Avoid antibiotics use unless their use is justified

### **2.2.6 Feedlot disease surveillance**

A focal point in the management of disease in the feedlot is the capacity to make a rapid and accurate diagnosis. This necessitates a good surveillance system, a careful full-time search for sick animals, appropriate facilities for examination and treatment of sick animals, accurate identification of animals, and first-class laboratory facilities.

Regular surveillance by the feedlot animal health personnel in charge of animal health is crucial for good health management of feedlot operations.

The feedlot veterinarian should be in charge of ensuring training and supervision of feedlot employees on methods and importance of regular inspection, detection, isolation, care provision and reporting of sick animals. Employees should be regularly updated on recognition of sick animals, major signs of common diseases, disease prevention and containment measures when detected. Adequate personnel should be available to thoroughly inspect each pen of livestock at

least twice daily. It is the veterinarian's responsibility to ensure that these personnel are adequately trained to ensure they are fit for doing the job.

#### **2.2.6.1 Surveillance methods**

The feeding pens must be under surveillance every day and on at least two occasions per day. When certain epidemics of disease occur, it is necessary to check the animals as often as every six hours on a 24-hour basis for several days in order to detect new cases as early as possible. The surveillance can be done by walking through pens slowly with the least possible excitement. Pen checking is an art that requires constant practice and attention to small details. A pen checker (inspector) needs to be observant, knowledgeable, trustworthy and must have sharp eyes if early diagnosis is to be made.

The signs of ill health that the feedlot inspectors (pen checkers) should be aware in order to determine the presence of illness include the following:

- Animals standing in isolation;
- Rapid respiratory rate, coughing and nasal discharge;
- Animals not coming up to the feed bunk and appearing empty;
- Reluctance to rise or move, walking slowly.
- Appear to be lame or have other abnormal gait, such as knuckling of the fetlocks or dragging of the toes;
- Crusted muzzle, nasal discharge, sunken eyes;
- Rough, dry-looking hair coat;
- Diarrhea with or without blood in the feces;
- Straining to urinate with grunting and tail switching;
- Drooped head and ears with an arched back and others;

Livestock showing these or other obvious signs of illness should be examined more closely in the isolation area. It is important to follow the standard treatment protocol recommended by the veterinarian in charge of the feedlot operation. Recovered animals should be put back into their original pens. Animals which do not recover or that relapse after the first treatment are retreated.

### **2.2.7 Feedlot records**

Records are essential to monitor the incidence of disease, response to treatment, and production performance, and they should be analyzed regularly by the veterinarian, feedlot manager and if possible, by the nutritionist. Feedlot records should include, among other things, the following:

- ❖ All animal populations on the feedlot (groups or individuals as relevant).
- ❖ All animal arrivals, including their identification marks or devices (if there is any), origin and date of arrival, to ensure that incoming animals are traceable to their sources.
- ❖ Movements of other animals around the feedlot.
- ❖ Changes to feeding or health regimes, and any other management changes that may occur.
- ❖ Origin and use of all feeds, drugs, disinfectants, herbicides and other consumable items used in the feedlot.
- ❖ The necessary output records should include the numbers of animals shown signs of disease, the dates of treatment, the treatment response report according to drug used; the daily mortality, the causes of death, production costs, the health and production performance of the lot of livestock (including morbidity, mortality, body weight gain), the costs of feed per unit of gain, the number of days on feed, and the profit or loss.
- ❖ Each animal treated should be individually identified and the information recorded on the treatment report. Treatment personnel should record the feeding pen, lot number, body temperature, body weight, disease suspected, treatment given, treatment outcome (recovered, not-recovered, relapsed) and location of the animal after treatment (eg, which isolation pen).
- ❖ The causes of death as determined by necropsy should be summarized on a regular basis
- ❖ The performance record and feeding summary sections include average daily gain, total feed consumption, feed conversion ratios and cost per unit of body weight gain, mortality rates, culling rate, and medical costs.
- ❖ The financial summary should provide the profit or loss on an individual and lot basis.
- ❖ Known diseases/infections, diseased/infected animals and mortalities, as far as possible giving details such as dates, diagnoses, animals affected, treatments and results.

