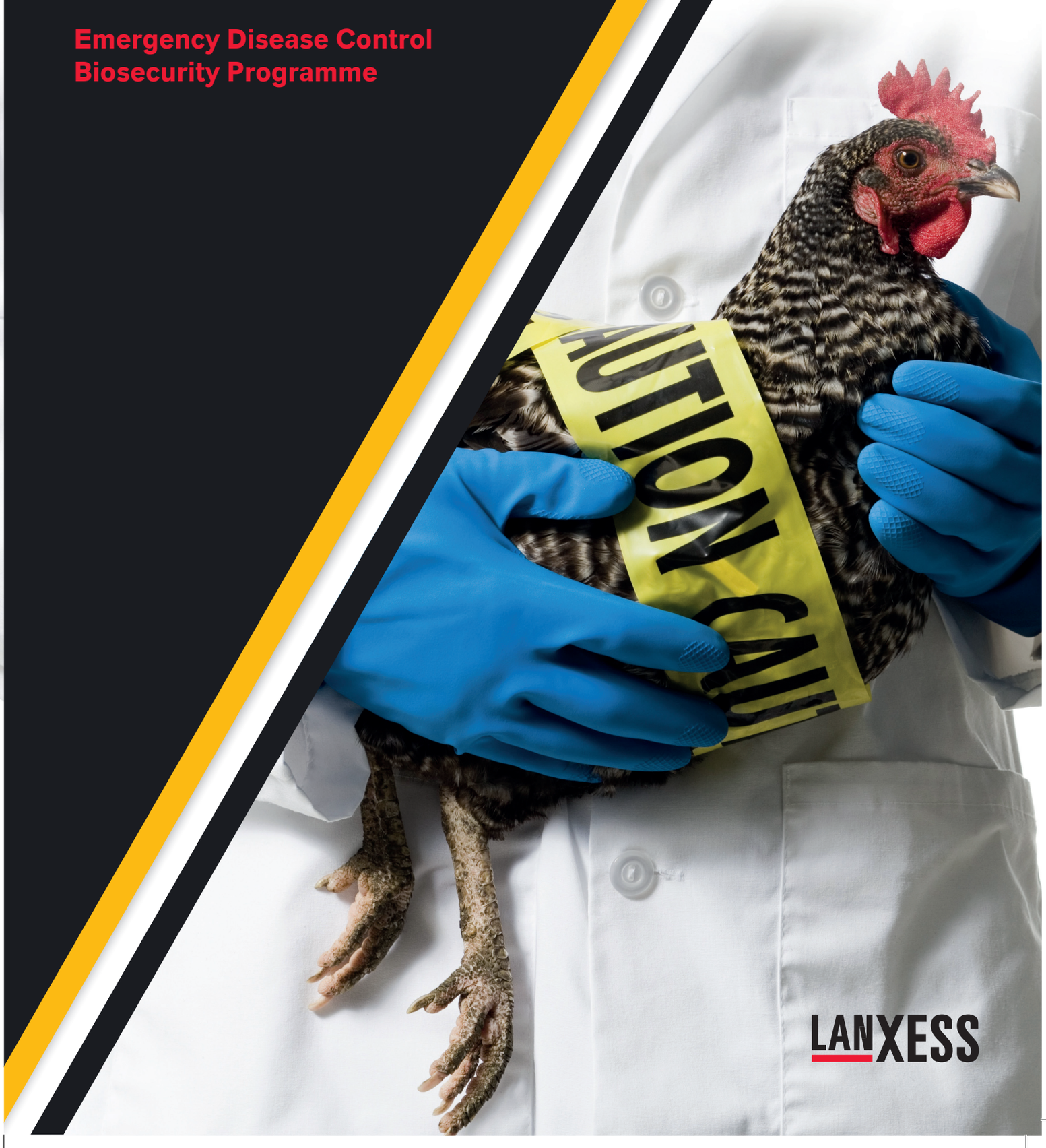
LANXESS BIOSECURITY SOLUTIONS

Avian Influenza
Prevention & Control

Emergency Disease Control Biosecurity Programme



LANXESS

Highly Pathogenic Avian Influenza - Bird Flu

Avian Influenza, also referred to as bird flu, is an extremely contagious and devastating disease, which causes high morbidity and mortality rates in poultry (predominantly chickens and turkeys).

The consequences of Avian Influenza are immediate and financially severe. However, with thought and planning, a comprehensive Advanced Biosecurity Programme can be implemented in order to minimise the impact of potentially catastrophic outbreaks.

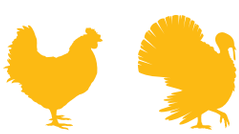
Stopping the spread of Avian Influenza infection.

Avian Influenza is caused by an orthomyxovirus (influenza virus). It can survive for considerable lengths of time outside of the host with birds being infected through contact with other birds, mechanical vectors such as vehicles and equipment, and personnel travelling between farms, markets and abattoirs.

