BIOSECURITY GUIDANCE TO SUPPORT RAW MILK MOVEMENT AND HANDLING AT PROCESSING FACILITIES DURING A FOOT-AND-MOUTH DISEASE OUTBREAK

SCOPE

The guideline document focusses on developing biosecurity criteria for dairy processing plants with the intent that details of specific options for achieving these criteria will be acceptable to the Directorate: Animal Health and provincial state veterinary offices moving forward.

OVERARCHING GOAL

This guideline document is intended to provide guidance which will assure that milk tankers entering milk processing premises from dairy farms with or without evidence of foot-and-mouth disease (FMD) virus infection within an FMD control area, contain no external contamination with FMD virus. Further, it seeks to prevent any cross contamination between raw milk potentially contaminated with FMD virus and people, vehicles, and processed milk products. Thus, ideally, there will be negligible risk of FMD virus spread from a milk processing facility.

Initial focus: Raw milk movement from a dairy farm with no evidence of FMD virus infection in an FMD control area via milk tanker to processing.

Management control to note the following:

- FMD has been diagnosed in South Africa in various provinces with the risk of spreading across provincial borders if not fully controlled.
- Establishing effective control measures in and around infected areas and constant monitoring/surveillance of FMD control area(s) is a legal requirement enforced by the Department of Agriculture, Directorate: Animal Health.
- Animal and dairy product movement restrictions are controlled in terms of FMD protocol issued by the Directorate: Animal Health and are applicable to FMD infected dairy farms and processing facilities handling the FMD milk.
- Dairy farms with no evidence of FMD virus infection based on visual assessment may continue to move raw milk to processing facilities.
- In support of biosecurity, the criteria as outlined in this guideline are to be implemented and verified.
- Milk that is collected from an infected dairy farm and transported to an approved (Department of Agriculture, Directorate: Animal Health) processing facility may only be done under a Red Cross permit issued by the provincial state veterinary services.
- Other product/animal/people movement to be examined, monitored and disinfected, as needed to prevent possible spread of the FMD virus.

1. INFORMATION ABOUT FMD

1.1 Species affected and clinical signs

FMD is a highly contagious viral disease of cattle and other cloven-hoofed animals such as pigs, sheep, and goats. FMD does not affect humans. Signs of illness in affected animals include fever, blisters that become ulcers on the mouth, tongue, feet or teats, increased salivation or slobbering, decreased feed consumption, and lameness. This may result in production and body condition loss but not typically death in adults. However, death rates in young animals can be high. In dairy cattle severe mastitis is a common feature with sores on teats and udders. It is not uncommon for cows to lose teats or udder quarters as a result of infection.

1.2 Incubation period

In cattle, the incubation period ranges from 2 to 14 days. FMD virus can be shed in milk up to 4 days before clinical signs appear.

1.3 Transmission of FMD

FMD virus can enter or exit an operation via:

- **Live animals** shedding viruses, for example cattle, pigs, sheep, goats, or any other cloven-hoofed animal.
- **Live animals** transporting viruses from place to place, for example horses, dogs, cats, rodents (via contaminated fur, hooves, foot pads), and birds (via contaminated feathers).
- **Animal products** (unpasteurized milk, colostrum) carrying the virus.

- **Fomites** (contaminated inanimate objects) such as dead animals, feed, water, people's clothing/footwear, human nasal passages (rare; carried less than 28 hours after contact with infected animals), transport vehicles (animals, feed, milk, rendering), off-farm vehicles or equipment contaminated with infected excretions (such as manure) or secretions (such as milk, colostrum, saliva).
- **Airborne** virus from infected animals in close proximity under ideal weather conditions.

FMD virus can be transmitted to cattle through the following exposures:

- **Direct contact** with an infected animal.
  - Virus shed in nasal secretions, blood, milk, urine, faeces, saliva, semen, or during pregnancy (from infected cow to calf).
- **Fomites** such as coveralls, boots, truck tires, manure.
- **Oral** – consuming contaminated feed, milk.
- **Aerosol** – inhaling virus particles; highly variable by serotype, usually requires close contact with infected animals.