### **2.2.8 Dust control**

Dust generally should not be a major problem with good feedlot design and management. Dust will tend to occur during prolonged dry periods and the worst problems develop during the late afternoon and at dusk when the cattle start moving around. This creates health problems for the cattle, staff and neighbors. Different approaches which may be used to prevent dust from being created in feedlot pens and on roads and service areas are:

- ❖ Remove manure frequently
- ❖ Maintain stocking density within allowable limits, which has the effect of maintaining the pad in a moister state
- ❖ Application of water. Where water is applied to control dust, the aim should be to apply initially approximately 10 - 15 liters/square meter over the whole area followed by follow-up applications at 10-day intervals or when necessary.

### **Part III: Feedlot biosecurity**

#### **1. What is Biosecurity?**

Biosecurity is those practices that prevent or mitigate disease from entering, spreading within or being released from operations that may contain livestock. The goal of biosecurity is to stop transmission of disease-causing agents by preventing, minimizing or controlling cross-contamination of body fluids between animals, animals to feed and animals to equipment that may directly or indirectly contact animals. Biosecurity management practices are designed to prevent the spread of disease by minimizing the movement of biologic organisms and their vectors onto and within your operation.

While developing and maintaining biosecurity is difficult, it is the cheapest, most effective means of disease control available, and no disease prevention program will work without it.

Infectious diseases can be spread between operations through:

- introduction of diseased livestock or healthy livestock incubating disease;
- introduction of healthy livestock who have recovered from disease but are now carriers;
- vehicles, equipment, clothing and shoes of visitors or employees who move between herds;

- contact with inanimate objects that are contaminated with disease organisms;
- carcasses of dead livestock that have not been disposed of properly;
- feedstuffs, especially high-risk feedstuff which could be contaminated with feces,
- impure water (surface drainage water, etc.);
- manure handling and aerosolized manure and dust; and
- contact with other animals including wildlife, rodents, birds and insects

## **2. Biosecurity and its importance**

Biosecurity is an important tool that producers can use to manage disease in livestock feedlot industry. Diseases such as Foot and Mouth Disease, Contagious Bovine Pleuropneumonia, Contagious Caprine Pleuropneumonia, Peste des Petits Ruminants and others that are known to be endemic in parts of the country pose considerable risks to the success of feedlot operations. If one or more of these diseases are introduced in to feedlot operations, they have the capacity to inflict substantial economic losses to the feedlot operators.

Therefore, biosecurity is important to individual feedlot operators for its role in managing endemic diseases. Biosecurity is also important to individual producers and the feedlot industry as a whole for its role in managing emerging or new diseases, and re-emerging or pre-existing diseases returning often in a different or more virulent form.

## **3. Development and implementation of a bio-security plan**

Implementation of a bio-security plan in feedlot facilities is a process that requires commitment at all levels (owner, management, veterinary staff and all workers) in the facility. The facility should prepare a bio-security plan taking in to account the Federal Animal Health's disease risk assessment findings and recommended guidelines in consultation with the veterinarian in charge of feedlot animal health. The feedlot facility needs to conduct the following activities:

- ❖ assign a person responsible for monitoring the bio-security levels in the facility and regularly train its employees on bio-security.
- ❖ allocate the necessary resources needed for the implementation of the plan.
- ❖ take corrective measures to address identified bio-security gaps
- ❖ regularly reviews and update the written plan on annual basis.

#### **4. Major biosecurity focus areas**

This guideline addresses four major feedlot biosecurity focus areas as listed below:

- ❖ Manage and minimize animal movement risks
- ❖ Manage the movement of people, vehicles, equipment, and tools
- ❖ Manage animal health practices
- ❖ Educate, plan, record

#### **4.1 Manage and minimize animal movement risks**

##### **4.1.1 Manage commingling of animals**

Commingling occurs when livestock from one operation mix or come into contact with livestock from another operation. This can take place in livestock markets where animals coming from different localities are comingled. It can also happen while purchased animals are transported to the holding grounds and feedlot facilities.

