BVS POULTRY Talk

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Summer 2012

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## MEETINGS & EVENTS:

**July 8-10, 2012**
NTF Summer Leadership Conference
Washington DC

**September 18-19, 2012**
DPI National Broiler Health Meeting
Ocean City, MD

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# Protect Your Birds and Your Profits in Hot Weather

*By Jim Donald, Extension Engineer, and*
*Jess Campbell, Poultry Housing Technician, Auburn University.*

Each summer we are able to visit many poultry houses under full tunnel conditions. While many growers do a good job of routine maintenance on their houses, there are still plenty of folks who just won't take the time or don't see the value of keeping their air moving and evaporative cooling equipment in top shape. The fact is, those growers that take proper care of fans, fan belts, pulleys, shutters and cooling pads are rewarded for their time and effort in increased meat production, better feed conversion, and lower moralities. This article explains the importance of maintaining air-moving and cooling equipment and points out the most important things you should be doing to keep birds growing fast in hot weather.

## How Important Can Fan & Pad Maintenance Be?

The chart below shows how important air velocity is for getting maximum broiler performance. The data, from research done at Mississippi State University by Dr. Berry Lott, especially demonstrates the effect on birds of being grown at 600 fpm vs. 400 fpm. The low wind speed house was 0.30 lbs per bird lighter by week 7. For example, 0.30 lbs x 20,000 birds x $0.05 per bird nets $300 per house in added weight. And that's without taking the improved feed conversion into account.

Notice also that these birds were not being reared in optimum thermometer temperatures. The research setup was designed only to test how important wind-chill cooling is, with temperatures controlled at 77°F during the night and 86°F during the day, and no evaporative cooling was used. In other words, at these temperatures, wind-chill effect alone was adequate to get good performance if air velocity was high enough. When temperatures go above the mid-80s, you definitely need the additional real temperature drop from evaporative cooling to keep birds growing fast.

What happens in hot weather if good air velocity is maintained but the evaporative cooling system is neglected and doesn't perform as designed? Analysis of other research done by Dr. Lott indicated that if groups of birds were grown at the same wind speed, but with one group at a constant 81°F and the other at a constant 86°F, the birds grown at the higher temperature would be about 20% lighter in weight. In real world summertime conditions, of course, we aren't likely to see a constant round-the-clock overtemperature. These studies do, however, provide a basis for a reasonable expectation that a cooling system allowing temperature to run +5°F warmer than normal during the heat of the day (slightly less than one-third of 24 hours) would be likely to cost us about 6% of the birds' body weight.

*continued on page 3*

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**Vitamin B Complex**

# Poultry Talk

It's been a great start to our summer! With the early spring crops look great and are way ahead of normal. Yields should be at record levels if we continue to get timely rains and get the heat units needed to produce a great crop. Hopefully this will mean lower feed costs as the corn and bean crop look great across the country.

Poultry markets continue to stay strong. Hopefully we don't produce more than the demand is to keep our markets strong through the end of the year.

With summer comes heat. Make sure that you're prepared for it by running electrolytes when needed. Also, make sure that cool cells are properly maintained. Virocid works great for cleaning up cool cell pads. If you have any questions regarding how to use Virocid for cleaning cool cell pads, contact your BVS sales rep or BVS distributor in your area for more information regarding cool cell pad cleaning.

With the early spring and warmer temperatures also, come increased challenges with controlling darkling beetles and flies. Let BVS help you update and review your insect control program, so that it can be the most effective program for you and the most economical program for your situation.

With summer also come many industry outings. Please make sure that you're supporting your local and state poultry associations by attending these outings. It's a great time to share information and fellowship with others involved in this great poultry industry of ours!

I hope that you and your families have a great summer! Enjoy it. It goes by too fast.

Till next time, and God Bless,
Randy

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## Hot Weather Protection, *continued from cover*

How much would that cost the grower? In a house growing 20,000 birds to 7 lbs, we would produce 140,000 lbs of meat. A 6% loss in weight would be 8,400 lbs. At $0.05/lb grower pay that is a $420 per house price for not keeping cool pads in top shape. There would also be a loss due to a drastic reduction in feed conversion, which we are ignoring here for the sake of this simplified example. Conclusion: The only way to get top bird performance is to maintain both good air velocity and good cooling.

