LANXESS

Virkon™ S

Powerful Broad Spectrum
Virucidal Disinfectant

The Leader in Biosecurity for Poultry Farms

Product Overview



Redefining the chemistry of biosecurity.

When Virkon™ S was launched in 1986, it was the most advanced farm disinfectant for its time. It was one of the first oxidative disinfectants to be used on the farm and continues to lead the way in poultry biosecurity, having been deployed successfully against 500 disease-causing organisms.

For over 30 years, Virkon™ S has set new benchmarks in many important aspects of biosecurity, from improved handling and operator safety profiles, to proven on-farm efficacy and application flexibility. Add to this the excellent stability and long shelf life of the powder-based formulation, and it is easy to see why governments the world over keep stocks of Virkon™ S for emergency disease-control purposes.

Virkon™ S was originally developed to specifically address the practical biosecurity requirements of modern-day farming and livestock production. The powerful capabilities of peroxygen-based chemistry in the formulation of Virkon™ S provide a broad spectrum of efficacy with specific focus against viral disease-causing organisms.

New design. Same unrivalled science.

The Virkon™ range of disinfection products now have a dynamic new look to match their biosecurity disinfecting power. Look out for the new enhanced pack designs from your local supplier.

Visit **virkon.com** for more details.









Industry-leading chemistry recognised by governments worldwide.

Virkon™ S is a scientific breakthrough with performance characteristics that have defined biosecurity standards. Not surprisingly, Virkon™ S is the choice of the Food and Agriculture Organization of the United Nations and governments worldwide to secure biosecurity and strengthen emergency disease control (EDC) contingency planning. The Australian and New Zealand governments' AUSVETPLAN is probably the best-regarded EDC reference source. Virkon™ S continues to be the only branded disinfectant referred to in the 2008 AUSVETPLAN, stating that "Virkon™ S is a modern disinfectant with outstanding virucidal properties."

It is proven:

- To kill over 500 strains of viruses, bacteria, and fungi and yeasts
- Against Newcastle disease, Avian influenza, *Salmonella,* and *Campylobacter*
- To be a powerful, fast acting, flexible, multipurpose biosecurity disinfectant

Proven chemistry. Proven results.

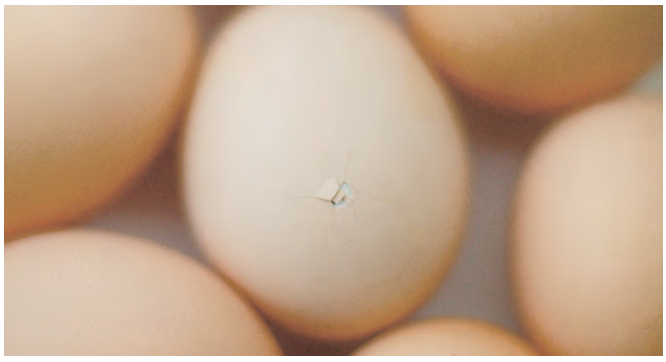
Independently proven broad spectrum efficacy.

As part of our commitment to evolving chemistry, safety, and stewardship, we have heavily invested in performance and safety testing. And, Virkon™ S has a significant number of studies supporting approved label claims against the OIE listed diseases, including exotic Newcastle disease and highly pathogenic Avian influenza (fowl plague).

For *Salmonella*, studies confirm that Virkon™ S is highly active against the most prevalent strains responsible for food poisoning. The broad spectrum efficacy of Virkon™ S has been independently proven against:

- Over 100 strains of viruses in 22 viral families
- Over 400 strains of bacteria
- Over 60 strains of fungi and yeasts

These studies were conducted using a wide range of contact times, temperatures, and organic challenge levels.



Formulated broad spectrum killing power.

Formulated to overcome the problems of limited spectrum and limited activity exhibited by other disinfectants, Virkon™ S achieves deactivation and destruction of the target organism through a broad spectrum, non-selective range of oxidation reactions. Unlike other disinfectant chemistries, such as aldehydes, Virkon™ S does not exert a specific toxicological effect on the target organism and is proven to kill pathogens in seconds.