When animals from different sources are mingled together, they may be exposed to diseases present in other animals. Feedlot operators should recognize and manage the risks that accompany these practices. The following measures are recommended to reduce chances of comingling and minimizing the disease risks associated with it:

- Keep purchased animals away from other herds while being transported and during their stay in holding grounds
- Keep new coming groups of purchased animals from different markets or different days in the same market place, in pens separate from the groups that have arrived earlier.
- Ensure animals leaving the holding facility are transported to the feedlot facility in clean transport vehicles without mixing them with other animals
- Use effective physical barriers such as double fenced perimeters to minimize the chances of comingling of animals
- If animals start showing disease symptoms in a group, isolate and keep them in a separate pen where care is provided and their health status monitored

#### **4.1.2 Minimize contact with other species of animals**

Animals of other species, whether from the same or a different operation, may present disease risks that are not being managed within the feedlot herd in question. A disease that is latent or not expressed in another species could be expressed with significant and negative impact in feedlot animals. Minimizing direct and indirect contact with animals from another operation, or from other species, helps prevent the introduction of diseases in to the feedlot. Perimeter fences that can effectively exclude other animals should be erected based on the relevant guidelines.

#### **4.2 Manage the movement of people, vehicles, equipment, and tools**

People and vehicles, equipment, veterinary or other tools and items such as clothing and shoes are all capable of carrying disease into and within the feedlot operation. The people who are capable of carrying disease include owners, staff and service personnel including animal health personnel, and visitors.

From a biosecurity or disease risk management perspective, movements involving entry to and within the production area, including the feedlot pens, barns, and other areas where livestock are kept require managing more than others. Managing the movements of people, vehicles, equipment, and tools in the production area is therefore important to minimize disease incidence and the spread of disease.

##### **4.2.1 Apply sanitation practices**

It is important for the feedlot to develop sanitation protocols to manage the disease risks posed by the degree to which a person's clothing, footwear, skin, or objects is/are contaminated with a disease and the production area in which to apply sanitation practices. Accordingly, certain sanitation practices should be applied at the feedlot: at entry, within, and/or on exit.

To apply the required sanitation practices, the feedlot operator should do the following:

- ❖ All employees should be trained on the bio-security plan of the facility and updated regularly.
- ❖ Employees should apply and enforce the bio-security plan. Compliance must be monitored by Bio-security officer on a regular basis.

- ❖ Animal health personnel should take care while visiting different facilities. They should wear clean working clothes and boots intended for such purpose only before entering livestock facilities,
- ❖ Allocate dedicated clothing and footwear at each site for personnel working in the feedlot
- ❖ Take special prequestionnaire measures for those employees who might have contact with animals of their own or other operations
- ❖ Restrict temporary personnel from accessing the production area for a period of time after their last contact with livestock and farm sites in another area or operation.
- ❖ Clean, and in some instances, disinfect, equipment and tools that are used for isolated animals prior to their use with other animals.

#### **4.2.2 Minimize the use of the same equipment for both “clean” and “dirty” tasks**

Clean tasks are those in which equipment surfaces come into contact with feed, water, and new bedding. Dirty tasks are those in which equipment surfaces come into contact with deadstock, manure, used bedding, and garbage. Having certain equipment dedicated for clean tasks only, such as handling feed, water, and bedding, and different equipment dedicated for dirty tasks, such as handling deadstock, manure, and garbage, helps prevent disease spread. If there is shortage of separate equipment for different tasks, the following alternative approaches should be followed:

- ❖ Clean, and in some cases, disinfect, the contact surfaces on equipment used for dirty tasks prior to using that equipment for clean tasks.
- ❖ Use dedicated equipment and, if possible, single-use needles to administer treatments for isolated and sick animals.

#### **4.2.3 Ensure reliability of production area perimeters**

Perimeters such as fences are used to keep some livestock in and other livestock out. They minimize the potential contact with animals of other operations or wildlife. Natural and fenced perimeters help to minimize what might otherwise be an uninhibited commingling of animals and introduction of disease. The following guidelines should be followed:

- ❖ The perimeters of production areas should generally be sufficient to contain livestock.
- ❖ Access points should have gates, or some other means to prevent access.

