



Improving the World of Disinfection

GO₂™ A WIDE-SPREAD DISINFECTANT FOR THE SWINE INDUSTRY

What is GO₂?

GO₂™ is the 21st Century replacement for environmentally harmful chlorine, which has been in use for over a century to disinfect drinking water. GO₂ is an advanced chemistry to generate chlorine dioxide (ClO₂) in solution with a purity of 95.0+%. Pure ClO₂ is ten times more powerful as an oxidizing biocide than chlorine and chlorine-type disinfectants. GO₂ creates zero disinfection byproducts, (DBP's), including carcinogenic chlorine, chloramines, chlorites and chlorides. GO₂ kills most water-borne micro organisms. These include bacteria, including coliform, salmonella, listeria, E-coli, cinobacteria, viruses, yeast, fungi, mold, algae, spores, protozoans, cryptosporidia, actinomycetes, cysts, giardia, legionnaire's disease, cholera, dengue, hepatitis and typhoid. GO₂ also kills airborne viruses when misted into air or used on contaminated surfaces via HVAC or spray system distribution, including anthrax, influenza, SARS, smallpox, chickenpox and avian flu. The range includes not only viruses which infect humans but viruses that kill poultry, fish and livestock. GO₂ also removes phenols, cyanides, iron, manganese and ethnogeny from water. GO₂ eliminates microbial slime from water distribution and storage systems, whether this contamination is in a simple village well, a farm drinking water or irrigation system.

GO₂ Applications in Swine Industry

The importance of drinking water quality for the production and performance of pigs is often overlooked and underestimated. Pigs consume 4 to 6 times as much water as feed. Sows consume as much as 10+ gallons of water per day. Without an adequate supply of good quality water, pig growth and reproduction can suffer. The key is not just the adequate supply of water, but good quality water.

Water can be a source of contamination if the microbiological load in the water is too high. This can also affect digestion and absorption of nutrients from the feed, as well as additives like medications, vaccines and vitamins. Health issues linked to, but not limited to, drinking contaminated water include transmissible gastroenteritis (TGE), pneumonia, diarrhea, salmonella, listeria, typhoid, cholera and hepatitis.

Routine drinking water additives, like vaccines and vitamins contribute to a polysaccharide layer inside the drinking lines, commonly called "slime". The micro-organisms attach to the inside of the line and develop and flourish within this layer. The waterborne bacteria are difficult to kill due to their protective cell wall and encased protection within the slime. Most water treatments and disinfectants, including chlorine, cannot penetrate or degrade the cell wall, nor penetrate and eliminate the slime.

Routinely washing drinkers and flushing water lines is not sufficient because these practices do not remove the source of the problem inside the drinking system. Even with "good quality water", problems effecting health and performance can occur because the contaminants are inside the lines.

The ultimate water treatment product should:

- ▶ Remove the slime
- ▶ Destroy the micro-organisms in the lines
- ▶ Prevent any new build-up of slime
- ▶ Reduce the microbial population to a very low level
- ▶ Leave no residues that can accumulate in the meat

The above leads to healthier, better performing pigs with lower overall costs.



GO₂™ is manufactured in the United States

- ▶ US EPA Reg. No.: 84912-2
- ▶ US EPA Est. No.: 66397-OK-1



APP.013.01.en.090610

GO₂™ APPLICATION BRIEF



Corporate Office
2625 Townsgate Road
Suite 330
Westlake Village
CA 91361
Ph: +1.877.369.4872

Northern California Office
1990 N. California Blvd.
8th Floor
Walnut Creek
CA 94596
Ph: +1.925.408.8026

Mexico Office
Torre IOS Campestre
Av. Ricardo Margain 575
Parque Corp. Sta. Engracia
San Pedro Garza Garcia,
Nuevo León
Mexico 66267
Ph: 52.81.8000.7545

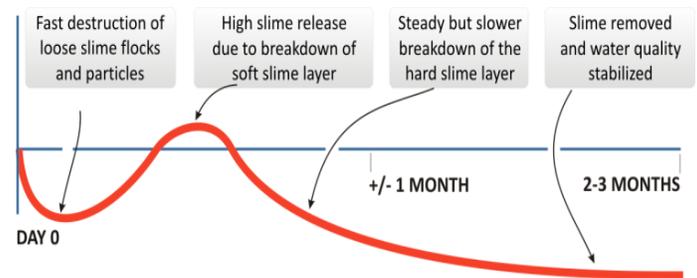
EU Office
Weena 290, 3012 NJ
P.O.Box 819, 3000AV
Rotterdam
The Netherlands
Ph: +3.110.282.1687

GO₂ is manufactured in powder form. Two component powders mixed in tap water on-site produces a 95.0+% pure chlorine dioxide solution (ClO₂) within 90 minutes, at a concentration of 4,000 ppm. The concentrate is simply dosed into the drinking water system.