Performs in the laboratory. Performs on the farm.

Proven on-farm efficacy offers producers reassurance and the knowledge that the product they are using will be effective in real farm conditions, where low temperatures and high levels of organic challenge can present serious problems to other disinfectants.

In field studies carried out by the United States Department of Agriculture (USDA) Centers for Epidemiology and Animal Health, researchers confirmed that Virkon™ S was 100% effective in eradicating the exotic Newcastle disease virus, eliminating the need for costly sentinel bird placement.[1]





Excellent control of food-poisoning pathogens to EN test standards.

With the stringent EU legislation on *Salmonella* and *Campylobacter* control in full force across the poultry industry, Virkon™ S has been re-evaluated at Wageningen University in the Netherlands to specifically address the EU legislation. The latest EN 1656 *Salmonella* and *Campylobacter* studies confirmed that Virkon™ S achieved excellent dilution rates of 1:100 and 1:200 against the most prevalent *Salmonella* strains responsible for food poisoning; these include *S. enteritidis, S. typhimurium, S. virchow, S. infantis*, and *S. hadar*, and *Campylobacter jejuni*.

The gold standard foot dip disinfectant – for rapid speed of kill.

Independent field trials have demonstrated the impracticality of many types of disinfectants for foot dips due to slow kill rates. Researchers at Indiana's Purdue University in the US compared the performance of disinfectants from six leading classes,[2] and only the QAC disinfectant provided adequate foot dip disinfection but required an impractical five-minute soak after boot cleaning. However, when Virkon™ S was evaluated under similar circumstances, effective disinfection was achieved after boot cleaning in just 30 seconds.[3] The study confirmed that Virkon™ S achieves excellent speed of kill at low temperatures and in the presence of organic challenge.



Operational benefits. Because Virkon™ S simply offers more.

No need for rotation.

Independent studies have demonstrated that Virkon™ S is less likely to lead to the development of acquired resistance when compared with certain other disinfectant chemistries, consequently removing the need for disinfectant rotation.[4,5]

Superior operator safety.

Extensive investment has been made to assess the safety of Virkon™ S users. The assessment demonstrates that Virkon™ S is not corrosive to skin and does not cause sensitisation. A typical in-use dilution of 1:100 (1%) has been shown to be non-irritating to skin and eyes, and is not a sensitising agent.

Effective low-temperature performance.

The ability of a disinfectant to work well at low temperatures contributes to the value of its use on a daily basis. It is well established that the efficacy of disinfectants can decrease as temperature decreases. Further, it has been shown that formaldehyde exhibits reduced biocide performance when the temperature is lowered. Conversely, Virkon™ S maintains activity against various viruses at 4°C.

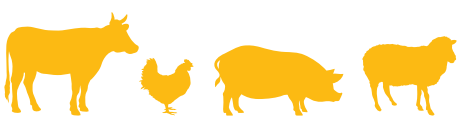
Easy to transport and store.

Virkon™ S can be transported conveniently and rapidly by rail, sea, and air. It is not classified as “dangerous for transport,” reducing the cost of shipment and negating the requirement to manage staff qualified in the shipment of dangerous goods. Due to the complexities and restrictions surrounding shipment of dangerous goods, shipment times can be prolonged.

The powder formulation of Virkon™ S simplifies storage thanks to its stability. So it can be stored for long periods, making it ideal for stockpiling in bulk.









Environmental profile.

The Virkon™ S oxygen-based chemistry contains simple inorganic salts and organic acids. The active ingredient decomposes by a variety of routes within the environment, in soil and in water, breaking down to form the naturally occurring substances potassium salts and oxygen. The major organic components are classified as readily biodegradable, according to OECD and EU test methods.

Virkon™ S is not considered persistent in the environment, according to the standard European process for the classification and labelling of chemical preparations. Independent studies have shown that diluted Virkon™ S should not, when used as directed, pose any threat to sewage treatment facilities.[6]

Aerial misting in the presence of animals.