- ❖ To prevent closer physical contact of between animals, the perimeter fences should be double with 10 meters distance between them

#### **4.2.4 Biosecurity signs posts**

Biosecurity signs can assist producers in controlling the traffic flow of people and equipment on, off and within the farmyard and around the production area that holds the livestock. These signs may also be used to inform the public, visitors and/or personnel that they should not enter, or to indicate where and to whom they should report. Biosecurity signs should be posted at:

- ❖ gates or entries to the feedlot area where livestock are kept,
- ❖ the farmyard where the office is located and equipment is maintained.
- ❖ at key points along the perimeters between access points.

#### **4.2.5. Isolate and manage sick animals**

Sick animals with infectious diseases contaminate livestock facilities by air and by their discharges (e.g. urine, manure, saliva, pus, etc). Such animals are important source of disease agents and require a special management regime which should allow prevention and control of the introduced disease. The following measures need to be applied:

- ❖ Isolate sick animals, in a designated isolation pen, at first sign of illness and check all the other animals in the feedlot.
- ❖ Provide the necessary care for sick and isolated animals
- ❖ Report to the veterinarian in charge as soon as possible
- ❖ The disease condition must be recorded and reported to the veterinarian in charge for his/her further action
- ❖ Avoid movement of operators and tools between isolation pen (sick animals) and other animal premises.
- ❖ Animals isolated for disease conditions should leave the isolation pen when the animal health officer in charge permits to do so
- ❖ Organic materials such as soil, plant debris, milk, blood, pus, and manure often minimize the effectiveness of some disinfectants by inactivating them or protecting germs being exposed to the disinfectant's active ingredients. Chlorine-based disinfectants are especially subject to this problem. Therefore, collect such infected materials and dispose them by burning or by burying in a separate dedicated area.

- ❖ If the pen has a soil floor, exposure to direct sunlight may facilitate killing of non-spore forming germs or leave the pens open for a week to allow desiccation.
- ❖ If the pen floor is concrete, expose the contaminated area to 2% NaOH for several hours (3-5 hrs).
- ❖ All equipment in contact with infected animal including building used to isolate must be disinfected properly.

#### **4.2.6 Manage and dispose manure**

Preventing direct and indirect contact between accumulated manure and livestock, or wildlife, is another important means of controlling disease. This helps to minimize disease spread from where it may exist to other livestock or wildlife from which it can spread further.

The following are some suggested manure management practices for biosecurity purposes:

- ❖ Use dedicated equipment, or clean and disinfect prior to alternate uses.
- ❖ Regularly remove manure accumulations from key production areas
- ❖ Inactivate potential disease agents in manure through composting and weathering.
- ❖ Maintain manure-free roads and tracks for use by service vehicles accessing critical locations within the farmyard and possibly the production area.

#### **4.2.7 Disposal of dead animals**

Any feedlot will have animals to dispose of and adequate arrangements must be made to handle this on an on-going basis. Dead animals must be disposed of immediately upon discovery. To minimize disease transfer carcasses should be removed from the pens using a front-end loader rather than dragging the carcass as this may release body fluids along the drag path. Post mortems should be performed in designated areas before carcass disposal. The most common methods used for carcass disposal are burial and burning. Burning should only be used where burial is not possible.

**Burial:** If burial is undertaken the minimum requirements are listed below:

- Burial pits should be established in low permeability soils on a site well removed from surface waters, drainage lines or gullies.
- The pit must be located so that all water runoff is directed away from the pit.
- Pits should be deep but relatively narrow, and are best dug using an excavator.

- The bottom of the pit must be at least 2 meters above the highest ground water level at the site.
- Avoid rocky areas.
- If the pit is in lighter soils the pit should be lined with at least 600 millimeters of clay.
- The carcass should be immediately covered by at least 500 mm of soil to reduce odour and exclude flies and vermin.
- The pit can be progressively filled with carcasses until sufficient pit capacity remains for the pit to be sealed with clay and compacted to a minimum depth of 1 meter.
- The site where mortalities are buried should be recorded for future reference.

#### **4.2.8 Minimize pests**

Minimizing direct or indirect contact between certain types of pests and livestock can reduce some disease risks. Within the feedlot environment, accumulated manure under fence lines and in drains, spilt feed around feed troughs, manure piles, silage pits and the edges of sedimentation basins and holding ponds provide ideal locations for fly breeding. If manure management is inadequate there is considerable potential for fly breeding. Uncontrolled fly populations may lead to reduced production from flies ‘worrying’ the feedlot animals. When a pest population is a factor in the disease risk, feedlot producers should apply alternate disease risk management practices.

