

## Committed to providing the best in disease protection

Novartis is a leading global animal health company dedicated to providing a full range of solutions to the veterinary and farming community.

We understand the increasing importance of bio-security programmes in modern 'best practice' farming and are therefore committed to finding ways to help counter the rising threat of bacterial and viral disease.

Virusnip is an advanced disinfectant that reflects our dedication to offering farmers and veterinarians the best protection of animals from disease.

- Destroys bacteria, fungi, viruses in the farm environment of swine, poultry, dairy, equine and other farm animals
- Suitable for use in a wide range of applications for all farms, veterinary and slaughterhouse operations
- Effective on all surfaces regardless of pH
- Effective in the presence of organic matter
- Suitable for use with all disinfecting systems (including aerial)
- Suitable for sanitising water systems
- Does not contain common salt which is known to be corrosive to farm buildings and equipment
- Non-tainting, leaves no unsightly residues
- Bio-degradable
- Non-intrusive odour, no impact on animals or workers
- Simple user friendly formulation
- Easy to store with a three year shelf life
- Powder formulation, dissolves rapidly

For further information on Virusnip applications and performance please contact Novartis Animal Health Inc.  
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### FARM DISINFECTANT

## Boost your confidence in bio-security

An aerial illustration of a farm with several large barns, silos, and a house, surrounded by green fields and trees. A grey text box is overlaid in the upper right corner.

Disease outbreaks increase farm costs, decrease income and have a negative impact on consumer confidence.

Effective disinfection is the front line in any farm bio-security programme, so choosing the right disinfectant is essential.



# A faster, better way to disinfect

Virusnip is a new generation farm disinfectant with a faster biocidal action and a host of other unbeatable features.

## Destroys bacteria, viruses and fungi

Highly effective against Avian Influenza, FMD, SARS coronavirus, Newcastle Disease Virus, PRRS, PCV-2, *Salmonella*, *Campylobacter* and *E.coli* 0157:H7.

## Fast-acting formulation

Advanced *REGENU*™ chemical formulation destroys microbes in under 10 minutes sustaining the biocidal action by regeneration of stabilised non-gaseous chlorine in a mildly acid solution.

## High potency and temperature stability

Proven efficacious even at exceptionally high dilutions with all microbes destroyed by a 1% solution. Unlike some other disinfectants this efficacy remains undiminished at all environmental temperatures.

## Easy, convenient and versatile

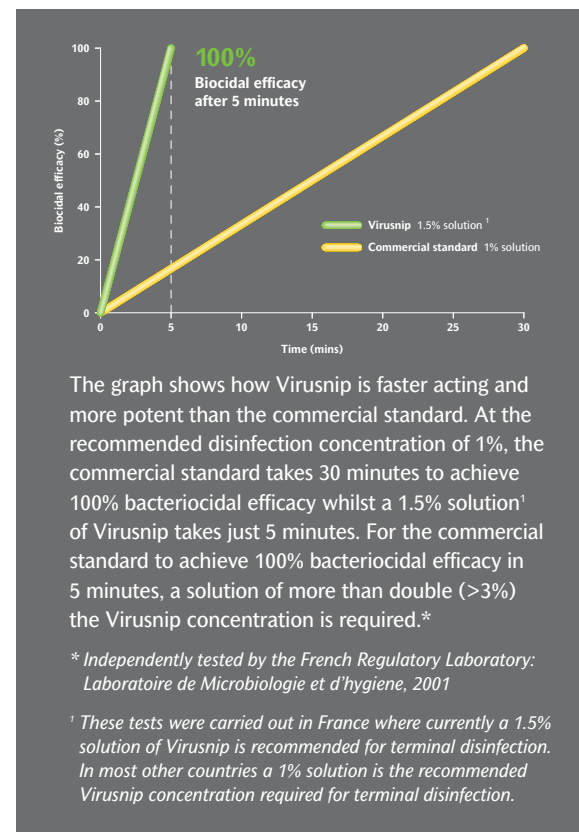
Virusnip is a stable fine powder with a shelf life of three years that is easily transported and stored. It rapidly dissolves, in hard or soft water, and can be used on all surfaces regardless of pH. And it is suitable for use for sanitising water systems, in the presence of organic matter, and with all modern disinfection apparatus including spraying, misting and fogging equipment for aerial disinfection.

## Use with confidence in the farm environment

Farmers can use Virusnip with confidence around swine, poultry, cattle, equine and other farm animals to help provide a disease free environment. It is non-tainting, leaves no unsightly residues and is entirely bio-degradable.

## Non-corrosive

Unlike some other disinfectants Virusnip does not contain common salt which is known to be corrosive to farm buildings and equipment. Therefore you can use Virusnip confidently at all recommended concentrations.