Outbreaks of Avian Influenza tend to be seasonal, and coincide with the late autumn and early spring migratory patterns of wild birds, particularly waterfowl.

Biosecurity is the only real way of stopping the spread of the Avian Influenza virus onto and around a poultry farm site. Producers need to achieve the highest possible levels of biosecurity, leveraged by good buy-in and compliance from management, their staff and their suppliers.

The main route of transmission onto poultry production facilities has been strongly linked to transportation of infected live birds, contaminated carcasses or litter in vehicles, and has highlighted the importance of biosecurity protocols targeting vehicle cleaning and disinfection. Poultry producers may have difficulty in justifying this precaution, as time must be spent ensuring that vehicles are adequately disinfected, which may have a financial impact. However, the risk of contaminated vehicles or associated equipment with infectious bacterial and viral particles, such as Avian Influenza, could be extremely hazardous to the health of livestock and ultimately the financial performance of a farm.



Advanced biosecurity is the answer.

For biosecurity to be effective against the threat of Avian Influenza, there must be good planning, good procedures, good training and good tools.

Planning

Thoroughly review your production facility's biosecurity plans at all levels using a risk based approach involving your veterinarian, management team and farm staff.

Starting with transport, scheduling is vital; all deliveries and entry of equipment to the production facility needs planning, as do removal of dead chickens, litter and any other waste. If possible, have different transport for infected and free farms.

Personnel movement is another target area; avoid sharing staff between sites at times of heightened risk of infection. Advisers, management and field staff are all increased vectors through which the Avian Influenza virus could be spread as they move more between production facilities.

Control of wild birds, rodents and other animals should also be fully reviewed and measures put in place to prevent their entry into the production buildings.

Finally, in planning, there is another good rule that should be adhered to at all times; never share anything between positive and negative production facilities, be it transport, personnel or equipment.

Procedures

One of the most important aspects of biosecurity is the understanding and use of lines of separation between clean and dirty areas. This has to happen throughout the production system, for example, between the dirty and clean sides in a Danish entry system (see page 6), or between the ground and the cab of a feed delivery vehicle. All the relevant lines of separation have to be identified and correct procedures for achieving separation established and used.

There are many other procedures that need complying with. These include such things as correct use of shower facilities, correct procedures for leaving and re-entering the farm, disinfection of equipment arriving at the farm, disinfection after risk vehicles have been near the farm, and contractor and staff behaviour whilst in and around the production facility.

In an infected farm, where bio-containment is being practised, examples of procedures are: control of staff movement around the farm, cleaning and disinfection of paths and roadways, correct local litter removal, and high level terminal cleaning and disinfection between production cycles.

Training

Buy-in and training is an integral part of any biosecurity programme. This must include management, farm staff, drivers, service personnel and visitors. They need to understand why biosecurity against Avian Influenza is important, that it is still important, and how easily the virus spreads so they can understand what they need to do.

Biosecurity coordinators must make it a prime task to train, review and retrain as needed. One challenge is high staff turnover and the need to keep up to date. Compliance is everything, and failure to comply will lead to a biosecurity breach sooner or later.

The Tools

Without the right tools, biosecurity will fail.

With vehicles being the primary vector through which Avian Influenza is spread, providing well equipped vehicle cleaning and disinfection areas is essential. Good vehicle washes must allow manure removal, provide good cleaning and disinfection, and vitally, prevent the possibility of cross contamination. The provision of drying and heating for trucks after cleaning and disinfection is an advantage, but does not replace it.

Other examples of good biosecurity tools are disinfectant sprays on approach to farms, external washes to disinfect where trucks have been, remote dead chicken collection points, and good entry facilities such as showers or a Danish entry system.

Some of the most important tools for effective biosecurity are the Biosolve® heavy-duty detergents and Virkon® disinfectants for use in the advanced biosecurity cleaning and disinfection programme.

Washing with water alone reduces contamination by up-to 60%, but using a heavy-duty detergent decreases the original organic burden by 99%. Therefore, thorough washing of all surfaces and equipment with Biosolve® PLUS heavy-duty detergent is essential to achieve the best results from any subsequent disinfection procedure.

The choice of disinfectant is vital. It needs to be active against various strains of the Avian Influenza virus but also have a broad spectrum of activity against other poultry disease-causing organisms because we still need to control them.

LANXESS specialise in the environmental control of highly infectious diseases and two of its disinfectants have been independently tested and approved effective against many Avian Influenza virus strains:

Disease	Virus family	Disinfectant from LANXESS	Strain	Dilution Rate	Contact time (mins)
Avian Influenza	Orthomyxoviridae	Virkon® S	H5N1	1:800	5
			H7N1	1:320	30
			H7N9	1:300	0.25
			H7N9	1:600	10
			H5N8	1:1500	30
			H5N8	1:500	1
		Virkon® LSP	H5N1	1:250	5
			H5N1	1:1000	10
			H5N8	1:400	1
			H3N8	1:400	5
			H7N9	1:200	5

DAFM Approval - Virkon® S has been approved by the Minister for Agriculture, Food and the Marine, Dublin, Ireland, at the approved use and dilution rate for Avian Influenza & Newcastle Disease: 1 part of Virkon® S to 280 parts of water.

