



Virkon[®] S

יורומר בע"מ

Proven Broad Spectrum Virucidal Activity

Versatility – Surface, Equipment, Water and Aerial Disinfection

Environmentally Acceptable with an Exceptional Safety Profile

יוני 2009 - יורומר בע"מ, וירקון 001.



The miracles of science™

Virkon® S - Only by DuPont™



Virkon[®] S - Selected By The Experts

Selected and recommended by government & NGOs globally for livestock disease control.



Virkon[®] S – Registrations and freedom to operate around the world.



Virkon® S – used by Government Agencies around the world at border controls to limit the spread of emergency diseases.



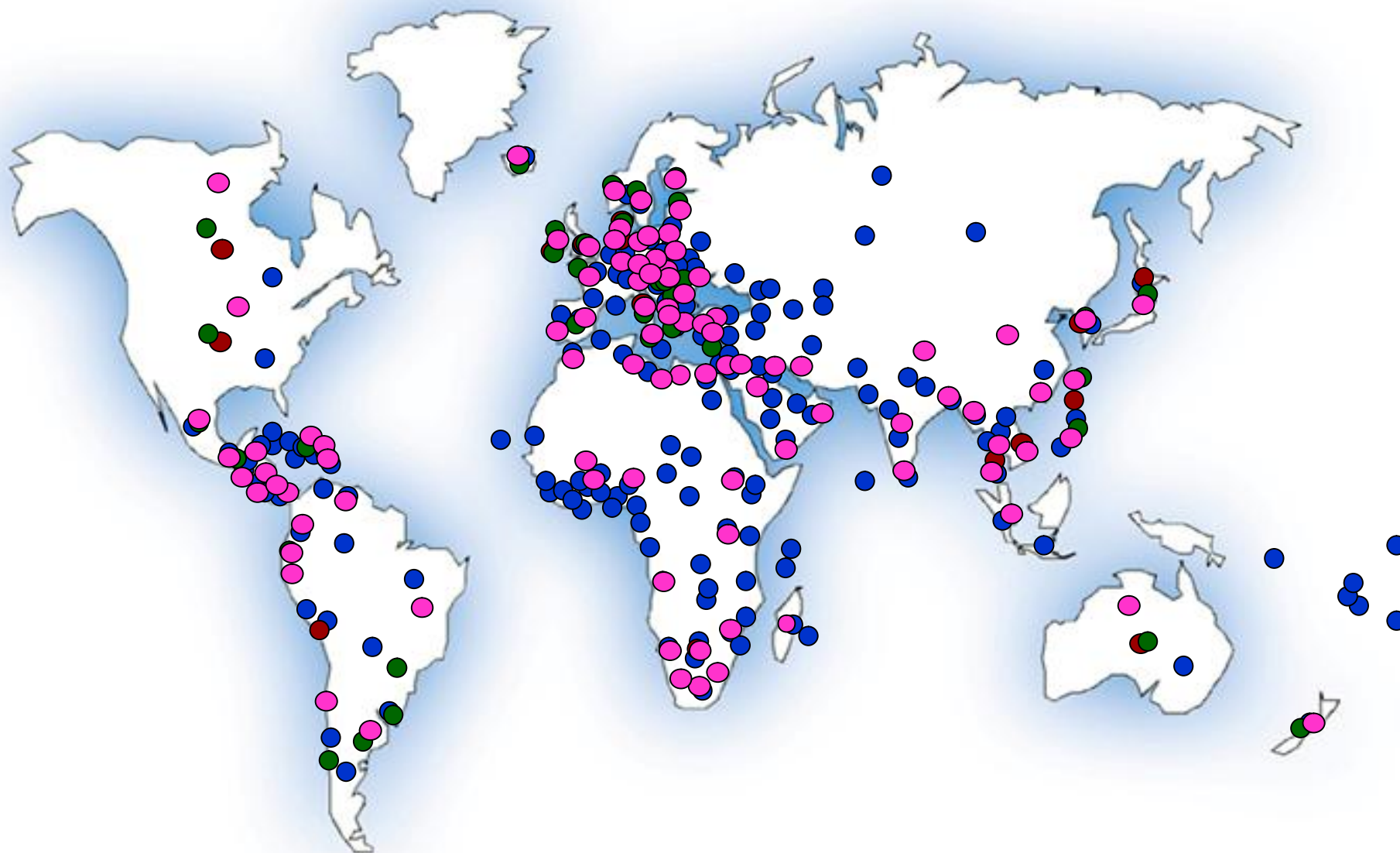
Virkon® S – Emergency Disease Control



The Food & Agriculture Organisation of the United Nations (FAO) supplied Virkon[®] S to 81 countries for stockpiling in the event of an Avian Influenza outbreak.