For reducing nuisance fly population, the following measures should be applied:

- To prevent flies breeding in the undisturbed manure, any livestock pens which are to remain empty for more than four days must be cleared of all manure within three days of the animals being removed.
- Particular attention must be paid to removal of solid wastes under fence lines and around feed and water troughs. Manure which accumulates in the drains and the settling lagoon after rain creates odours and can provide fly breeding sites.
- This sediment should be removed as soon as it is dry enough to handle.
- Feed which is spilt in the feed preparation area and around the cattle feed troughs must be removed weekly.

- Fly populations which develop in the feed preparation and the manure stock pile areas should be controlled by the use of chemical sprays or baits registered for the purpose.
- Pens and confinement areas should be cleaned to reduce fly numbers
- Regular feedlot maintenance minimizes breeding sites
- Use insecticides selectively through rotating chemical groups
- Apply targeted insecticide use on fly hot spot areas
- Spray fly resting sites but not manure

#### **4.2.9 Manage Livestock to reduce exposure to wildlife**

Direct or indirect contact between livestock and wildlife may result in exposure to a range of diseases. Wildlife can also serve as a (latent) carrier for diseases common to livestock, creating the possibility for undetected introduction and spread within the herd. Livestock should be managed to minimize direct or indirect contact and commingling with wildlife.

#### **4.2.10 Ensure facilities are maintained and clean**

Keeping facilities, including buildings, barns, chutes, fences, and pens, clean helps reduce the possible transfer of disease within a herd. To keep facilities maintained and clean, feedlots should do the following:

- ❖ Maintain their condition to ensure animals are contained and can be handled safely.
- ❖ Avoid contamination of compound by using a foot bath (0.5 x 1.5 m) made of 10 cm thick mass concrete and filled with freshly prepared 2% NaOH solution or others as recommended by relevant guidelines.
- ❖ Regularly clean and disinfect e.g. all equipment including those in contact with sick animals and isolation pens.
- ❖ Clean and disinfect all equipment and pens after any disease outbreak.
- ❖ Clean and disinfect pens after use by livestock.
- ❖ Insist all workers/visitors use foot dip which is changed regularly.
- ❖ Wash hands with soap before and after handling sick animals.
- ❖ Remove dead animals and dispose carcasses by burial or burning.
- ❖ Boot bottoms must be cleaned mechanically to remove soil or manure before rolling in the disinfectant bath.
- ❖ Clean regularly animal premises, feeding and watering equipment and facility compound.

- ❖ Ensure that garbage is stored in a manner that prevents contact with live animals and that it is removed regularly.

#### **4.2.11 Manage movement of visitors**

- ❖ Facilities should be secured to deny unauthorized access to visitors.
- ❖ Signs should be posted to direct visitors to report to a main office.
- ❖ Find out where they have been in the past two weeks.
- ❖ Determine if visitors have been on other facilities prior to visiting the facility.
- ❖ Keep accurate and current records of these visits including dates.
- ❖ Provide boots and clean or disposable coveralls for visitors, record where they go in the operation.
- ❖ Attempt to minimize the number of access routes to facilities. Consider locking gates or otherwise obstructing alternative entry sites.
- ❖ The office area frequented by visitors or by outsiders must be separated by lockable gate from the rest of the facilities where animal premises, stores, isolation pen etc. are established.
- ❖ Allocate a parking area outside the facility compound for visitors' vehicles.
- ❖ All persons entering livestock facilities must be briefed for awareness on the biosecurity plan.

#### **4.2.12 Vehicles**

- ❖ Provide facilities for washing and disinfecting tires, mud flaps, etc.
- ❖ Ensure truckers have cleaned and disinfected their truck or trailer before transporting animals.
- ❖ Clean and disinfect vehicle after visiting other livestock facilities.
- ❖ Avoid unnecessary entry of vehicles (private vehicles) in to the facility compound.
- ❖ Specify designated parking places for authorized visitors.