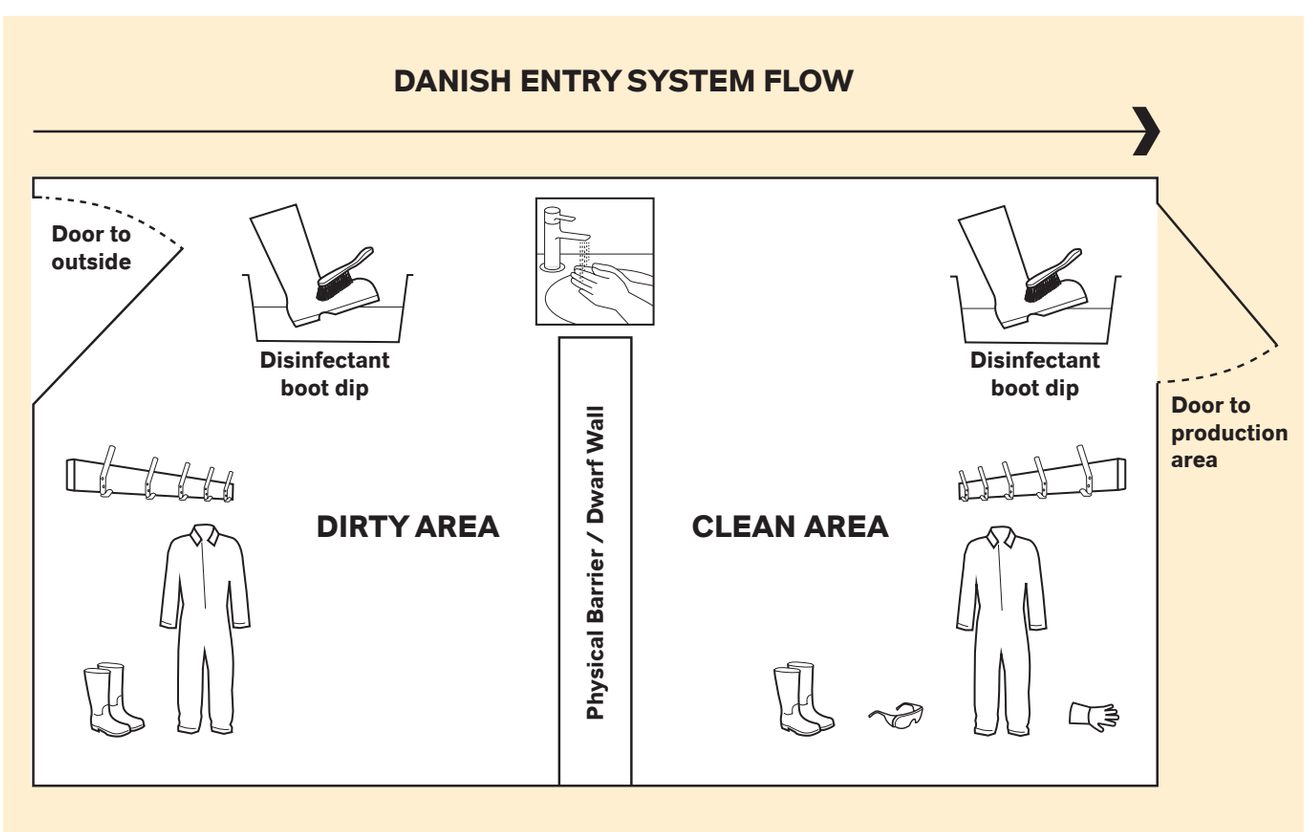
Unlike some other disinfectant chemistries, such as Glutaraldehyde and Glut/QAC mixes, Virkon® S remains effective against the Avian Influenza virus in just 60 seconds, even in cold temperatures. This is representative of real farm conditions. In addition, adding liquid Propylene Glycol to Virkon® S solutions may reduce its freezing point to -10°C, without affecting efficacy, providing poultry farmers with the reassurance that the disinfectant solution they're using will remain in solution during freezing winter conditions.

The outstanding scientifically formulated properties of Virkon® LSP and Virkon® S make them essential tools in any Avian Influenza advanced biosecurity programme.

The Danish Entry System is an easy to use biosecurity tool that can greatly help reduce the spread of disease-causing organisms such as Avian Influenza from being introduced to, or spreading from, a poultry production shed/barn.