Virkon® S – Available around the world for both routine biosecurity & emergency disease control.

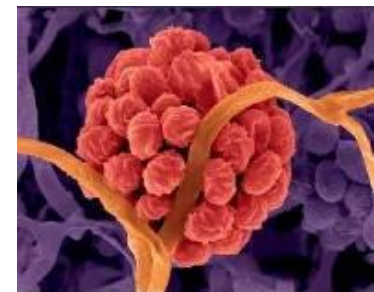


Broad Spectrum Proven Efficacy

Independently proven highly effective against

- *over 100 strains of virus in 22 viral families*
- *over 400 strains of bacteria*
- *over 100 strains of fungi*

using a wide variety of contact times, temperatures and organic challenge levels.

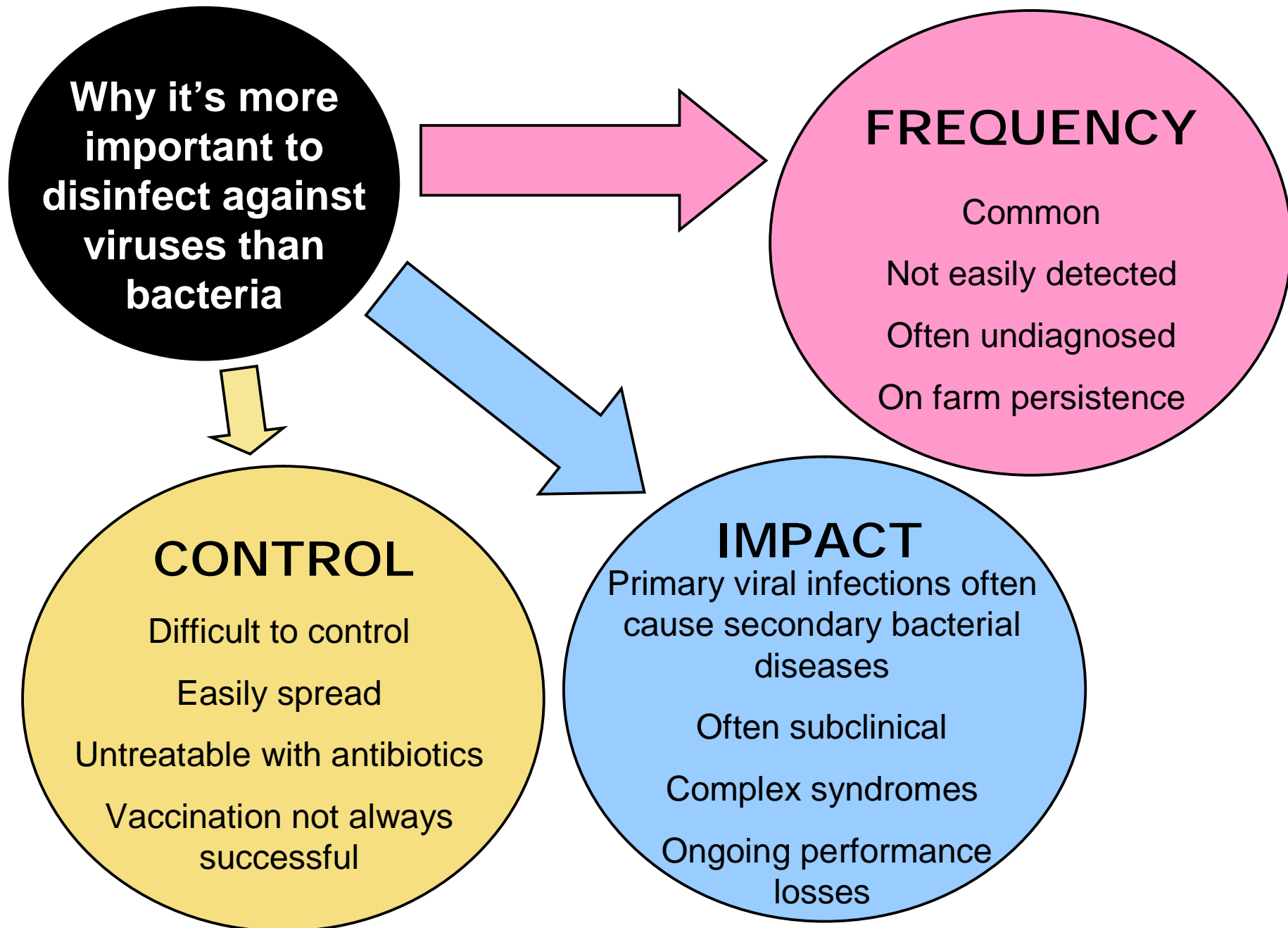


Virucidal Activity

VIRUS FAMILY	POULTRY DISEASE/DILUTION	PIG DISEASE/DILUTION	OTHER COMPARATIVE ORGANISMS/DISEASES
Adenoviridae	Egg drop syndrome – 1:100		Infectious canine hepatitis (ICH) - 1:100
Arenaviridae			Lassa fever – 1:200
Arteriviridae		PRRS – 1:500	
Asfarviridae		African Swine Fever – 1:800	
Astroviridae	PEMS – 1:67		
Baculoviridae			White Spot Syndrome – 9ppm
Birnaviridae	Gumboro – 1:100		
Bunyaviridae			Rift Valley virus – 1:400
Circoviridae	Chicken anaemia – 1:250	PCV2 (incl. PMWS) – 1:200	
Coronaviridae	Infectious bronchitis – 1:100	TGE – 1:100	Canine coronavirus
Flaviviridae		Classical Swine Fever – 1:150	West Nile virus – 1:250
Herpesviridae	Marek's disease – 1:200	Aujesky's disease – 1:100	
Orthomyxoviridae	Avian influenza – 1:320		Equine influenza
Paramyxoviridae	Newcastle disease – 1:280		Parainfluenza (kennel cough) 1:100
Parvoviridae			Canine parvovirus – 1:100 Feline panleucopaenia – 1:100
Picornaviridae		FMD – 1:1300	Teschen Talfan virus
Poxviridae	Avian poxvirus		Bovine pseudocowpox virus 1:300
Reoviridae	Avian reovirus – 1:100	Calf rotavirus – 1:100	
Retroviridae	Avian leucosis virus – 1:200		Equine infectious anaemia virus
Rhabdoviridae			Rabies virus – 1:600

Bactericidal, Fungicidal & Sporocidal Efficacy Data