Spraying a fine disinfectant mist in poultry housing can help reduce cross infection and prevent secondary infection during outbreaks of respiratory and other diseases. Virkon™ S can be misted in the presence of poultry at a dilution rate of 1:200 (0.5%). It is always important to read the Virkon™ S label in order to ensure regulatory compliance.

Biosecurity in a single pack.

Virkon™ S offers farmers a convenient, multipurpose biosecurity system all in one pack for a wide range of applications:

- Surfaces
- Equipment
- Vehicles
- Aerial disinfection
- Water delivery systems

Supporting the reduction of antibiotic use.





Governments worldwide are seeking reductions in the use of livestock antibiotics to limit the development of antibiotic resistance, which can pass to the human population. Targeted legislation to reduce the use of prophylactic antibiotics in the food chain is now becoming a reality. So it's critical that producers take steps to improve their biosecurity measures.





With proven efficacy in a wide range of real-world biosecurity challenges against both viruses and bacteria, Virkon™ S has proven key to combating the effects of viruses and bacteria in livestock production. As a disinfectant of choice for governments worldwide, Virkon™ S leads the way forward in biosecurity best-practice programmes.

Application & Use Guidance

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		
		Routine Disinfection and UK DEFRA General Orders 1:100 (1%)	1:200 (0.5%)	UK DEFRA Diseases of Poultry Orders 1:280
		Quantity of Virkon™ S to be added		
50m^2	15 litres	150g	75g	54g
100m^2	30 litres	300g	150g	107g
500m^2	150 litres	1.5kg	750g	536g
1000m^2	300 litres	3kg	1.5kg	1.071kg
2500m^2	750 litres	7.5kg	3.75kg	2.68kg

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.

Application & Use Guidance

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.

Disinfectant Foot 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)	Replace solution once it has either become soiled or after a period of 4–5 days.

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, and fungal growth.

Water System Disinfection	Dilution Rate	Application
Terminal disinfection	1:200 to 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 volume of Virkon™ S powder, thoroughly stir and leave for 10 minutes. Flush system through to all drain-off points and leave for a further 50 minutes before draining system and refilling with clean water. At the terminal disinfection stage, biofilm build-up within irrigation lines is a known issue of concern, we recommend a longer contact time to address this challenge. Follow the instructions as above, but increase the soak time to a minimum of 4 hours.
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	500g	1kg	100g
250 litres	1.25kg	2.5kg	250g
500 litres	2.5kg	5kg	500g
1000 litres	5kg	10kg	1kg

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.

Aerial Disinfection in the Presence of Poultry

- 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.

Proven Broad Spectrum Efficacy

Virucidal Activity Data

Poultry Disease / Related Condition	Virus Family	Dilution Rate	Contact time (mins)
Egg drop syndrome (EDS)	*Adenoviridae*	1:100	10
Infectious bursal disease (Gumboro)	*Birnaviridae*	1:250 1:200	30 10
Chicken anaemia virus (CAV)	*Circoviridae*	1:250	30
Infectious bronchitis	*Coronaviridae*	1:200	1
Marek's disease Infectious laryngotracheitis (ILT)	*Herpesviridae*	1:200 1:200	10 10
Avian influenza H7N1 Avian influenza H5N1 Avian influenza H7N9 Avian influenza H7N9	*Orthomyxoviridae*	1:320 1:800 1:600 1:200	30 5 10 1
Newcastle disease (NDV) (DEFRA approval) Newcastle disease (NDV) Turkey rhinotracheitis (TRT)	*Paramyxoviridae*	1:280 1:200 1:200	30 1 30
Fowl pox	*Poxviridae*	1:100	15
Avian reovirus	*Reoviridae*	1:100	10
Myeloid leucosis	*Retroviridae*	1:200	30

Fungicidal & Yeasticidal Activity Data

Poultry Disease / Related Condition	Pathogen	Dilution Rate	Contact time (mins)
Aspergillosis (hatchery)	*Aspergillus fumigatus*	1:100	5
Aspergillosis	*Aspergillus niger*	1:25	30
Infections of the oesophagus and crop	*Candida albicans*	1:100	10
Dermatophytosis	*Trichophyton mentagrophytes*	1:50	10

The specified uses and registered claims for Virkon™ S may vary from country to country. Please contact LANXESS directly to verify country–specific approved usages. See page 14 for contact details.