# Versatile all-purpose disinfectant

Virusnip does not only destroy microbes with its uniquely potent chemistry, but it is also suitable for use in a wide range of animal farms, including poultry, dairy and swine.

Operations	Applications
Poultry farms	Buildings
Swine production	Farm equipment
Dairy farms	Water systems
Equine stables	Air
Hatcheries	Feeding systems
Sheep farms	Transport vehicles
Cattle Feedlots	Animal / human foot baths
	Clothing and footwear
	Milking equipment

With Virusnip's versatility and stability in organic and inorganic environments at a full range of temperatures, nothing is left to chance.

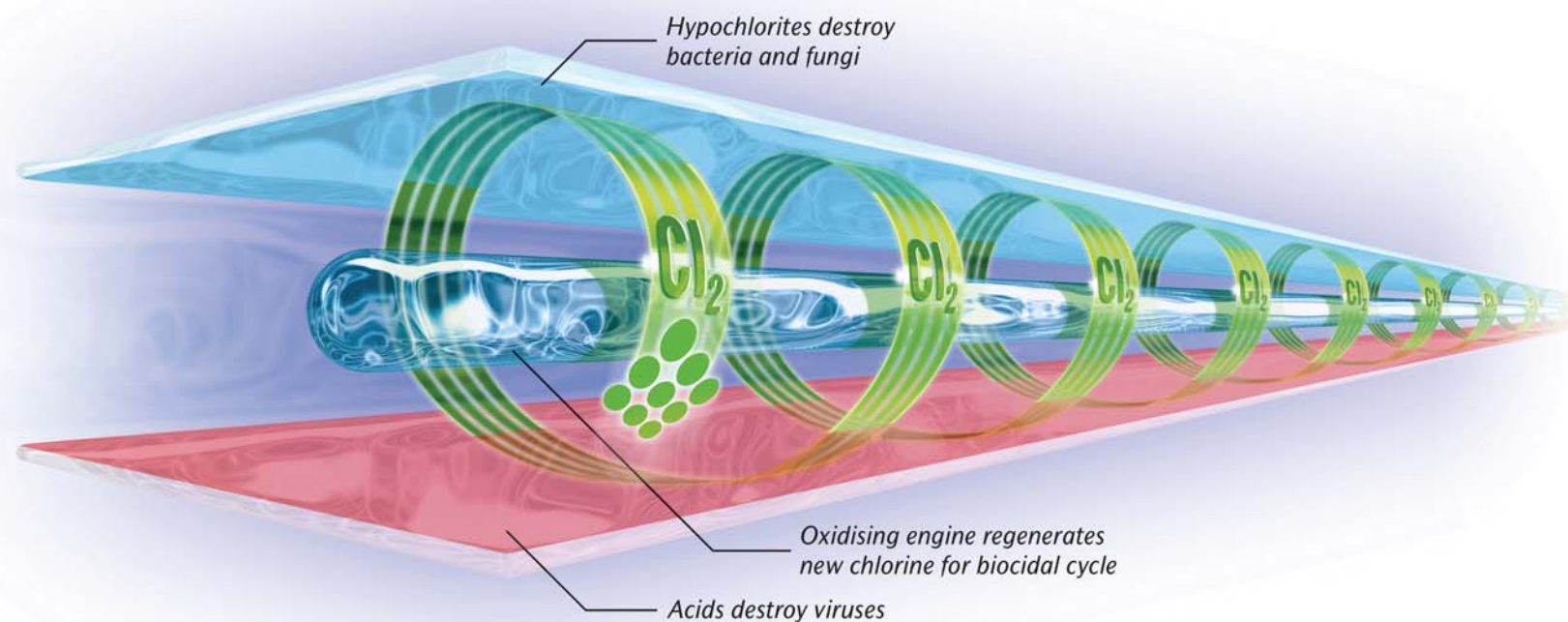
No matter what the biological challenge, you can rely on Virusnip to make sure you are 100% equipped to deal with it.



## Unique *REGENU*<sup>™</sup> chemistry gives faster, more potent disinfection

Virusnip has a unique chemical formulation that destroys microbes in under 10 minutes. This *REGENU*<sup>™</sup> technology makes Virusnip extremely versatile for use on farm and slaughterhouses because it works on any surface, at any pH and is effective in the presence of organic matter.

The secret of Virusnip's success is its ability to regenerate biocidal chlorine, at the same time as maintaining the acidic environment essential for destroying viruses.