1.4 Destroying the virus

FMD virus can be destroyed chemically or thermally. Only registered commercial disinfectants for use against the FMD virus should be used. Disinfectants are only effective if used appropriately. Normal high-temperature short-time (HTST) pasteurisation (72°C for 15 seconds) significantly reduces the viable FMD virus in milk with a pH <7.0 but does not eliminate it. Heating milk to 100°C for 20 minutes will inactivate the virus. Ultra-high temperature (UHT) pasteurisation (148°C for 3 seconds) will completely kill FMD virus in milk. Manure slurry must be heated to 67°C for at least three minutes to destroy FMD virus.

For more information about FMD, see:

- Foot-And-Mouth Disease Fact Sheet.
- WOAH.

2. TERMINOLOGY

Clean-in-place (CIP) – procedures that allow for the cleaning and sanitising of equipment without dismantling, generally by means of an automated system. Clean-out-of-place (COP) requires equipment be dismantled to clean and sanitise it.

Milking parlour – the physical location where cows are milked and milk is stored until collected for transport to the dairy processing facility.

Dairy processing facility – the facility that receives, stores, processes, distributes, and sells products made from milk.

Disinfection station – a physical location equipped with adequate water, soap (if vehicle is excessively dirty), effective disinfectant against the disease organism of concern, and the ability to capture or minimise run-off into waterways or animal housing or traffic areas. Personnel operating the disinfection station should be trained in proper selection and use of personal protective equipment and the principles of cleaning and disinfection.

FMD outbreak – upon initial diagnosis of FMD in susceptible species (such as cloven-hoofed animals including cattle, sheep, goat, pigs, deer) a series of response activities depending upon the specific situation and response goals will be initiated by the Directorate: Animal Health, Provincial State Veterinary offices, and industry stakeholders. Activities will include implementing biosecurity protocols and animal/vehicle movement restrictions to achieve desired containment, using emergency vaccination, and culling infected animals to control or eradicate FMD.

Infected premises – premises where a presumptive positive case or confirmed positive case exists based on laboratory results, compatible clinical signs, case definition, and international standards.

Manifolding – equipment needed to transfer the raw milk from the farm bulk tank or other bulk milk source to the milk tanker, generally associated with the tankers milk pump. It includes the crossover hose or pipe (connects tank truck milk pump to tank truck tank valve), clamps and short pipe sections and other items that come into contact with raw milk.

Milk tanker – the vehicle used to transport milk from dairy premises via road to processing facilities.

Owner of milk tanker – the person legally identifiable and responsible for the milk tanker.

Milk tanker driver – the person responsible for driving a milk tanker and legally responsible for milk measuring, sampling, pumping, and transporting milk in a milk tanker as per the national milk shed regulations.

Transfer hose – milk hose carried on a milk tanker used to transfer milk into the tanker from a farm bulk tank or other bulk milk source when attached to the tanker milk pump.

3. GUIDANCE FOR MILK RECEIVING AT A DAIRY PROCESSING FACILITY

3.1 Controlling access to a dairy processing facility premises that handles FMD infected milk

All traffic entering the premises (for example vehicles, people) involved in milk receiving should be limited to one designated entry point at the facility. Non-essential traffic should be refused or diverted to another location. The processing facility should post signs directing all road and foot traffic to this entry and informing unauthorised visitors that they are not to enter. This is where the disinfection station for the premises could be located. This disinfection station should be set up and operated by dairy facility personnel. Training should be provided by the facility management to ensure personnel are safely and effectively implementing the recommended protocols. These actions must be followed up with periodical training and effectively controlled/monitored by members of the facility management team.