AGENT TESTED	DILUTION	AGENT TESTED	DILUTION	AGENT TESTED	DILUTION
BACTERIA					
Actinobacillus pleuropneumoniae	1:200	Haemophilus somnus	1:100	Salmonella enteritidis PT4	1:100
Bacillus cereus	1:100	Klebsiella pneumoniae	1:200	Salmonella thomasville	1:200
Bordetella avium	1:100	Klebsiella oxytoca	1:100	Salmonella typhimurium DT104	1:200
Bordetella bronchiseptica	1:150	Lawsonia intracellularis	1:100	Serpulina hyodysenteriae	1:400
Brucella abortus	1:100	Listeria monocytogenes	1:100	Serratia marcescens	1:200
Campylobacter coli	1:100	Mycoplasma gallisepticum	1:100	Shigella sonnei	1:100
Campylobacter jejuni	1:100	Mycoplasma hyorhinis	1:800	Staphylococcus aureus	1:100
Campylobacter pyloridis	1:100	Ornithobacterium rhinotracheale	1:100	Staphylococcus epidermidis	1:100
Chlamydophila psittaci	1:100	Pasteurella haemolytica	1:100	Staphylococcus intermedius	1:100
Clostridium perfringens	1:100	Pasteurella multocida	1:150	Streptococcus equi	1:100
Dermatophilus congolensis	1:100	Proteus spp	1:200	Streptococcus faecalis	1:100
Enterobacter cloacae	1:200	Pseudomonas aeruginosa	1:100	Streptococcus suis	1:150
Erysipelothrix rhusiopathiae	1:100	Pseudomonas mallei	1:200	Streptococcus zooepidemicus	1:100
Escherichia coli 0157:H7	1:100	Salmonella arizona	1:100	Taylorella (Haemophilus) equigenitalis	1:400
Eubacterium suis	1:200	Salmonella choleraesuis	1:120		
FUNGI				SPORES	
Aspergillus fumigatus	1:100	Microsporidium canis	1:300	Aspergillus niger	1:100
Aspergillus niger	1:100	Trichophyton gypseum	1:200	Bacillus cereus	1:100
Candida albicans	1:100	Trichophyton mentagrophytes	1:300	Bacillus subtilis	1:100
Malassezia pachydermatis	1:100	Trichophyton rubrum	1:200	Clostridium sporogenes	1:100