*This process was described by Mr John T. McCullins, MSc, FRSC, CChem, CSci, CEng, FIEng, FIGasE, FCIWEM, FIPet. John McCullins is an Honorary Lecturer in Chemical Engineering at Queen's University Belfast and was Director of the Northern Ireland Industrial Science Laboratory for 13 years.*

Virusnip uses molecular chlorine to generate bacteriocidal and fungicidal hypochlorites.<sup>a</sup> These hypochlorites are stabilised by the presence of sulphamic acid, itself a virucide. Once the hypochlorites have destroyed the micro-organisms a halide by-product is formed and is immediately regenerated back into new active chlorine via a process which produces two different virucidal acids as an intermediate step. This ensures a very broad spectrum of potency resulting from a continuous supply of hypochlorites and the presence of three viricidal acids.

<sup>a</sup> A **hypochlorite** is a negative ion ( $\text{ClO}^-$ ) formed when oxidising chlorine to achieve an oxidation state of +1. Hypochlorites are very strong oxidising agents because they are unstable and highly reactive with many organic and inorganic compounds including the cellular material of micro-organisms.

## How does Virusnip work?

At the heart of Virusnip's powerful biocidal action is its advanced formulation and *REGENU*<sup>™</sup> technology. This unique chemistry actively regenerates all the ingredients to deliver an additional level of disinfecting power compared to other available brands.

Virusnip starts to work immediately, disinfecting once it is in solution. This is because it uses an organic source of chlorine, ready to disinfect instantly. By contrast, the commercial standard uses common salt as a source of chloride which requires oxidation back to sodium dichloroisocyanurate (SDIC) before molecular chlorine can be made available for disinfection. In addition this use of salt gives the commercial standard its corrosive properties.

TABLE 1 – VIRUSNIP FORMULATION

Ingredient	Function
Potassium monopersulphate	Oxidising agent
Sodium dichloroisocyanurate (SDIC)	Chlorine source
Sulphamic acid	Acidifier & chlorine stabiliser
Water softener	Softener & buffer to maintain acid pH
Detergent	Cleaning agent / improves penetration
Dye / fragrance	Unique identifier

Potassium monopersulphate is a powerful oxidiser used to regenerate active chlorine for destroying bacteria, viruses and fungi.

During disinfection chlorine attacks micro-organisms and, once they are destroyed, forms a by-product which monopersulphate then converts back into SDIC, the source of active chlorine. This regenerative process ensures Virusnip continuously disinfects until all the monopersulphate is used up.

The presence of sulphamic acid in Virusnip serves a dual purpose. Firstly, it binds the chlorine stabilising it and preventing the release of toxic gas. On contact with microbes, this weak bond is broken and the chlorine is free to destroy microbes without being released as a harmful gas.

The second purpose of the sulphamic acid is to act as a virucide. It creates a controlled acid solution essential for breaking down the protective casing (capsid) of viruses by acid hydrolysis<sup>b</sup>. Very few disinfectants are acidic enough to destroy all classes of viruses in the way that Virusnip does.

The water softener allows the product to be used with hard or soft water, while the detergent helps Virusnip to be effective on soiled surfaces.

<sup>b</sup> **Hydrolysis** is a chemical decomposition process using water to split the chemical bonds of substances, in this case the protective casing around viruses. There are two types of hydrolysis - acid and enzymatic. Acid hydrolysis, as deployed by Virusnip, is highly destructive to amino acids which are the building blocks of the proteins constituent in the protective capsids of viruses.

# Virusnip destroys microbes

Disinfecting with Virusnip leaves nothing to chance when it comes to protecting farms against a full spectrum of biological threats.

A 1% solution Virusnip destroys viruses, bacteria and fungi within minutes protecting your animals, your farm and your profits.

As the following tables demonstrates, a great many microbes are susceptible to Virusnip at far higher dilution rates.



### TABLE 2 – POULTRY

Approved\* disinfecting dilution rates for poultry pathogens

Pathogen or disease	Approved Dilution kg / litres of water
Avian Influenza Virus (Fowl Plague)	1 to 300
SARS coronavirus	1 to 100
Newcastle Disease Virus	1 to 300
Bursal Disease (Gumboro)	1 to 300
Avian Laryngotracheitis Virus	1 to 100
Chicken Anaemia Virus	1 to 250
Parvovirus	1 to 500
Marek's Disease Virus	1 to 200
<i>E.coli</i>	1 to 320
Avian tuberculosis	1 to 2400
<i>Salmonella typhimurium</i>	1 to 320
<i>Salmonella enteritis</i>	1 to 200
<i>Staphylococcus aureus</i>	1 to 640
<i>Pasteurella haemolytica</i>	1 to 300
<i>Staphylococcus hyicus</i>	1 to 300
<i>Mycoplasma gallisepticum</i>	1 to 112
<i>Mycoplasma synoviae</i>	1 to 112
<i>Pseudomonas aeruginosa</i>	1 to 200
<i>Campylobacter jejuni</i>	1 to 200
<i>Listeria monocytogenes</i>	1 to 600
<i>Proteus vulgaris</i>	1 to 130
<i>Proteus mirabilis</i>	1 to 130
<i>Candida albicans</i>	1 to 800
<i>Aspergillus niger</i>	1 to 100
Ringworm	1 to 300
<i>Penicillium roquefortii</i>	1 to 100