Bactericidal Activity Data

Poultry Disease / Related Condition	Pathogen	Dilution Rate	Contact time (mins)
Food poisoning — humans	*Bacillus cereus*	1:100	10
Coryza in turkeys	*Bordetella avium*	1:100	10
Spirochaetosis	*Brachyspira pilosicoli* *Brachyspira hyodysenteriae*	1:3333 1:3333	10 10
Food poisoning — humans	*Campylobacter coli* *Campylobacter jejuni* *Campylobacter jejuni* *Campylobacter pyloridis*	1:100 1:100 1:200 1:100	5 5 30 10
Psittacosis	*Chlamydophila psittaci*	1:100	10
Necrotic enteritis	*Clostridium perfringens*	1:100	10
Septicaemia, arthritis in turkeys	*Erysipelothrix rhusiopathiae*	1:100	10
Enteritis	*Escherichia coli*	1:200	5
Various infections — humans	Escherichia coli *ESBL strain*	1:100	10
Food poisoning — humans	*Escherichia coli* O157:H7 *strain*	1:100	5
Embryo mortality	*Klebsiella pneumoniae*	1:100	10
Various infections — humans	Klebsiella pneumoniae *ESBL strain*	1:100	10
Food poisoning — humans, septicaemia in poultry	*Listeria monocytogenes*	1:100 1:1000	5 30
Chronic Respiratory Disease	*Mycoplasma gallisepticum*	1:100	10
Respiratory diseases	*Ornithobacterium rhinotracheale* (ORT)	1:100	15
Fowl Cholera	*Pasteurella multocida*	1:150	5
Secondary infections	*Proteus mirabilis* *Proteus vulgaris*	1:200 1:200	5 30
Respiratory infection, Septicaemia	*Pseudomonas aeruginosa*	1:200 1:1000	5 30
Paracolon infection in Turkeys	*Salmonella arizona*	1:100	15
Food poisoning — humans	*Salmonella choleraesuis* *Salmonella enteritidis* PT4 *strain* *Salmonella enteritidis* *Salmonella hadar* *Salmonella infantis* *Salmonella virchow*	1:100 1:100 1:200 1:200 1:200 1:200	10 5 30 30 30 30
Septicaemia in Chickens, Food poisoning — humans	*Salmonella typhimurium* DT104 *strain*	1:200	30
Food poisoning — humans	*Salmonella enteritidis (DEFRA)*	1:100	30
Arthritis and septicaemia in turkeys, Omphalitis in chicks	*Staphylococcus aureus*	1:100 1:200	0.5 30
Septicaemia in poultry	*Streptococcus zooepidemicus*	1:100	5

References

1. *Use of sentinel chickens to evaluate the effectiveness of cleaning and disinfection procedures in non-commercial poultry operations infected with exotic Newcastle disease virus.* Brian J McCluskey et al. J Vet Diagn Invest 18:296-299 (2006).
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4. *Possible associations between Salmonella persistence in poultry houses and resistance to commonly used disinfectants and a putative role of mar.* K.O. Gradel et al./ Veterinary Microbiology 107 (2005) 127-138.
5. Randall, L. P., et al. 2007. *Commonly used farm disinfectants can select for mutant Salmonella enterica serovar typhimurium with decreased susceptibility to biocides and antibiotics without compromising virulence*. J. antimicrob. Chemother. 60, 1273 – 1280.
6. WRc, 1997. Study to determine the toxicity of the virucidal disinfectant Virkon™ S to the waterflea (Daphnia magna), the earthworm (Eisenia foetida) and anaerobic sludge.

Use biocides safely. Always read the label and product information before use.

LANXESS
Energizing Chemistry

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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 2008 AUSVETPLAN, Australia and New Zealand's emergency disease control plan
4. The gold standard foot dip disinfectant that kills pathogens 10 times faster than the nearest competitor, even at low temperatures and in the presence of organic challenge[2,5]
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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