#### **4.3. Manage animal health practices**

The general health of all animals within the feedlot, and how that health is maintained, is a critical factor that should be managed to effectively minimize disease within the feedlot herd. Healthy animals are less prone to disease, yet many of the day-to-day activities and events that normally occur within feedlot operations are also opportunities for disease transmission. Accordingly, the processes and practices by which producers maintain their animals in a

generally healthy state are critical to the overall biosecurity of the operation. Activities, practices, and processes that contribute to normal, healthy, and cost-effective production within feedlot operations include the following:

#### **4.3.1 Employ and maintain a working relationship with a veterinarian**

The success and profitability of a feedlot operation mainly depends, among other things, on the application of current scientific knowledge and practical skills on animal health management and improved husbandry practices. Feedlot operators need to understand the importance of employing a qualified, experienced and motivated veterinarian to manage and oversee the day to day animal health, nutrition, housing, welfare and related feedlot activities.

Contractual arrangement with a private veterinarian is not advised for the sake of minimizing the possible feedlot to feedlot disease transmission risks through the visits he/she may make to other farms and/or feedlots as part of his/her routine professional practices.

#### **4.3.2 Manage feedlot health according to a documented health plan**

A feedlot health plan must be prepared by the feedlot in consultation with the veterinarian. Preparing the feedlot health plan, in collaboration with a veterinarian helps to ensure that all risks are considered, that a set of disease risk management responses has been planned that considers the costs and the benefits, and that there will be something to evaluate at a later date to determine whether improvements or changes are required. The plan should address the following key elements:

- ❖ Feed and nutrition
- ❖ Risk identification (e.g. disease risks relevant to the operation);
- ❖ Risk management (e.g. practices for buying, vaccination, testing, segregation);
- ❖ Disease surveillance (e.g. regular scheduled monitoring by knowledgeable personnel);
- ❖ Response management (e.g. managing specific conditions that trigger a specific response);
- ❖ Record-keeping (e.g. documenting the application of disease risk management practices such as vaccinations and tests, as well as incidents and responses); and
- ❖ Review (e.g. reviewing records and comparing with the feedlot health plan to identify shortfalls and necessary changes to specific elements of the feedlot health plan).

### **4.3.3 Water, feed, medications, and other inputs supply**

All inputs are a possible means of introducing disease to livestock. Most inputs also serve as necessary ingredients in the treatment and recovery from a disease. Inputs, in general, play an important role in managing the health of livestock. To minimize disease risks, the feedlot operators should:

- ❖ Use water sources should be used for livestock where possible.
- ❖ Wells and water sources should be protected from intentional tampering and accidental contamination by wastewater and manure.
- ❖ Where possible, watercourses and stagnant ponds should be fenced off.
- ❖ Water troughs should be cleaned regularly.
- ❖ Buy feed materials from reliable sources or areas to minimize the risk of contamination with pathogens
- ❖ Store feed in clean, dry and well-ventilated areas with no direct access to strangers.
- ❖ Arrange a separate feeding/watering area for isolated and sick animals.
- ❖ Clean all feed storage areas before adding new batches of feed materials.
- ❖ When there are signs of mold growth and spoilage problems, the design and feed out procedures should be re-evaluated and corrected accordingly.
- ❖ Feed troughs should be cleaned out daily.
- ❖ Feed refusals should not be stored more than 24 hours to prevent spoilage.
- ❖ Fecal and urine contamination of feed and water should be prevented.
- ❖ Feed should be kept dry and clean to avoid growth of fungus and bacteria.
- ❖ Feed bins and troughs should be regularly cleaned and washed.
- ❖ Discard all waste feed in a manner which will not attract pests.
- ❖ Mineral blocks should be secured well off the ground.
- ❖ Feed and water troughs should be smooth sided and their edges should be a minimum of 90 cm for cattle and camel and 30 cm for sheep and goats off the ground.
- ❖ Feed and feed materials should be sourced from suppliers with protocols to ensure raw materials are harvested, stored, and transported properly;
- ❖ Protect feed and supplements from contamination by wildlife with fencing or tarps.
- ❖ Protect harvested feed and supplements from weathering, contamination with manure, and/or deadstock.