3.2 General guidance for milk processing facilities

- Processing facilities should initiate a biosecurity protocol based on the guidance included in this document for facility and factory employees.
- Non-affected milk processing facilities should take the necessary precautions to avoid contact with infected pasteurised milk and milk products, as well as vehicles delivering finished products with any potential source of FMD virus infected milk or any vehicles transporting raw milk to the processing facility.
- In the case of handling infected milk, management should institute a practice of moving samples/paperwork, etc. from the receiving room to the processing area in a manner that does not involve the milk receiver entering the processing facility.
- The facility should enhance vigilance to assure that measures are in place and explicitly followed to prevent cross contamination from raw milk areas into areas where pasteurised milk or milk products are processed, handled, or stored.
- If not already part of the facility's operating protocol, a boot bath, with product effective at killing FMD virus, should be placed between the receiving room and the milk processing section of the facility.
- All employees who come into contact with cloven-hoofed livestock should be advised to arrive at work in clean street clothes and footwear and then shower (if possible) at the facility prior to changing into their facility-issued uniforms and footwear.

3.3 Milk tanker

3.3.1 Upon arrival at a dairy processing facility, the performance standard is removal of all visible contamination on the milk tanker followed by disinfection.

3.3.1.1 The dairy processing facility should have a disinfection station set up at or near the entrance to clean and disinfect all vehicles entering or leaving:

- The milk tanker driver should remain in the cab of the milk tanker during the cleaning and disinfection process.
  - o If the milk tanker driver must leave the cab for any reason, protocols under "3.4.1 Upon arrival at the receiving bay" should be followed.
- Designated personnel should be prepared to clean and disinfect the milk tanker upon entry to the plant premises.
- This will require proper protective gear, spray equipment, and an approved disinfectant (see sections 4 and 5).
- All protective gear and equipment should be stored at or near the disinfection station.

3.3.1.2 The transport vehicle should be cleaned (focusing on the tanker lid, sides of the tanker, tyres, wheel wells, undercarriage, mud flaps, splash guards, steps) to remove all visible contamination (see section 4):

- Use the least amount of water necessary.
- Run-off should be contained so that it is prevented from entering the environment, including water sources and animal housing/traffic areas, per regulations.

3.3.1.3 The transport vehicle should be properly disinfected with an approved disinfectant that is applied for the recommended contact time per label directions before entry to the premises:

- Only approved disinfectants against FMD must be used.

3.3.1.4 Facility personnel should record all vehicle and personnel movements onto and off the premises including date, time of arrival and departure, origin of tanker, driver name, vehicle identification, and dairies from which milk was collected from prior to arrival at the facility:

- This information is obtained from the driver's records.
  - All movements onto the premises should be maintained and made available to animal health authorities in the event it is needed for a traceback or trace forward investigation.

- Any evidence of milk on the outside of the transport vehicle should be noted so that this issue can be discussed and the reason resolved prior to future transport by that driver/vehicle.

3.3.1.5 After the tanker is cleaned, the tanker driver can then drive over the scales and weigh-in or proceed to the receiving bay where milk is metered at off-loading:

- Any milk spillage that occurs at the scales should be cleaned and disinfected prior to the next use following the same cleaning and disinfection protocols described above for the transport vehicle.

3.3.1.6 When possible, the tanker driver should remain in the cab until the processing facility personnel have collected a milk sample from the tanker and cleared it for off-loading:

- If the tanker driver must leave the cab for any reason, protocols under "3.4.1 Upon arrival at the receiving bay" should be followed.

3.3.1.7 Milk receivers responsible for any tasks involving raw milk contact (collecting tanker sample for antibiotic screening, off-loading/assisting with off-loading/cleaning pumps, hoses, collection equipment), should prevent any raw milk cross contamination between loads:

- Clothing – plant-dedicated or protective outerwear.
- Should plant-dedicated clothing become contaminated with raw milk, it should be changed prior to receiving the next load:
  - Protective outerwear should cover the legs, arms, torso, head, and neck.
  - Protective outerwear should be disposable or waterproof to withstand washing and disinfection while being worn.
  - Protective eyewear should be available to the receiving personnel if wearing waterproof outerwear that will be disinfected after use to prevent splashes of disinfectant into the eyes.
- Protective footwear.
- Protective footwear should cover the shoes and socks.
- Protective footwear should be disposable or waterproof to withstand washing and disinfection while being worn.
- If disposable outwear is worn, the pant legs of the protective outerwear should be tucked into the protective footwear and the tops of the footwear sealed.
- If waterproof outerwear is worn, the pant legs should go over the boots but not touch the ground. This will allow water and disinfectant to remain on the outside of the protective footwear.
- Gloves.
- The gloves should be disposable or waterproof to withstand washing and disinfection while being worn.