**Airflow vs. Weight Table**

| Air Velocity | Weeks of Age | | | |
|---|---|---|---|---|
| | 4 | 5 | 6 | 7 |
| | ---Body Weight--- | | | |
| 0 | 2.96 | 4.24 | 5.32 | 6.10 |
| 400 | 3.00 | 4.44 | 5.81 | .92 |
| 600 | 3.02 | 4.49 | 5.92 | 7.22 |

### Fan Maintenance Tips

Fan rpm's and air movement (cfm's and velocity) are directly related. A fan turning 10% slower in rpm's moves 10% less air. A fan turning 15% slower moves 15% less air than normal. And it's the fan belt and pulley that determine fan rpm. As a fan belt wears, it becomes thinner and rides deeper in the pulley than when new. The effect is exactly the same as installing a smaller motor pulley: the fan rpm speed is reduced. The same thing happens with a worn pulley, of course. Note: Tightening a worn belt does not cure the problem. Field studies have found a surprising number of farms where growers have kept fan belts tight but the fan rpm's have been reduced because the pulleys and the belts were worn.

### How serious a problem is a 10% loss in air velocity?

For example, if a house has 10 fans in good condition and the air speed in the house is 600 fpm, the estimated wind chill cooling will be 15 degrees F (see wind-chill figure on facing page). A 10% reduction in rpm's will result in 540 fpm wind speed, which produces about 12 degrees of wind chill cooling, a significant 3-degree loss.

Another important fan maintenance item is cleaning fan shutters and blades. Research shows that if shutters and blades are allowed to become caked with dust, fan performance can be cut by as much as 30%. This means that fans delivering 600 fpm when clean may deliver only 420 fpm when they are dirty.

These are realistic numbers. Without proper fan maintenance, conditions will be nowhere near optimum and bird growth rate and feed conversion will be greatly hurt. Check and clean fan blades and shutters on a weekly basis. Replace belts and pulleys before they have an effect on rpm's.

### Evaporative Cooling Maintenance Tips

Like fans, evaporative cooling systems are expensive items that pay off by helping keep birds in optimum growth conditions. But you can't get the benefits you paid for unless you do what's needed to keep your cooling pads operating at top efficiency. Following is a list of the most important items to keep up with.

**1.** The first step in getting maximum cooling from pads is to get the house tight and get all incoming air going through the pads. Hot outside air that leaks through cracks works against the pad cooling system. Find and seal all house air leaks. Curtain flaps help minimize air leaks around curtains, so that houses run cooler in summer and save gas in winter.

**2.** The second step to get good pad cooling is to make sure that pads have 100% wetted surface area. Any dry area on a pad is the same as any other air leak in the house, allowing hot air to come in without being cooled. This means it is imperative to check pad plumbing, and especially the distribution header holes in recirculating systems, to make sure water is flowing properly and you have completely wetted pads to get the cooling you need. If you have a spray pad system, be certain also that worn or clogged nozzles are cleaned or replaced, so that 100% of the pad area is kept wet.

**3.** Like fan blades and shutters, cooling pads will get dirty and must be kept clean to work at top efficiency. The required maintenance is to check and if necessary unclog the pad flute holes. One of the best ways to unclog channels in a cooling pad is just to spray a lot of water on them. Use normal water pressure only. High pressure systems can cut or damage pads. Several products are available that help loosen dirt on pads. These are normally sprayed onto the pads with a garden type sprayer and allowed to soak. Then loose material can be flushed out with just plain water. Be certain that whatever material you use to clean your pads does not contain chlorine and is approved for use on the pads.

**4.** In addition to collecting dirt and dust, pads can also become clogged with algae. If you see green growth, use a manufacturer approved cleaning agent only. Do not use chlorine or bromine to control algae growth on your cooling pads. If you are not sure about a product, do not use it. Contact the manufacturer of your pad for assistance in selecting a cleaning agent. Dump the water from the sump tank at least one time every two weeks to keep algae from growing in the sump.