Virkon® S – the only disinfectant to achieve an effective kill against PEMS-Associated Astrovirus in a practical time.

Product	Active constituent	Incubation time	Inactivation [^]
Untreated control	-	-	0/10
Poul Phene	Phenolic	2 hours	0/10
Poul Phene	Phenolic	Overnight	4/10
Cresto Klean	Phenolic	Overnight	0/10
Environ	Phenolic	Overnight	2/10
Synergize	Quaternary ammonia	2 hours Overnight	4/10 4/10
Tryad	Quaternary ammonia	Overnight	0/10
Lysol	Quaternary ammonia	Overnight	0/10
DC&R	Aldehyde	Overnight	0/10
Formaldehyde	-	Overnight	10/10
Bleach	Hypochlorite	Overnight	6/10
Triton X-100	Non-ionic detergent	2 hours	0/10
B-Propriolactone	Hydracrylic acid beta-lactone	Overnight	10/10
Methanol	Alchahol	Overnight	10/10
Virkon® S	Peroxymonosulphate	30 minutes	10/10

Inactivation of an Astrovirus Associated with Poul Enteritis Mortality Syndrome

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No Need to Rotate Virkon® S

- Based on the data available, it appears Virkon® S is less likely to have adverse effects than the other disinfectants examined.
- 286 Salmonella isolates (256 from Danish poultry houses and others adapted to mimic development of resistance) tested against formaldehyde, QAC (“Quat”), glutaraldehyde / QAC, tar oil phenol, and Virkon® S
- Repeated exposure to Virkon® S was most effective – and no benefit in rotating away from Virkon® S observed

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.

- Salmonella strains repeatedly exposed to glutaraldehyde / QAC, tar oil phenol and QAC respond by increasing number of efflux pumps to reduce levels of disinfectant within cells and therefore develop greater tolerance to disinfectants. Virkon® S does not demonstrate this effect.

Randall LP, Cooles SW, Coldham NG, Penuela EG, Mott AC, Woodward MJ, Piddock LJ, Webber MA. 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. 2007 Dec;60(6):1273-80.

- This efflux mechanism might be related to the selection for antibiotic resistance. Therefore Virkon® S had lowest potential for this to occur.

Ref: Karatzas KA, Webber MA, Jorgensen F, Woodward MJ, Piddock LJ, Humphrey TJ. Prolonged treatment of Salmonella enterica serovar Typhimurium with commercial disinfectants selects for multiple antibiotic resistance, increased efflux and reduced invasiveness. J Antimicrob Chemother. 2007 Nov;60(5):947-55