The key to the Danish Entry System:

- a biosecure entrance to the poultry production shed/barn
- the entrance area of the shed/barn has separate clean and dirty areas divided by a physical barrier, usually a small dwarf wall
- upon entry to the building you will be in the "dirty" area where you will be required to:
  - disinfect footwear using a disinfection boot dip
  - remove outer clothing and footwear
  - wash and disinfect hands
  - move to the clean area, on the other side of the barrier, where clean protective clothing, such as boots and coveralls, are provided (boots should be put on before coveralls)
  - Disinfect boots using the disinfectant boot dip provided, and then enter the production area
- The protocol is completed in reverse when exiting the building.



Practical ‘how to’ biosecurity guide

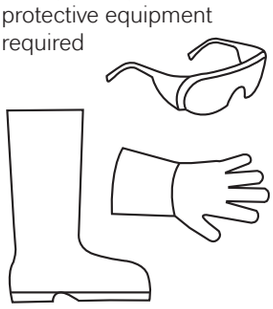
In the face of challenging farm conditions, such as heavy organic challenge, short contact time, possible dilution by rain water, low temperatures and the broad range of disease-causing organisms that can exist on farms, Virkon® disinfectants are recommended for use at a dilution of 1:100 for Emergency Disease control, preventative and continuous biosecurity measures to provide high levels of efficacy.

How to make a ready-to-use Biosolve® PLUS heavy-duty detergent solution

Preparing the Biosolve® PLUS solution

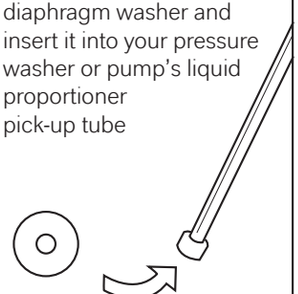
STEP 1

Site specific personal protective equipment required

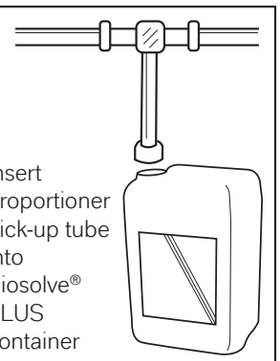


STEP 2

Select a 1% (1:100) diaphragm washer and insert it into your pressure washer or pump’s liquid proportioner pick-up tube



STEP 3



Insert proportioner pick-up tube into Biosolve® PLUS container

STEP 4

Commence detergent cleaning procedure

How to make a ready-to-use Virkon® LSP disinfectant solution

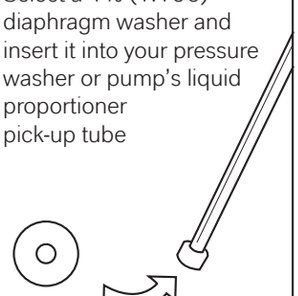
Preparing the Virkon® LSP solution

STEP 1

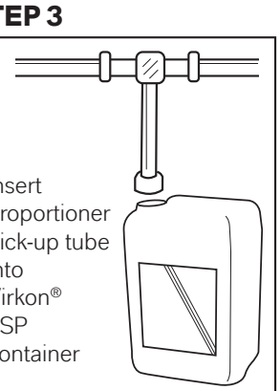
Site specific personal protective equipment required

STEP 2

Select a 1% (1:100) diaphragm washer and insert it into your pressure washer or pump’s liquid proportioner pick-up tube



STEP 3



Insert proportioner pick-up tube into Virkon® LSP container

STEP 4

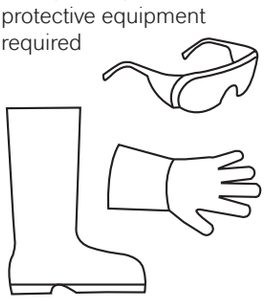
Commence the disinfection procedure

How to make a ready-to-use Virkon® S disinfectant solution

Preparing the Virkon® S solution

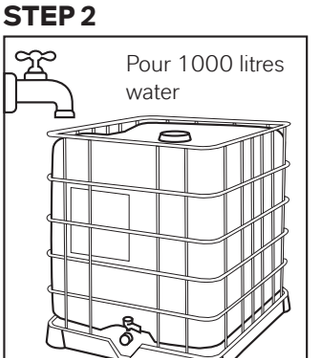
STEP 1

Site specific personal protective equipment required



STEP 2

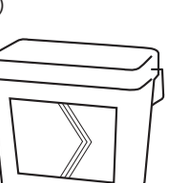
Pour 1000 litres water



STEP 3

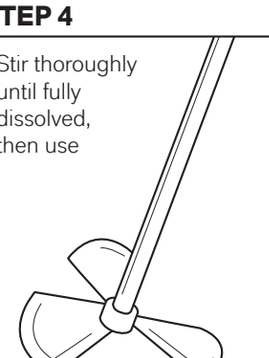
Add Virkon® S
10kg per 1000 litres = 1:100 (1%)

5kg per 1000 litres = 1:200 (0.5%)