GO₂ is the 21st Century replacement for environmentally harmful chlorine, a 150 year old chemistry. In treating human and animal drinking water, pure ClO₂ is ten times more powerful than chlorine and chlorine-type disinfectants. GO₂ removes odors, iron, manganese, phenols and cyanides from water and creates zero disinfection byproducts, such as free-chlorine, chloramines, chlorites and chlorides, which all affect poultry health. GO₂ is not corrosive to pipes, pumps and equipment and leaves no residue except trace amounts of common salt.

1. How ClO₂ removes slime

Slime in drinking water is a constant threat to livestock health. In Europe, thousands of growers use ClO₂ in livestock drinking water and houses. ATP readings have shown that the chart below is typical when using GO₂. There is no need for any other product to prevent slime. Slime is eliminated from the entire drinking system, which lowers the health challenge to pigs and improves their performance.



Minimal investment in equipment or infrastructure is required to use GO₂. The product is simple to use, transport and store. It has a shelf life of 3 years. One gallon of GO₂ will treat 40,000 gallons of water at 0.1 ppm. When mixed, the concentrate has an active life of up to 60 days.



GO₂ comes in dry-powder form 1.0kg (2.2 lbs) of component A and 1.0kg of component B produces 50 liters (13.2 gal) of 4,000 ppm chlorine dioxide. Large sizes are available. Only a dosing pump with a flow sensor (optional) and a mixing tank are required. GO₂ is a clean process. It is environmentally friendly and produces zero by-products.

2. GO₂ Applications in the Swine Industry

- Well water and drinking water treatment
- Potable water treatment with excellent slime control
- Facilities treatment: walls, floors, ceiling, equipment, fogging, etc.
- Truck cleaning for livestock transportation between farms.
- Bio-security Programs with consistent and on-going performance

3. GO₂ Key Features

- Easy and effective to apply
- Environmentally "GREEN" chemistry
- Treat and reduce slime and prevent its reformation in drinking and process water systems
- Carcass washing
- Improved production results and FCR
- Widely used as a water disinfectant for industrial, agricultural, municipal and consumer applications
- Competitive costs compared to conventional chemicals treatments



GO₂TM
APPLICATION
BRIEF

4. GO₂ Cleaning Properties

- ▶ Higher yield. Up to 260% more oxidation power than chlorine
- ▶ GO₂ does not chlorinate organic materials
- ▶ Steady bactericidal efficacy within pH levels pH 3 to 10
- ▶ ClO₂ is 99.9% effective against most water-borne micro-organisms (Bacteria, Viruses, Protozoa, Fungi, Mold, Spores, Algae)
- ▶ ClO₂ does not allow build-up of resistance in micro-organisms
- ▶ Kills airborne pathogens when misted

5. GO₂ Chemical Properties

- ▶ Unlike chlorine, GO₂ does not react with ammonia, ammonium or most organic compounds
- ▶ Decreases THM's, HAA's, MX and other harmful compounds
- ▶ No free chlorine, chlorite, chlorate or chloride
- ▶ High efficiency in the removal of iron and magnesium

6. Grower's Benefit

Research was done in Canada on a pig farm with 4 houses and 16,000 pigs to compare conventional water treatment with GO₂ for pig growing. The following Tables show the results:

CONVENTIONAL WATER SANITIZER (IODINE)

ROOM	STARTING DATE	# of Pigs	STARTING WEIGHT (Kg)	ENDING WEIGHT (Kg)	MORTALITY (%)	GAIN per DAY (g)	FEED CONVERSION RATIO
1	12/9/2008	1906	6.95	27.31	2.31	424	1.54
2	12/1/2008	2275	6.85	28.27	3.23	437	1.50
3	12/1/2008	2087	6.73	29.21	3.02	478	1.31
4	12/23/2008	2161	6.71	28.4	2.75	452	1.43
Total:		8429					
Average:			6.81	28.3	2.83	448	1.45

GO₂

ROOM	STARTING DATE	# of Pigs	STARTING WEIGHT (Kg)	ENDING WEIGHT (Kg)	MORTALITY (%)	GAIN per DAY (g)	FEED CONVERSION RATIO
1	11/14/2008	1729	6.80	27.94	2.32	472	1.44
2	11/17/2008	2084	6.99	27.94	3.16	419	1.41
3	11/28/2008	2047	6.99	30.37	2.15	477	1.30
4	11/28/2008	1664	6.74	30.26	2.69	470	1.52
Total:		7524					
Average:			6.88	29.39	2.58	460	1.43

GO ₂ ADVANTAGES:	ENDING WEIGHT	MORTALITY	GAIN per DAY	FEED CONVERSION RATIO
	+ 2.82%	- 8.8%	+ 2.68%	+ 2 points

After the research period, the total profit increase for the grower was CN \$16,436 (US \$ 13,539).