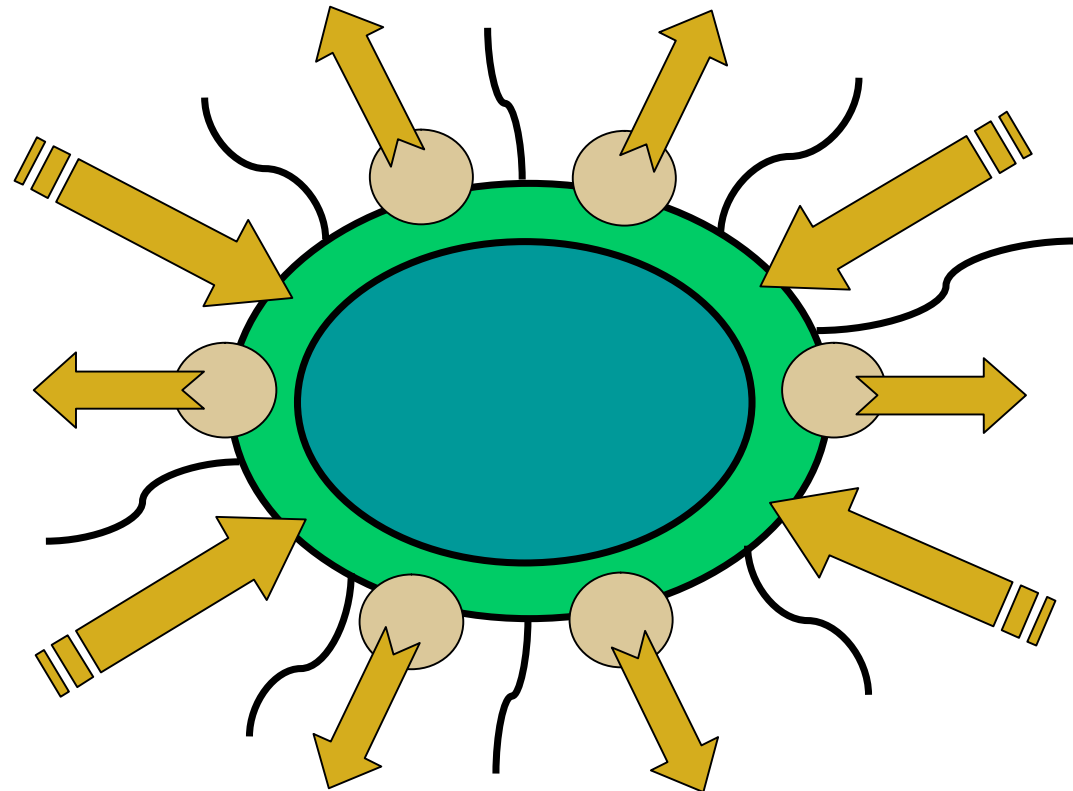
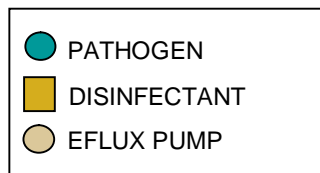
- Further work on this effect to understand significance is expected. The scientific knowledge regarding disinfectant use and selection for resistance is limited and all potential effects of disinfectant use have not been examined.
- Based on the data available, it appears Virkon® S is less likely to have adverse effects than other disinfectants.

No Need to Rotate Virkon[®] S

Bacteria responding to repeated exposure to;

- Glutaraldehyde / QAC
- Tar oil phenol
- QAC (“Quat”)