STEP 4

Stir thoroughly until fully dissolved, then use

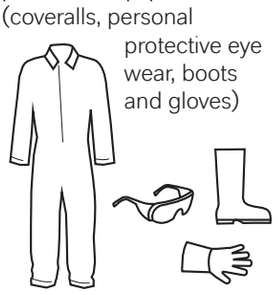


How to clean and disinfect poultry transport vehicles

Dry Cleaning

STEP 1

Wear appropriate personal protective equipment (coveralls, personal protective eye wear, boots and gloves)

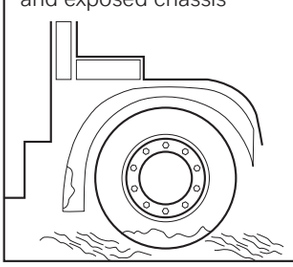


STEP 2

Scrape/brush the crate support posts, bars and floor of the trailer

STEP 3

Remove any deposits of mud, straw etc. from wheels, wheel arches, mudguards and exposed chassis



Biosolve® Detergent Wash & High Pressure Rinse

STEP 1

Soak all external surfaces with Biosolve® PLUS heavy-duty cleaner solution

STEP 2

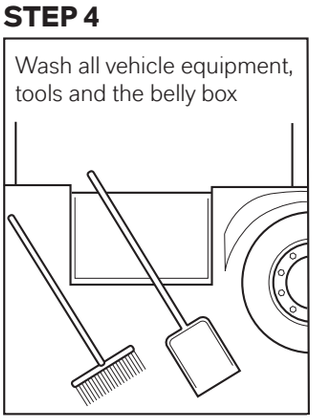
Clean the outside from top down, with attention to wheels, arches and mudguards

STEP 3

Soak the crate support posts, bars and floor of the trailer

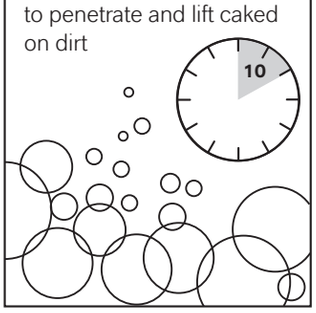
STEP 4

Wash all vehicle equipment, tools and the belly box



STEP 5

Leave detergent solution for at least 10 minutes in order to penetrate and lift caked on dirt



STEP 6

Rinse all surfaces and equipment at high pressure with clean water

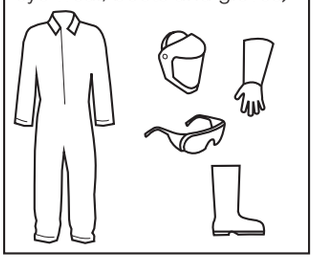
STEP 7

Inspect all internal and external surfaces to ensure they are thoroughly clean

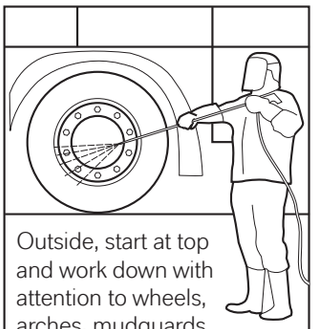
Virkon® S Disinfection Stage

STEP 1

Wear appropriate personal protective equipment (coveralls, personal protective eye wear, boots and gloves)



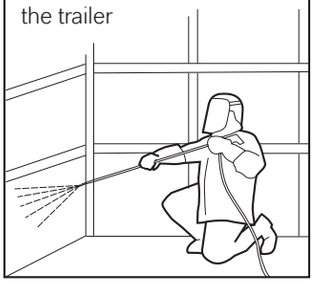
STEP 2



Outside, start at top and work down with attention to wheels, arches, mudguards and underside of vehicle

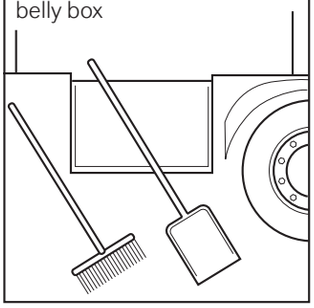
STEP 3

Starting from top to bottom disinfect the crate support posts, bars and floor of the trailer



STEP 4

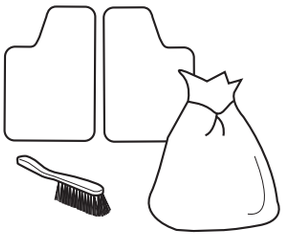
Disinfect all vehicle equipment, tools and the belly box