3.3.1.8 Milk receivers should take great care not to spill any milk on the outside of the milk tanker as the tanker sample is collected:

- The first two samples should be poured into a collection bucket which can later be disinfected, neutralised, and then poured into a sanitary sewer.
- Any milk spillage should be immediately cleaned and disinfected.
- Sample collection areas and equipment should be cleaned and disinfected in between each tanker with a food-grade disinfectant that is effective against FMD.

3.4 Milk tanker drivers

Only authorised personnel are allowed to be present in the cab of the transport vehicle as it enters the milk processing facility premises. The cab should be considered and maintained as a clean, non-contaminated zone. Tanker drivers should carry a supply of protective outerwear and footwear with them on their routes. They should also carry a supply of approved disinfectant (see section 5). NOTE: Due to transportation regulations, the disinfectant should not be stored in the cab or with any milk samples.

3.4.1 Upon arrival at the receiving bay, when the tanker driver leaves the cab of the tanker, the performance standard is to have only clean, protective footwear/clothing/gloves enter the processing plant premises and no direct contact with other personnel.

3.4.1.1 Tanker drivers responsible for any tasks involving raw milk contact (off-loading/assisting with off-loading/cleaning pumps, hoses, collection equipment) should put on protective outerwear before stepping away from the driver's door area to prevent contamination of street clothes:

- The protective outerwear should cover the legs, arms, torso, head, and neck.
- The protective outerwear should be disposable or waterproof to withstand washing and disinfection while being worn.

- Protective eyewear should be available to the milk hauler if wearing waterproof outerwear that will be disinfected after use to prevent splashes of disinfectant into the eyes.

3.4.1.2 All tanker drivers and assistant personnel *exiting the cab should put on protective footwear before stepping away from the driver's door area to prevent contamination of street shoes:*
- The protective footwear should cover the shoes and socks.
- The protective footwear should be disposable or waterproof to withstand washing and disinfection while being worn.
- If disposable outwear is worn, the pant legs of the protective outerwear should be tucked into the protective footwear and the tops of the footwear sealed.
- If waterproof outerwear is worn, the pant legs should go over the boots but not touch the ground. This will allow water and disinfectant to remain on the outside of the protective footwear.

3.4.1.3 All tanker drivers and assistant personnel exiting the cab should put on gloves before exiting the milk tanker to prevent contamination of hands:
- The gloves should be disposable or waterproof to withstand washing and disinfection while being worn.
- Tanker drivers and assistant personnel responsible for any tasks involving raw milk contact should obtain an extra pair of gloves that will be placed in a disinfectable outer container (plastic bag) and taped to the protective outerwear.

3.4.1.4 When on-farm bulk tank samples are collected, the driver will provide the labelled sample collection vial(s) and previously disinfected container(s) (plastic sealable bag) to designated facility personnel.

3.4.1.5 Tanker drivers responsible for any tasks involving raw milk contact (off-loading/assisting with off-loading/ cleaning pumps, hoses, collection equipment), should dispose of or disinfect contaminated protective outerwear/ footwear once tasks are complete:
- Contaminated disposable outerwear/footwear should be disposed of properly within the receiving bay prior to entering the cab of the tanker (see steps under 3.4.4.1).
- Contaminated disposable outerwear/footwear should not be worn in any other areas of the processing facility.
- Adhere to all facility protocols designating foot traffic and use of facilities.

3.4.1.6 Tanker drivers and their assistants not responsible for any tasks involving raw milk contact (off-loading or cleaning pumps/hoses/collection equipment) should go directly to, then remain in, the designated area (break room):
- Tanker drivers and their assistants should have no direct contact with processing facility personnel, raw milk handling equipment, or other milk transport vehicles.
- Tanker drivers should not enter the milk processing area.
- Adhere to all plant protocols designating foot traffic and use of facilities.