- ❖ Purchase medications and supplements from reliable sources
- ❖ Store medications according to manufacturer's recommendations.
- ❖ All chemicals and pesticides should be properly labelled and stored separately

#### **4.4 Educate, plan, record**

Personnel working with/or in contact with livestock feedlot operations should be made aware of and understand the importance of:

- biosecurity in their operation and the industry;
- the biosecurity plan for their operation and protocols for tasks within the operation for which they are responsible;
- knowing what action to take in typical and unusual animal health situations; and
- maintaining basic records on an ongoing basis.

##### **4.4.1 Importance of education, planning, and record-keeping for biosecurity**

When producers are aware of the importance of biosecurity and the potential disease risks, they can take appropriate actions to enhance biosecurity within their operation. Planning and record-keeping are two important activities that enhance feedlot biosecurity. Planning assists producers in responding to the range of risks that potentially exist. Record-keeping helps producers evaluate and improve their plans and is critical in controlling an outbreak. The following actions support effective training, planning and record-keeping practices:

- ❖ ***Ensure personnel understand how and why biosecurity is applied on their operation:***  
Personnel, namely owners, managers, staff should receive training on biosecurity measures that apply to the operation as a whole, and their role. Additional training should be provided when new procedures are introduced or roles change. Managers and owners should also review the application of biosecurity practices with personnel and visitors to identify changes where necessary.
- ❖ ***Develop, document, and maintain a biosecurity plan specific to the needs of the operation:***  
Producers have to document a biosecurity plan for their operation. A biosecurity plan should address the following key areas, with current practices documented in simple written protocols:
  - sanitation;
  - incoming animals;

- deadstock and manure disposal; and
- initial disease response and high-risk biosecurity.

There is significant value in thinking through present biosecurity practices, evaluating for effectiveness in minimizing or preventing known or potential disease risks, documenting for training and consistent application by all personnel within the operation, and evaluating regularly to identify necessary changes or improvements.

❖ ***Ensure personnel know how to respond to the range of animal health situations:***

Identify the typical animal health situations for the operation by considering those that have already occurred within the operation and in the area, together with those that might occur. These would include the range of diseases such as FMD, CBPP, LSD, bloat, acidosis etc that are present in the area or its environment periodically. Standardized approaches that have been prepared for specific situations can be effectively communicated, consistently applied, and evaluated over time to determine their effectiveness. Such approaches need not be highly detailed and should identify those indicators of common situations, the outcomes desired for each, and suggested response measures.

❖ ***Ensure personnel know how to respond to unusual animal health situations:*** Unusual animal health situations are infrequent or low-probability events, though they may have significant consequences to both the operation and the industry at large. High rates of disease or death signals an unusual animal health situation. Personnel throughout the operation must know how to distinguish unusually high levels of disease or death, and be aware of their own roles and appropriate responses. The situation could involve an endemic disease, an emerging or re-emerging disease, or an exotic disease. An appropriate response to an unusual animal health situation includes these elements:

- define triggers – events that signify an unusual animal health situation (e.g. high rate of disease);
- indicate initial responses – the limited number of key actions or decisions to undertake initially (e.g. telephone the operation’s veterinarian); and
- develop a high-risk biosecurity plan – the practices that are appropriate to the conditions of unusually high levels of disease or death

❖ ***Maintain ongoing records for animal health management:*** The benefits derived from the time and effort taken to ensure effective record keeping include the following:

- more consistent control throughout the operation by ensuring that practices, medications, etc. are managed as desired and according to a plan that is intended to minimize disease; and
- the ability to conduct regular and/or “after the fact” reviews that can assist in identifying important disease control information, such as the potential cause of disease or additional “at risk” operations or animals.

Certain records that should be maintained on an ongoing basis on livestock feedlot operations include:

- ❖ records of all visitors accessing the production area or, in some cases, the farmyard;
- ❖ records of all movements, involving commingling, purchases, and sales;
- ❖ records of all treatments of individual animals and vaccinations, generally on a broader or herd application basis; and
- ❖ records of feed purchases and dispositions or use.

These records can provide information about the order of events and the possible changes over time that may be critical in identifying either a typical or an unusual animal health situation, and in effectively managing the response. If a typical animal health situation were to occur, these records might assist the producer and veterinarian in identifying a mode of transmission and in recommending adjusted practices to avoid similar circumstances in the future.