Cab disinfection and final steps

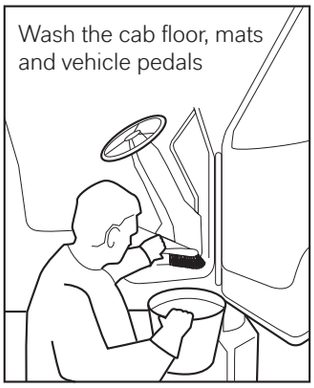
STEP 1

Remove mats and brush debris & organic matter into a refuse sack for disposal



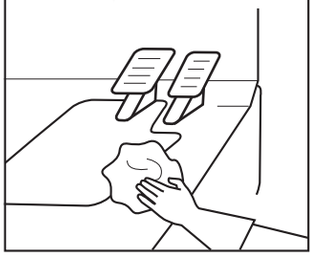
STEP 2

Wash the cab floor, mats and vehicle pedals



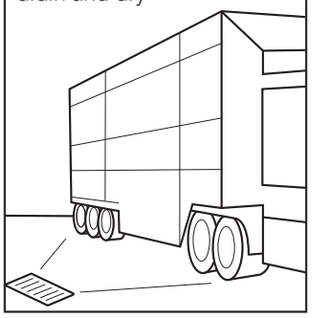
STEP 3

Using a clean cloth soaked in disinfectant solution, disinfect cab floor, mats and floor pedals



STEP 4

Park vehicle on a slope to drain and dry

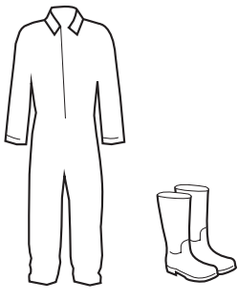


STEP 5

Once the vehicle has been removed, wash away any remaining debris from the area

STEP 6

Disinfect coveralls and boots



PRODUCT DILUTION RATE

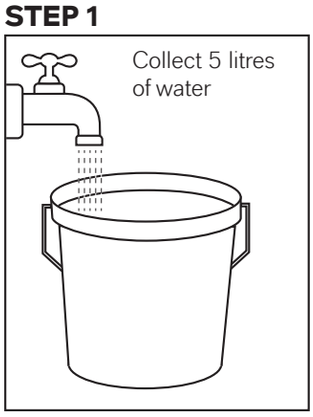
Biosecurity Task	LANXESS Product	Dilution Rate
Detergent Wash	Biosolve® PLUS	1:100 (10ml to 1 litre of water)
Surface & Equipment Disinfection	Virkon® S	1:200 (5 grams of Virkon® S to every 1 litre of water)

How to make a Virkon® S disinfectant boot dip

Preparing the solution

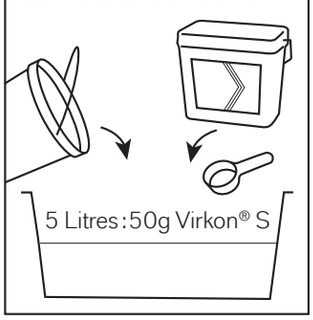
STEP 1

Collect 5 litres of water



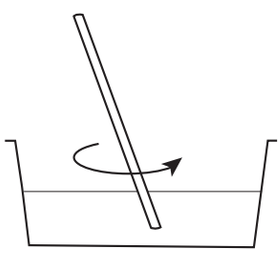
STEP 2

Fill suitable container with the water and Virkon® S



STEP 3

Stir thoroughly until fully dissolved



STEP 4

Provide 2 brushes to dry and wet clean

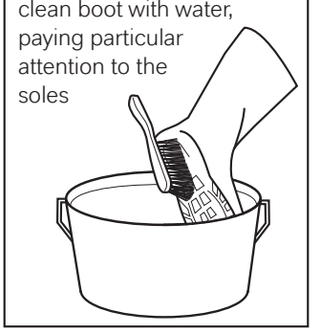
How to use a Virkon® S disinfectant boot dip

STEP 1

Remove organic matter from boots and soles

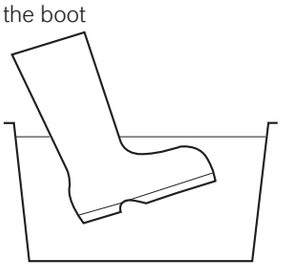
STEP 2

Using the other brush, clean boot with water, paying particular attention to the soles



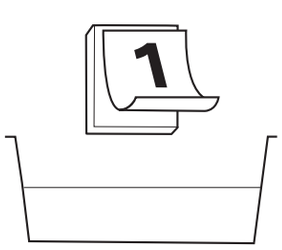
STEP 3

Step into Virkon® S disinfectant solution covering the foot of the boot



STEP 4

Refresh boot dip daily and dispose of used solution responsibly



How to clean and disinfect farm building internal and external surfaces

Dry & wet clean procedure

STEP 1

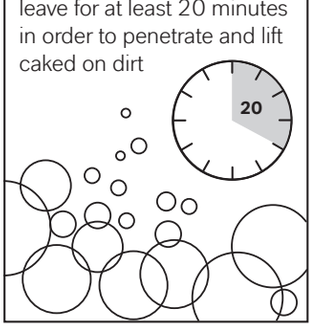
Dry clean all internal surfaces

STEP 2

Presoak all surfaces with clean water at low pressure, and leave for 1 hour

STEP 3

Now apply detergent solution, leave for at least 20 minutes in order to penetrate and lift caked on dirt