### TABLE 3 – SWINE

Approved disinfecting dilution rates for swine pathogens

Pathogen or disease	Approved Dilution kg / litres of water
PRRS Virus	1 to 100
PCV-2	1 to 100
<i>Mycoplasma spp.</i>	1 to 112
Classical Swine Fever	1 to 300
Foot and Mouth Disease Virus	1 to 1300
Transmissible Gastroenteritis Virus	1 to 500
Swine Dysentery	1 to 300
Colitis ( <i>B. pilosicoli</i> )	1 to 300
Swine Vesicular disease	1 to 300
<i>E.coli</i>	1 to 320
Leptospirosis	1 to 500
<i>Staphylococcus aureus</i>	1 to 640
<i>Pasteurella haemolytica</i>	1 to 300
<i>Staphylococcus hyicus</i>	1 to 300
<i>Campylobacter jejuni</i>	1 to 320
<i>Listeria monocytogenes</i>	1 to 600
<i>Pseudomonas aeruginosa</i>	1 to 200
Anthrax	1 to 112
Brucellosis	1 to 112
<i>Candida albicans</i>	1 to 800
<i>Aspergillus niger</i>	1 to 100
Ringworm	1 to 300
<i>Penicillium roquefort</i>	1 to 100
<i>Saccharomyces cerevisiae</i>	1 to 200



### TABLE 4 – CATTLE

Approved disinfecting dilution rates for cattle pathogens

Pathogen or disease	Approved Dilution kg / litres of water
Anthrax	1 to 112
Brucellosis	1 to 112
Contagious Bovine Pleuropneumonia	1 to 112
Rinderpest	1 to 300
Tuberculosis	1 to 2400
<i>E.coli</i>	1 to 320
<i>Streptococcus spp.</i>	1 to 200
Leptospirosis	1 to 500
<i>Staphylococcus aureus</i>	1 to 640
<i>Pasteurella haemolytica</i>	1 to 300
<i>Staphylococcus hyicus</i>	1 to 300
<i>Campylobacter jejuni</i>	1 to 320
<i>Listeria monocytogenes</i>	1 to 600
<i>Pseudomonas aeruginosa</i>	1 to 200
<i>Candida albicans</i>	1 to 800
<i>Aspergillus niger</i>	1 to 100
Ringworm	1 to 300
<i>Penicillium roquefort</i>	1 to 100
<i>Saccharomyces cerevisiae</i>	1 to 200

\*Dilution rates indicated are based on the approval of local agricultural authorities. A complete list is held by Novartis Animal Health Inc., Basel, Switzerland.

# Cleaning and disinfecting with Virusnip

It is advised to mix solutions of Virusnip using clean water at room temperature (20°C). Table 5, below provides reference for how to correctly mix cleaning and disinfecting concentrations of Virusnip in a variety of different volumes.

For routine cleaning a 0.5% solution (5 grams of Virusnip to 1 litre of water) is recommended to thoroughly clean all surfaces.

To disinfect against all bacteria, viruses and fungi, a 1% solution (10 grams of Virusnip to 1 litre of water) should be used on all hard, non-porous surfaces which should be allowed to remain wet for at least 10 minutes.

Prior to disinfection all gross contamination should be removed, all surfaces cleaned and all poultry and livestock removed from the areas being disinfected.

All food contact surfaces should be thoroughly rinsed with potable water after treatment with Virusnip.

Table 5 : Mixing Virusnip (1:200 and 1:100 solutions)		
Quantity	0.5% Solution	1% Solution
1 L	5 g	10 g
10 L	50 g	100 g
50 L	250 g	500 g
100 L	500 g	1000 g



## Disinfecting using Virusnip with fogging equipment

Prior to using Virusnip with fogging equipment all surfaces should be pre-cleaned and all poultry, livestock, food and feed materials removed.

For disinfection a 1% solution of Virusnip should be applied at the rate of 1 litre of solution per 40 square metres of floor space ensuring all surfaces are thoroughly wetted for at least 10 minutes.

Operators should wear protective equipment and not enter the treated area until the fog has dispersed.

It is recommended that fresh solutions be prepared daily, however unused solutions of Virusnip remain stable for up to 7 days.