**5.** Another item that helps prevent algae growth and keeps water flowing properly is to clean water filters weekly. Filters prevent dirt, bugs, and other foreign debris from making their way into the water distribution header. They are often the source behind your pads not being wetted thoroughly by clogging up the holes in the header. Filters that are clogged greatly reduce the amount of water flowing to the pad, which can reduce cooling as well as reduce the life of your pads.

**6.** Cooling pads need to be dried out at least once each day after being used. At night when you are not using the pads turn them off between, say 10 pm and 9 am, so that they are allowed to dry at night before use again.

**7.** If you have in-house foggers, you need to make sure all nozzles are clear and in good condition, and that pressure regulation and fogging coverage are adequate.

### Conclusion

The good money you have paid for quality fans and evaporative cooling equipment will largely go to waste and give you little or no return unless you make sure the equipment is maintained to operate at top efficiency. In the heat of summer, you can easily lose several hundred dollars per house in just a few weeks if you let fans and shutters get dirty, don't check and replace worn belts, or fail to see and correct an evaporative cooling problem.

Thanks to Dr. Berry Lott, poultry scientist, Mississippi State University, for personal consultation on this article.

*Reprinted from The Alabama Poultry Monthly, 2004.*

# BIOSUPREME®

## ANIMAL FEED INGREDIENT

Is a natural feed ingredient for livestock and poultry used to control odors, ammonia and other gas emissions, which can be detrimental to livestock performance. Is a 100% natural product, manufactured from pulverized *Yucca schidigera* plant, which is native to Baja California, Mexico.

Our Food Safety Management System is the most important basic principle in our production and in the marketing of our products. This innocuous process must comply with strict international standards for quality and organic certification as well as an integrated system of checks and balance to assure quality and continuous improvement (HACCP, ISO 22000:2005, GMP+, B2 and B3).

**BIOSUPREME** is produced by Baja Agro International S.A. de C.V., the only manufacturer of *Yucca schidigera* extract, that harvests the plant in its own ranches and those of its associate farms. This assures the highest quality products offered on the international market.

### SPECIFICATIONS

| | |
|---|---|
| Content | Pure *Yucca schidigera*[1] powder |
| Appearance | Free flowing powder |
| Color | Light beige |
| Odor | Sweet |
| Density | 550 – 650 g/L |
| pH (10% AQ solution) | 4.0 ± 0.5 |
| Toxicity | Non toxic |
| Shelf life | Min 48 months at room temperature |
| Heat stability | Excellent |
| pH stability | Excellent |
| Packaging | 55 lbs (25kg) Box |

### APPLICATIONS

**Improvement of animal feed**
Research in several universities, in addition to many successful trials and studies that have been conducted on farms worldwide, show that the use of *Yucca schidigera* extract in animal feed improves the health conditions of turkeys, broilers, chicken layers, ducks, geese, quails and pheasants by reducing the emission of ammonia and odor .

**Synergy**
Research indicates that there are additional secondary benefits from inclusion of *Yucca schidigera* extract in feeds, specifically, an increase in animal weight gain and better feed utilization.

**Gas reduction**
Reduces ammonia and other irritant gases in confined buildings, this creates healthier living conditions, including lower stress levels, helping to improve feed utilization and growth rates.

**Odor reduction**
Reduces waste odor, creating a better environment for animals, employees, visitors and neighbors.

**Economical**
Is one of the most cost-effective products to add for improved performance, allowing producers to maximize returns.