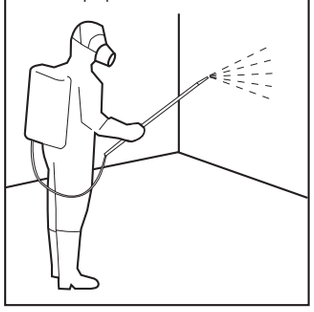
STEP 4

Rinse all internal and external surfaces with clean water, at high pressure

Disinfection procedure

STEP 1

Disinfect all internal surfaces and equipment

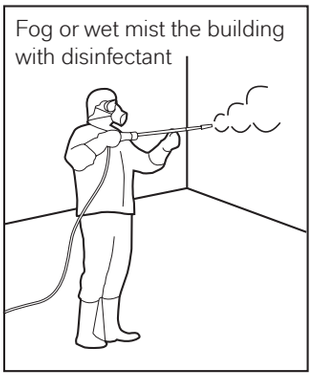


STEP 2

Disinfect around the building including paths, roads and service areas

STEP 3

Fog or wet mist the building with disinfectant



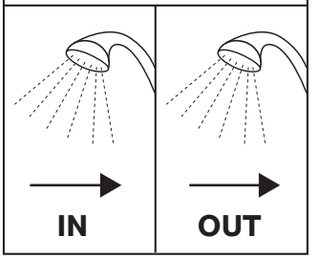
General Perimeter & Personnel Biosecurity

STEP 1

Restrict access to site

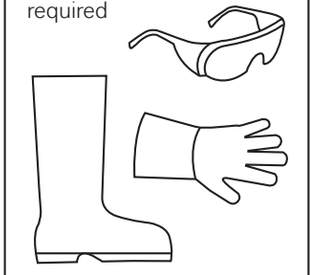
STEP 2

Implement a shower in on entrance, and a shower out leaving farm policy



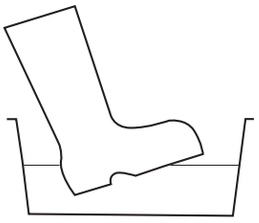
STEP 3

Site specific personal protective equipment required

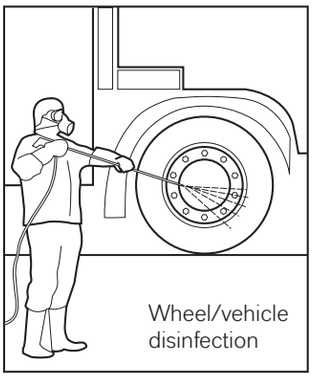


STEP 4

Boot dip - disinfect specialised footwear

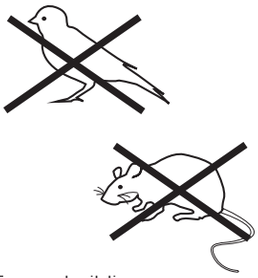


STEP 5



Wheel/vehicle disinfection

STEP 6



Ensure buildings are wild bird and rodent proof

Virkon® S Application & Use Guidance

Disinfectant Boot Dips: Preparation and Use

Disinfection	Dilution Rate	Application
Routine disinfection of footwear	1:100 (10 grams of Virkon® S to every 1 litre of water)	Refresh boot dip daily and dispose of used solution responsibly

Surface and Equipment Disinfection

Surface Disinfection	Dilution Rate	Application
Routine disinfection for all surfaces, earth, wood, and concrete	1:100 (10 grams of Virkon® S to every 1 litre of water)	Using a pressure washer or other mechanical sprayer, apply Virkon® S solution at an application rate of 300ml/m^2.

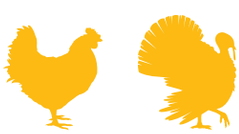
Surface Application Usage Chart

To estimate the total surface area to be disinfected, including walls and ceilings, multiply the total floor area by 2.5.*

Surface Area to be Disinfected	Volume of Water Required	Dilution Rate	
		1:100 (1%)	1:200 (0.5%)
		Quantity of Virkon® S to be added	
50m^2	15 litres	150g	75g
100m^2	30 litres	300g	150g
500m^2	150 litres	1.5kg	750g
1000m^2	300 litres	3kg	1.5kg
2500m^2	750 litres	7.5kg	3.75kg

1. Decide on the volume of disinfectant solution required at the appropriate dilution rate.
2. Measure out the appropriate quantity of Virkon® S powder to achieve the desired dilution rate.
3. Add the Virkon® S powder to the water and stir thoroughly to dissolve.
4. Using a pressure washer or other mechanical sprayer, apply Virkon® S solution at an application rate of 300ml/m^2.
5. All surfaces should be cleaned and allowed to dry prior to disinfection.