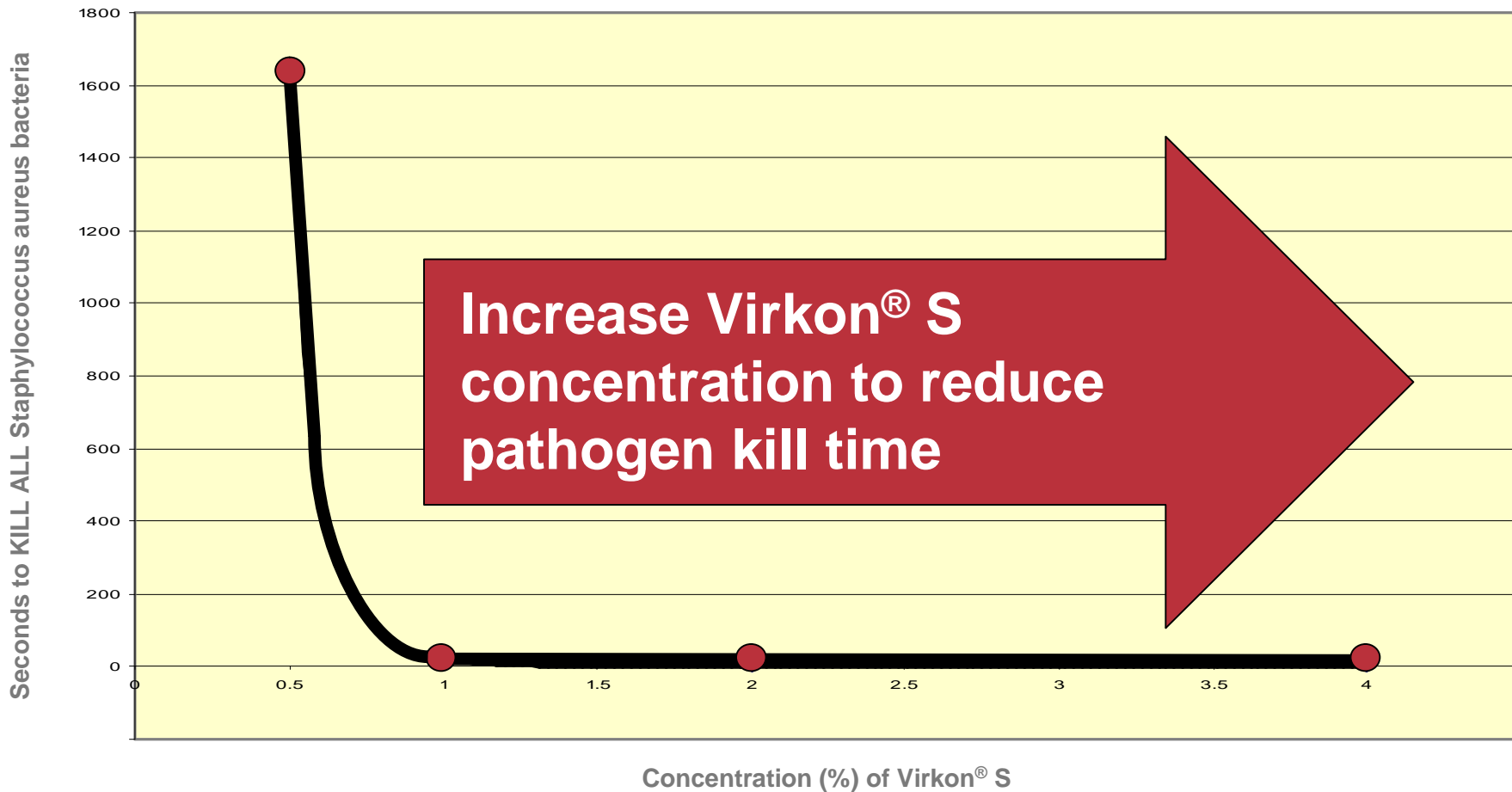
based disinfectants show increased tolerance.



Randall LP, Cooles SW, Coldham NG, Penuela EG, Mott AC, Woodward MJ, Piddock LJ, Webber MA. 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.* 2007 Dec;60(6):1273-80

Virkon[®] S disinfects more quickly with small increases in concentration

Evaluation of in vitro efficacy of Virkon[®] - Gasparini, Pozzi, Magnelli et al (European Journal of Epidemiology 11: 193-197 1995)



N.B. Exact time will depend upon pathogen type, initial challenge, organic challenge and temperature but fundamental relationship will remain the same



Virkon[®] S - Gold Standard for Footdip Disinfection

Unlike other disinfectant technologies such as aldehydes, chlorine & iodine releasing agents Virkon[®] S is independently proven to provide:

- Rapid disinfection of footwear in just 30 seconds
- Broad spectrum activity at low temperatures
- Proven effectiveness in the presence of organic challenge
- Degradable components for environmental acceptability

Amass SF, Ragland D, Spicer P. Evaluation of the efficacy of a peroxygen compound, Virkon[®] S, as a boot bath disinfectant.

Amass SF, Vyverberg BD, Ragland D, Dowell C, Anderson C, Stover JH, Beaudry DJ. Evaluating the efficacy of boot baths in biosecurity protocols

Dept. of Vet Clinical Sciences, Purdue University, 1248 Lynn Hall, West Lafayette, IN 47907-1248

J Swine Health Prod. 2001;9(3):121-123.