### SUGGESTED USAGE LEVELS

| POULTRY | onces per ton |
|---|---|
| Turkeys | 4 - 16 oz |
| Boilers | 4 - 16 oz |
| Chiken Layers | 4 - 16 oz |
| Ducks | 4 - 16 oz |
| Geese | 4.- 16 oz |
| Quails | 4.- 16 oz |
| Pheasants | 4.- 16 oz |

# BIOSUPREME® L

## FOR USE IN DRINKING WATER

### SPECIFICATIONS

| | |
|---|---|
| Content | *Yucca schidigera*[1] concentrate liquid extract |
| Appearance | |
| Color | Dark Brown |
| Odor | Sweet |
| Density | 1.10 ± 0.05 (25° C/25° C) |
| pH (10% AQ solution) | 4.0 ± 0.2 |
| Toxicity | Non toxic |
| Shelf life | Min 24 months at room temperature |
| Heat stability | Excellent |
| pH stability | Excellent |
| Packaging | 2.5 gallons plastic jugs |

### APPLICATIONS

**Animal drinking water**
Adding to the drinking water of poultry will reduce the level of ammonia in the animal's digestive track and in the litter thereby reducing the level of ammonia in the poultry houses.

**Broiler beds**
Spraying over broiler beds will reduce the ammonia and other toxic gases, as well as accelerate the organic matter degradation of the litter.

### SUGGESTED USAGE LEVELS

**Broiler beds**
Spray 6 oz per 1000 square feet twice a week over the litter until odor and toxic emanations are reduced.

**Recommendations**
The use of **BIOSUPREME L** can be stopped when desired ammonia or odor level is achieved, but it is recommended that **BIOSUPREME** be added in the animal's feed on a continuous basis to reduce noxious ammonia levels.

To obtain an even product distribution, it is recommended to dilute **BIOSUPREME L**[2] in water at a ratio of 10 to 1, or as needed.

**Application in animal drinking water**
Broilers, turkeys, chicken layer,
ducks, geese, quails and pheasants. 8 oz per 1000 gallons of water.

(1) *Yucca schidigera* is approved by the U.S. Food and Drug Administration as a natural food adjuvant under Title 21 CFR 172.510.

(2) Due to the natural composition of the extract, its contents may vary throughout the year; therefore, this is an average approximate analysis.

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## INNOVAX®-ND

TSP-V-048278 2000 dose ampules
TSP-V-116951 4000 dose ampules

### Marek's Disease - Newcastle Disease Vaccine

(Serotype 3, Live Virus, Live Marek's Disease Vector)

**INNOVAX®-ND** is a frozen, live, cell-associated Newcastle disease (ND) and Marek's disease (MD) vaccine. It provides proven protection against virulent NDV and MD. It is approved for *in ovo* injection of 18-day embryonated eggs.

**Advantages:**

- Provides extended protection for virulent ND and MD
- Offers effective protection in the face of NDV maternal antibodies
- Replaces a conventional live ND vaccination program in the absence of exotic ND
- Removes the potential for respiratory reactions due to live ND vaccines
- Allows the use of monovalent infectious bronchitis (IB) vaccines, improving IB protection

## NEWHATCH-C2®

TSP-V-053805 10,000 dose vials

### Newcastle Vaccine

($B_1$, Type, C2 Strain, Live Virus)

**NEWHATCH-C2®** is the patented, virtually nonreactive C2 strain of $B_1$ Type Newcastle disease (ND) virus. It is a lyophilized vaccine approved for spray vaccination of chickens one day-of-age or older for protection against Newcastle disease.

**Advantages:**

- Effective against field challenge of Newcastle disease virus
- C2 strain of $B_1$, Type Newcastle minimizes reaction to one day-of-age vaccination in broiler chicks
- NEWHATCH-C2 eliminates problems with lingering hatchery reaction prior to field boost
- Safe to use for hatchery application


## ORALVAX-HE®

TSP-V-065396 5 x 2000 dose vials
TSP-V-065398 5 x 5000 dose vials

### Hemorrhagic Enteritis Vaccine (Live Virus)

**ORALVAX-HE®** vaccine is a high titer vaccine that safely protects turkeys 6 weeks of age or older against the immuno-suppressive effects and death losses caused by hemorragic enteritis.