*This calculation is a guide based upon UK conversion rates, and reflects usage in buildings with semi porous surfaces. Please check your country-/regional-specific requirements.



Equipment Disinfection

Equipment Disinfection	Dilution Rate	Application
Routine cleaning and disinfection of movable equipment	1:100 (10 grams of Virkon® S to every 1 litre of water)	Using a brush or pressure washer, wash all equipment in Virkon® S solution until visibly clean.

Water System Disinfectant

Terminal and continuous disinfection — all water systems can potentially contain some viral and bacterial contamination, especially header tanks where dust and debris can accumulate. Disinfection will clean the system and eliminate viruses, bacteria, yeasts and fungal growth.

Water System Disinfection	Dilution Rate	Application
Terminal disinfection	1:100	Isolate header tank at the mains and drain off to drinker points farthest from tank. Clean out any gross soiling and debris. Refill with water and add the appropriate amount of Virkon® S powder, thoroughly stir and leave for 10 minutes. Release to fill the water system to all drinking points and leave for a minimum of 4 hours before draining the water system and all drinking points. Flush the system with clean water until the water is visibly clean.
Continuous disinfection	1:1000	Dose header tank as required or apply through water system dosing equipment*.

Virkon® S Water Disinfection Usage Table

Litres of Water to be Disinfected	Dilution Rate		
	Routine Terminal 1:200	High Disease Risk Terminal 1:100	Continuous Water Disinfection 1:1000
	Quantity of Virkon® S to be added		
100 litres	500 g	1 kg	100 g
250 litres	1.25 kg	2.5 kg	250 g
500 litres	2.5 kg	5 kg	500 g
1000 litres	5 kg	10 kg	1 kg

* A pH of 4.6 or below should be avoided, unless approved by your veterinarian.

Aerial Disinfection

Misting/Aerial Spraying, Cold and Thermal Fogging

To assist the control of organisms that may be introduced into a building during the set up procedure, and to disinfect inaccessible areas of the building and the air, use either a fine mist sprayer or thermal fogging machine to apply Virkon® S disinfectant solution evenly. Aerial disinfection may also help control any contamination introduced to the building surfaces by airborne particulate matter present within the environment.

Equipment Disinfection	Dilution Rate	Application
Misting / Aerial Spray	1:200	Using either a pressure washer or knapsack sprayer on its finest mist setting, apply 20ml of Virkon® S solution per m^3 of air space.*
Cold Fogging	1:100	Use a mechanical mister to apply the Virkon® S solution at a rate of 40ml per m^3 of air space.
Thermal Fogging	1:25 (4%) solution of Virkon® S in an 90:10 water: Virkon® S Fog Enhancer mixture	Using a suitable thermal fogging machine**, apply the prepared solution at 10ml per m^3 of air space.

* Equivalent to approximately 1 litre of Virkon® S solution per $20m^2$ of floor space. The calculations in this table are a guide based upon UK conversion rates, and reflects usage in buildings with semi-porous surfaces. Please check your country/regional specific requirements.
** Thermal fogger for delivering water based solution.

Aerial Disinfection in the Presence of Livestock

- Virkon® S can be misted in the presence of poultry at a dilution rate of 1:200 (0.5%)
- A cold fogger or mister should be used.
- Always read the Virkon® S label to ensure regulatory compliance.

References

1. Amass SF et al. *Evaluating the efficacy of boot baths in biosecurity protocols.* J Swine Health Prod 2000; 8:169–173.

2. Amass SF et al. *Evaluation of the efficacy of a peroxygen compound, Virkon® S, as a boot-bath disinfectant.* J Swine Health Prod 2001;9(3):121–123.

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Shaping the Future of Biosecurity

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Virkon® S

Powerful Broad Spectrum Virucidal Disinfectant

10 reasons to put Virkon® S at the heart of poultry farm biosecurity.

1. Virkon® S redefined farm biosecurity and leads the way forward in emergency disease control measures
2. Approved by governments worldwide to combat major diseases, such as Newcastle disease, infectious bursal disease, highly pathogenic avian influenza and more
3. The only branded disinfectant referred to in the 2016 AUSVETPLAN, Australia and New Zealand's emergency disease control plan
4. The gold standard boot dip disinfectant that kills pathogens 10 times faster than the nearest competitor, even at low temperatures and in the presence of organic challenge[1,2]
5. Independently proven in field trials to be highly effective against the most serious threat to livestock: viruses
6. No need to rotate; proven to reduce the potential infectivity of resistant Salmonella superstrains
7. Superior operator safety profile; can be misted in the presence of animals
8. Formulated to include ingredients that have been carefully selected for their ability to degrade naturally within the environment
9. Easy to store and to transport by rail, sea, and air, with no additional spend requirements for storage or transport
10. Biosecurity in a single pack for surfaces, equipment, vehicles, aerial disinfection, and water delivery systems

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