Environmental Profile

Virkon[®] S provides:

- Degradable key components
- Convenient management of wastes i.e. via foul sewer
- Meets the environmental standards for auditors and agencies including the UK's Advisory Committee on Organic Standards (ACOS) & DEFRA's ruling on the use of disinfectants in organic farming under EU council regulation 20/1991/EEC



Proven Virucidal Activity on Porous Surfaces

Virkon® S, at a dilution rate of 1:100, when used as directed, has proven activity on wooden surfaces against:

Bacteria	Viruses
E.Coli	Avian poxvirus
Pasteurella multocida	Avian reovirus
Salmonella arizona	Infectious Bursal Disease virus
Staphylococcus aureus	Newcastle Disease virus



The efficacy of Virkon® S on wood surfaces contaminated with bacteria & viruses

Amer Silim, DVM, Msc, PhD - Faculty of Veterinary Medicine, Montreal University, Canada – May 1998

6/30/2009 DuPont Animal Health Solutions



Proven Virucidal & Bactericidal Activity at Low Temperature

Unlike many other disinfectant types, Virkon® S is effective at low temperatures. Independently proven effective at 4°C against the following **viruses**:

- Avian influenza virus
- Newcastle disease virus
- Gumboro disease virus
- TGE virus
- Bovid herpes virus
- Gallid herpes virus
- Chicken anaemia virus
- Classical swine fever virus
- Swine vesicular virus
- Foot and Mouth disease virus
- IPN virus
- Bovine polyoma virus
- Canine parvovirus
- Equine arteritis virus
- PRRS virus

Independently proven effective at 4°C against the **bacteria** causing:

- Salmonella typhimurium
- Pseudomonas aeruginosa
- Salmonella choleraesuis

The above tests were carried out at the UK's Veterinary Laboratories Agency and the Institute of Animal Health, both recognised as world renowned reference testing facilities.



Operator Safety Profile

Virkon® S is not classified as harmful, toxic or a sensitiser in both powdered form and at in-use dilutions¹, requiring the operator to use minimal Personal Protective Equipment (PPE).



1. In accordance with EU Criteria on the classification and labelling of chemical preparations (1999/45/EC)

Aerial Misting Disinfection in the Presence of Animals

- Virkon[®] S can be misted in the presence of livestock or poultry at a dilution rate of 1:200 (0.5%).
- A cold fogger, mister or knapsack sprayer should be used, as the noise of a thermal fogger may disturb the animal's behaviour.
- Always read the Virkon[®] S label carefully to ensure regulatory compliance.



Study to test the effect of prolonged spraying of livestock with Virkon[®] S
D.W.B. Sainsbury, MA, PhD, BSc, MRCVS - Dept. of Clinical Veterinary Medicine, University of Cambridge, United Kingdom

Virkon[®] S Water System Disinfection

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 – 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.
Continuous Disinfection	1:1000	Dose header tank as required or apply through water system dosing equipment.

Virkon[®] S Disinfectant Footdips

Virkon[®] S Disinfectant Foot Dip Preparation & Use

Foot dips act as a demonstrable and highly visible sign that biosecurity and disease prevention is taken seriously and more importantly they help prevent disease transfer onto and around farm sites.

Place foot dips at all main farm/site entrances, and at entrances to farm buildings and ensure that all personnel and visitors use them.

Disinfection Foot	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.



Virkon[®] S Aerial Disinfection

Misting, Aerial Spraying, Cold and Thermal Fogging

To control organisms that can be introduced into a building during the setting 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	Dilution Rate	Application
Misting/Aerial Spray	1:200	Using either a pressure washer or knapsack sprayer on its finest mist setting and apply at 1 litre of Virkon [®] S solution per 10m ² of floor space.
Cold Fogging	1:100	Use a mechanical mister to apply the Virkon [®] S solution at a rate of 1 litre per 10m ² of floor space
Thermal Fogging	1:25 (4%) solution of Virkon [®] S in an 85:15 water Virkon [®] S Fog Enhancer mixture.	Using a thermal fogging machine apply the prepared solution at 1 litre per 40m ² of floor space



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03-5403219



The miracles of science™