7. Costs Properties

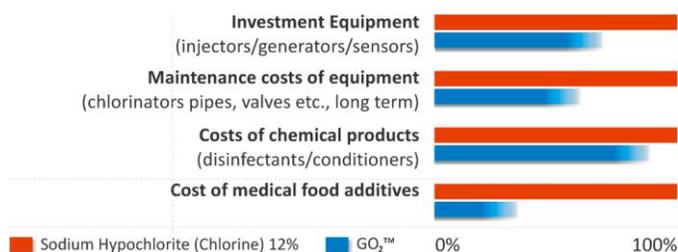
GO₂ is extremely cost competitive when compared by volume with other disinfectants. However, GO₂ delivers significant additional benefits which must be taken into account. These include:

- ▶ No corrosive effect on water distribution systems, equipment, pumps, pipes and filters
- ▶ No need for additional chemicals e.g. pH level stabilizers

GO₂TM
APPLICATION
BRIEF

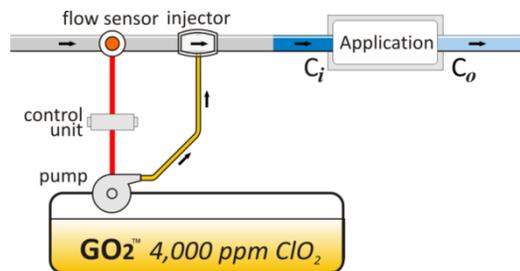
- ▶ No adverse environmental or ecological effects or known health and safety problems
- ▶ Complete slime reduction and control
- ▶ Reduced need for medicines and antibiotics
- ▶ Precise dosage management
- ▶ No risk of explosions
- ▶ Easy to use, transport and store (3 years shelf life of unopened powders packages)

The following slider graph gives an indication of comparison of the main grouped cost factors between Sodium Chlorite and GO₂ (depending on local conditions). A direct cost comparison by the volume of traditional disinfectants does not provide a realistic comparison with GO₂, as all side affect as mentioned above are traditionally not taken into account. The Total Cost of Disinfection is the cost of the chemical product, added to extra cost for maintenance and replacement of equipment, water conditioners and pH stabilizers, medicine and safety precautions, and training and insurance issues.



8. GO₂ Operation

- ▶ 3-year guaranteed shelf life (in unused and unopened jars/pails)
- ▶ Easy to apply (standard low cost industrial dosage equipment)
- ▶ High solubility in water; can be used in a very short time
- ▶ Up to 30 day shelf-life in activated solution
- ▶ Produces 95%+ pure ClO₂
- ▶ High yield rate, one gallon of GO₂ treats 40,000 gallons of water at 0.1 ppm
- ▶ No residues
- ▶ Non-corrosive at use dilution
- ▶ Easy and simple to use



To apply GO₂, the only equipment required is a storage tank, a flow sensor and dosing pump. These costs are minimal and eliminate the high investment hurdle required by conventional equipment-based ClO₂ generation technology.

GO₂ 4,000 ppm concentrate can treat the following amounts of water at 5 pre-set concentrations:

4,000 ppm KIT for	1.0 ppm	0.5 ppm	0.3 ppm	0.2 ppm	0.1 ppm
13.2 Gallons	52,834	105,699	176,115	264,172	528,344
50 Liters	200,000	400,000	666,667	1,000,000	2,000,000
264 Gallons	1,056,688	2,113,376	3,522,942	5,283,411	10,566,882
1000 Liters	4,000,000	8,000,000	13,333,333	20,000,000	40,000,000

As of 2008, ClO₂ has been adopted in many countries as a water disinfectant. Customers from a variety of industries where clean water is essential include drinking water, waste water, food and beverage producers, bottled water companies, agriculture, horticulture, aquaculture, livestock, poultry, vegetable, fruit and produce washing, meat processing, the food industry, retail grocery chains, restaurants, the pulp and paper industry, the oil and gas industry, hotels, hospitals, cruise ships and marine vessels, military, swimming pools, hot tubs and spas, ornamental water, ponds and aquaria.