3.4.1.7 Processing facilities should keep a supply of protective wear (boots, gloves) in the event the hauler's supply becomes depleted, damaged, or excessively contaminated.

3.4.2 During off-loading milk, the performance standard is to address raw milk spills immediately**.**
3.4.2.1 Raw milk spilled on the ground during the connection/disconnection of the transfer hose(s) should be disinfected as soon as all connections are made and before personnel walk through the area (see section 4).

3.4.3 After off-loading milk, the performance standard is to ensure no residual raw milk in the tanker and leaking hoses upon leaving the receiving bay at the processing plant.
3.4.3.1 CIP of milk tankers should be cleaned once every 24 hours when in use.

3.4.3.2 In the absence of full CIP or performing a sanitary rinse of the tanker after each off-load, all access points to raw milk on the tanker should be completely sealed to prevent leaking:
- Complete CIP of the tanker after each off-load may not be possible in many situations (lack of CIP equipment, lack of off-loading capacity for incoming loads, etc.).
- A sanitary rinse may not be possible due to the lack of a permit for wastewater disposal.
- Measures shall be implemented to avoid residual milk leaking on subsequent dairy premises pick-ups.

3.4.3.3 Once the tanker is externally cleaned and disinfected as per section 3.4.4.2 of this document, it should be permitted to move to the next location:
- The next location could be an off-site CIP facility or another dairy premises for raw milk pick-up.

3.4.4 Upon leaving a dairy processing facility premises, the performance standard is removal of all visible contamination leaving the facility, either on the tanker or milk hauler/tanker driver.

3.4.4.1 Before entering the cab of the milk tanker, the milk hauler should remove or disinfect protective outer clothing and footwear:

- Disposable:
  - Remove footwear first, gloves next, and outerwear last.
  - Handle the outerwear with the 'inside out' principle – only touch the inner surfaces to remove it so as not to contaminate hands.
  - Outerwear and footwear should be disposed of in a manner that does not contaminate personnel, equipment, or animals (option: before entering cab, place in a plastic biohazard bag in a designated location for proper disposal).
- Waterproof
  - Protective eyewear is recommended when waterproof clothing is worn to prevent splashing disinfectant into eyes upon decontamination.
  - From top to bottom, spray approved disinfectant so that it contacts all potentially contaminated surfaces of the outerwear, gloves, and footwear.
  - Allow the recommended contact time.
  - Outerwear and footwear may remain on the milk hauler; gloves should be removed and disposed of on the dairy facility premises in an appropriate manner.
  - After removal, protective eyewear should be disinfected and stored in the tanker cab.
  - Another option is to leave the cleaned and disinfected waterproof protective wear at the processing facility to be worn upon next delivery.

3.4.4.2 The milk tanker should go through the same cleaning and disinfecting steps when leaving the facility premises as upon entry:

- See 3.3.1.1 through 3.3.1.3 for specific details.

4. CLEANING AND DISINFECTION

The virus that causes FMD has been shown to be stable in the environment and in organic material (mud, manure, feed, and bedding). Virus stability increases at lower temperatures and with protection from sunlight. The FMD virus is inactivated at a pH below 6.5 or above 11. Proper cleaning procedures are essential for the disinfectant to adequately contact the virus and have time to inactivate it. Chemical suppliers should be consulted on the appropriate for different surfaces and materials.

4.1 Proper cleaning procedures for vehicles

4.1.1 Wear personal protective equipment.

4.1.1.1 Gloves, coveralls, rubber or disposable boots, and goggles and a mask if you are generating splashes (eye protection) or dust (respiratory protection).

4.1.2 Soak the most visibly contaminated areas to aid in washing.

4.1.2.1 Soak the area with water and a detergent or cleaning agent (soap), starting with the dirtiest area and working towards the cleaner areas:

- This will aid in the removal of organic material on the tyres, wheel wells, undercarriage, mud flaps, splash guards, and steps.
- May need to roll the vehicle forward slightly to ensure the tyre contact surface is soaked.