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## **Annex I. Disinfection and standard operational procedures**

### **1. Disinfection in livestock facility**

Important points about disinfection should be made before choosing a disinfectant for use:

Disinfectants won't work if the surface to be disinfected isn't clean before applying the disinfectant. Organic materials such as soil, plant debris, blood, pus, and manure often inactivate some disinfectants or protect germs from the disinfectant's active ingredients. Chlorine-based disinfectants are especially subject to this problem. Chlorine, the active ingredient in bleach, is relatively quickly inactivated by organic debris such as manure, and even milk, at the concentrations usually used on clean surfaces.

Even "hard" water can reduce or destroy the activity of some disinfectants. Some disinfectant solutions are only active for a few days after mixing or preparing. Failure to make a fresh solution of disinfectant after it has been prepared longer than a few days, or after it has become visibly contaminated by organic material like manure, may result in using a product that doesn't really work.

It is true that sufficient concentration and contact time can overcome some of these problems with certain classes of disinfectants, but often increasing the concentration or contact time makes use of the product impractical, costly, or caustic.

Disinfectants also vary considerably in their activity against the assorted germs bacteria, viruses, fungi, and protozoa about which livestock producers are concerned. For example, plain vinegar (4% acetic acid) will readily kill the foot-and-mouth disease virus, but it won't do much to *Mycobacterium paratuberculosis*. Most commonly used disinfectants are not active against bacterial spores, the environmentally hardy life form taken by the germs that cause tetanus, blackleg, botulism, and anthrax. Yes, formaldehyde is effective against most spores, but it is not really a practical disinfectant and is now considered a potential cancer-causing compound.

It is important to select a disinfectant that will be active across a wide spectrum of germs under the conditions in which it will usually be used. These conditions include hard water, contamination with organic material, and potential for toxicity or damage to environmental surfaces or skin and clothing. It is also important to keep solutions clean and freshly made as directed by the manufacturer.

Disinfectants must have sufficient contact time with the surfaces to which they are applied in order to allow them to kill the germs with which we are concerned. Contact time needed varies with the product and the germ. A quick splash of a dirty boot in a foot bath is not likely to accomplish anything except to give a false sense of security.

## **2. Standard operational procedures for cleaning and disinfection**

- ❖ The staff undertaking the cleaning and disinfection work should be fit and healthy.
- ❖ The concerned staff must ensure that all traces of material used in cleaning/pre disinfection process are flushed away with water.
- ❖ The cleaning process must be adequate and there must be no presence of residual cleaning liquid.
- ❖ The user must read the label instructions including dilution instructions to ensure safety, accuracy and effectiveness.
- ❖ The disinfectant should be applied to every surface starting at the highest point and working downwards. All doors, equipment and utensils should also be cleaned.
- ❖ The disinfectant must be left on surfaces as long as possible/as indicated in the instructions  
must be left on surfaces as long as possible/as indicated in the instructions. The area must then be thoroughly rinsed  
and left vacant for as long as possible before allowing the animals.
- ❖ The sheds should not be disinfected or fumigated in the presence of animals and if required must be done during down time.
- ❖ The foot bath and wheel bath area must be cleaned and filled every alternate day, to ensure that soil, manure, bedding material should not come into the foot bath.
- ❖ The common disinfectant which can be used for disinfection and fumigation are 5.25 % Sodium Hypochlorite (3%), Virkons (as per the label), Sodium Hydroxide (2%), Formalin (5-10%) etc.
- ❖ The label must be read carefully before using the disinfectant under consultation of the officer in charge.

### **3. Standard operational procedures for postmortem inspection**

- ❖ The designated staff should inspect the postmortem room before inspection begins.
- ❖ Availability of water and sufficient light must be checked
- ❖ Waste (left over) transport bags must be arranged in advance.
- ❖ The disposal site and method of disposal must be identified in advance.
- ❖ Arrangement of disinfectant must be done in advance so that the room and disposal site must be disinfected after post mortem.
- ❖ The carcass, waste and other material should be disposed following standard procedures.
- ❖ After post mortem inspection and disposal, complete area including post mortem inspection room and disposal site must be properly cleaned, disinfected as per the direction of inspector