Improving the World of Disinfection

GO₂TM: A WIDE-SPECTRUM
DISINFECTANT FOR THE
SWINE INDUSTRY

GO₂TM
APPLICATION
BRIEF

9. ClO₂ Germicidal Spectrum

BACTERIA		FUNGI	
Pseudomonas Aeruginosa	Campylobacter Jejuni	Candida Albicans	Trichophyton Rubrum
Pseudomona Specie	Flavobacterium Species	Scopulariosis Species	Aspergillus Niger
Enterobarcer Cloaceae	Yersinia Enterolitica	Trichophyton	Aspergillus Flavus
Enterobarcter Hafnia	Clostridium Sporogenus	Mucor Species	Fusarium Specie
Proteus Vulgaris	Clostridium Dificile	Saahromyces Cerevisiae	Fonsecaea Pedrosoi
Klebsiella Pneumoniae	Clostridium Perfringens		
Salmonella Typhi	Fusobacterium	VIRUS	
Salmonella Enteritidis	Bacilus Subtilis	Herpes Virus I	Poliovirus
Salmonella Gallinarum	Bacilus Circulans	Herpes Virus II	Encephalomyocerditis
Salmonella Typhimorium	Bacilus Megatarium	Adenovirus Echovirus	Vaccina Virus
Salmonella Choleraesuis	Bacilus Cereus	Coxsakiievirus	Vesicular Stomatitis Virus
Salmonella Typhosa	Bifedibacter Liberium	Influenza	Para Influenza
Corynebacterium	Staphylococcus Aureus	Feline Parvovirus	Bluetongue Virus
Sarcinae Lutae	Staphylococcus epidermia	Mouse Flu	Mouse Hepatitis Virus
Streptococcus Pyrogenes	Streptococcus Faecalis	Minute Virus of Mice	Mouse Encephalomyelitis
Strep 1, 2, 3.	Mycobacteroi Bovis	New Castle Disease Virus	Mouse Polio Virus (MEV)
Mycobacterium	Mycobacterium kansaaii	Iridovirus	Pertiviries – Togaviridae
		KHV, VHS, ISA	Hepatitis, Cholera,
OTHER			
Vidrio Cholerae	Culex Quinquifasiatus		
Mycoplasma			

Test Type	Test Organism	Contact Time	Result
9a	Aspergillus fumigatus spores	60 seconds	99.9999% kill
9b	Bacillus cereus Spores	5 minutes	99.999% kill
8f	Candida albicans	60 seconds	99.99999% kill
12	Canine Parvovirus	10 minutes	100% virucidal
	Erwinia carotovora carotovara	60 seconds	99.999% kill
1	Escherica coli	60 seconds	99.9999% kill
	Lactobacillus sp.	60 seconds	99.999% kill
3	Legionella pneumophila	60 seconds	99.999% kill
4	Listeria monocytogenes	60 seconds	99.9999% kill
	Listeria monocytogenes (ATCC15313, Briel, Scott A)	60 seconds	99.999% kill
	Mycobacterium bovis	10 minutes	> 6 log kill
	Newcastle Disease virus	10 minutes	100% virucidal
13	Pediococcus sp.	60 seconds	99.999% kill
10	Proteus mirabilis	60 seconds	99.999999% kill
	Pseudomonas aeruginosa	60 seconds	99.999999% kill
8a	Pseudo rabies virus	10 minutes	100% virucidal
5c	Saccharomyces cerevisiae	60 seconds	99.999% kill
11	Salmonella choleraesuis	10 minutes	100% kill
8c	Salmonella choleraesuis	60 minutes	100% kill
5a	Salmonella typhimurium	60 seconds	99.999% kill
6a	Staphylococcus aureus	10 minutes	100% kill
2	Staphylococcus aureus	60 minutes	100% kill
5b	Staphylococcus aureus	60 seconds	99.99999% kill
6b	Streptococcus faecalis	60 seconds	99.999999% kill
8b	Streptococcus faecium	60 seconds	99.99999% kill
8g	Trichophyton mentagro phytes	5 minutes	100% kill

Contact: Rich O'Reskie:
Technical Director
GO₂ International
Tel: +1.877.369.4872x103
roreskie@go2intl.com
Cell: +1. 952.250.0132

DISCLAIMER: We believe the information contained herein is accurate; however, GO₂ International makes no guarantees with respect to such accuracy and assumes no liability in connection with the use of the information contained herein by any party. The provision of the information contained herein and the provision of information by or reliance on GO₂ International. Technical and Environmental Services Department is not intended to be and should not be construed as legal advice or as ensuring compliance with any country, federal, state or local laws and regulations.

© GO₂ INTERNATIONAL

Visit www.go2intl.com

www.go2intl.com/copyrights