4.1.3 Wash

4.1.3.1 Wipe, spray or scrub the area, starting with the dirtiest and working towards the cleaner areas:

- The use of pressure washers can enhance organic matter removal on the tyres, wheel wells, undercarriage, mud flaps, splash guards, and steps.
- Washing the dirtier areas may cause splatter onto the cleaner areas; hence, starting with the dirtiest areas will allow removal there first and subsequent removal of splatter from the cleaner areas last.

4.1.4 Rinse

4.1.4.1 Remove all detergent/soap residues by applying a low-pressure water rinse on all surfaces, starting with the top of the tanker, and working down.

4.2 Proper disinfection procedures for vehicles

4.2.1 Read the product label

4.2.1.1 Handle the solution correctly to ensure safety of the handler and effectiveness of the disinfectant:

- *Personal protective equipment may be needed to mix up solutions.*
- Note the recommended dilutions, water temperature, environmental temperature, and the need for ventilation when using the product.

4.2.2 Disinfect

4.2.2.1 Apply the product to the cleaned areas of the vehicle, starting with the tyres to maximise contact time before moving:

- Vehicle can be slowly rolled forward to allow the disinfectant to contact all parts of the tyre.

4.2.2.2 Allow the product adequate contact time (per label directions) with all surfaces to inactivate the virus.

5. APPROVED DISINFECTANTS FOR FMD VIRUS

The National Regulator for Compulsory Specifications (NRCS) in South Africa maintains the register of disinfectants and is responsible for their compulsory registration. Disinfectant products must be pre-approved by the NRCS before they can be sold in the market, and the NRCS registration number must appear on the disinfectant product's label. The label will also specify the microorganisms the product is effective against and how to use it.

In the case of the FMD virus, only a few products are currently labelled for the is virus on hard, non-porous, non-food contact surfaces. Products such as sodium hypochlorite (bleach), sodium hydroxide, and sodium carbonate, however, may be used against the FMD virus if registered chemical products are not available during an FMD outbreak. It is important to consult your chemical supplier to ensure the correct chemicals are used including correct concentrations, application methods, times, and temperatures.

Alternatively, the NRCS contact details are:
Email: CMMAPPROVALS@nrcs.org.za
Phone: +27 12 428 6377

5.1 Safety

Follow all safety precautions listed on the product label during the handling and mixing of disinfectant solutions. Wear eye and respiratory protection when mixing or spraying disinfectants. Wear gloves to avoid skin contact with caustic materials. Immediately wash off any disinfectant that contacts bare skin.

5.2 Contact time

Before disinfecting, all surfaces must be cleaned. Disinfectants will not be effective unless the surface they are applied to remains visibly wet for the required period. Read label directions for this contact time. Disinfectants mixed with water are susceptible to evaporation in hot or windy conditions and in direct sunlight and thus will not be completely effective unless reapplied. Curved surfaces that cause disinfectants to run off (like milk tankers) may require reapplication to keep the surface wet for the required contact time. Improper use of disinfectants can damage dairy equipment, so it is essential to use them correctly to effectively destroy viruses while preserving the integrity of the equipment.

5.3 Cleaning and storage of cleaning equipment

Effective measures should be implemented to integrate any extra cleaning standard operating procedures relating to the FMD virus with the current master cleaning schedules of the processing facility. Cleaning of chemicals used for inactivation of any presence of the FMD virus should not cause harm to materials and food contact surfaces as well as cleaning equipment. Extra care should be taken regarding the cleaning of cleaning equipment as well as the use and storage thereof after cleaning.

Note: This document serves as biosecurity guideline to support raw milk movement and handling procedures at processing facilities during an FMD outbreak. It is not exhaustive and does not replace any government procedural notice relating to an FMD outbreak.

Reference:

SMS Secure Milk Supply "Biosecurity guidance to support raw milk movement and handling procedures at processing facilities during and FMD outbreak." USA 2012