**Advantages:**

- Safe and efficacious: produced with a stable and avirulent strain of type II avian adenovirus of pheasant origin
- Produced under federal quality control standards, ensuring purity and sterility
- Consistent high potency titers to en sure protection of every vaccinated bird, flock after flock
- Recommended administration at 6 weeks of age or older helps assure no maternal antibody interference

## NEWCASTLE CLONED N-79

TSP-V-066953 1000 dose units

### Newcastle Disease Vaccine ($B_1$ Type, clone-selected LaSota Strain)

(Live Virus, Chicken Embryo Origin)

**Newcastle Cloned N-79** is a live virus vaccine of chicken embryo origin containing a clone-selected $B_1$ Type, LaSota strain Newcastle disease virus. This virus has the ability to stimulate protection against a wide variety of Newcastle field strains while causing a milder reaction, in healthy chickens and turkeys, than other LaSota strain vaccines.

**Advantages:**

- Clone-selected LaSota strain stimulates strong immunity against Newcastle disease, while producing only mild reactions
- Product of choice for immunization of turkeys against Newcastle disease
- May be used to revaccinate broilers in areas with strong Newcastle disease challenge

# *BVS is the exclusive distributor and marketer of Schering-Plough turkey vaccines in the U.S.*

## PM-ONEVAX®-C

TSP-V-065417 1000 dose units

### Pasteurella multocida Vaccine

(Avirulent Live Culture, Avian Isolate)

**PM-ONEVAX®-C** vaccine. The seed culture used to make this vaccine hs been laboratory tested for protection of chickens against challenge with the X-73 (Type 1) strain of *P. multocida* and in turkeys against challenge with the P1059 (Type 3) strain of *P. multocida.*

**Advantages:**

- A temperature sensitive mutant of the CU strain that produces stronger takes than the M-9 strain, but less than the CU strain
- Offers protection against naturally occuring field strains of *P. multocida*
- Easy wing-web administration in broiler breeders, layers and turkey breeders

## ART VAX®

TSP-V-065236 1000 dose units

### Bordetella avium Vaccine

(Avirulent Live Culture)

**ART VAX®** vaccine is a live bacterial vaccine containing a chemically induced mutant of *Bordetella avium* which is immunogenic for turkeys when vaccinated by spray cabinet at day of age; then revaccinated in the drinking water at 2 weeks of age.

**Advantages:**

- Approved for spray administration at day of age followed by drinking water at 2 weeks of age
- Proven efficacy in preventing coryza in turkeys
- Time proven. This vaccine strain has been used effectively in the field for over twenty years
- Mild reaction
- Freeze dried product of proven quality and stability

## M-NINEVAX®-C

TSP-V-065378 1000 dose units with diluent and wing-web stabbers

### Pasteurella multocida Vaccine

(Avirulent Live Culture, Avian Isolate)

**M-NINEVAX®-C** vaccine is a live bacterial vaccine containing the mild avirulent M-9 strain of *Pasteurella multocida*, Heddleston Type 3-4 cross, in a freeze-dried preparation sealed under vacuum.

This vaccine strain has been shown to offer protection against fowl cholera in chickens and turkeys. The seed culture used to make this vaccine has been laboratory tested for protection in chickens against *P. multocida* serotype 1 and in turkeys against challenge with *P. multocida* serotype 3.

**Advantages:**

- Strong protection against *P. multocida* serotype 1 (chickens) and serotype 3 (turkeys)
- Mild. Less reactive than competitive products
- Safe. Avirulent live culture will not revert to virulence, will not cause mortality
- Specially formulated diluent provides excellent reconstitution stability

# Water Sanitation Information on Products and Proper Usage

*The three most common products used for water sanitation; overviewing how to use them, how they work, and positives and negatives on each product.*

## Chlorine with Acidification:

They most common approach to water sanitation is using Chlorine. Using Chlorine can be very effective to sanitize your water. The biggest upside to chlorine is the cost compared to other products. When you use Chlorine it is essential that you monitor your ORP readings. ORP or Oxidation-Reduction Potential is measuring the energy or conductivity in the water. The more free chlorine you have the higher your ORP. ORP readings should always read from 650 to 750 on your testing kits.

With higher pH water you should adjust your pH with an acid *before* injecting your Chlorine. The optimum pH to achieve is around 6. The reason you want to adjust your pH is so you can achieve more or higher ORP readings with less chlorine. Adjusting your pH to 6 allows Sodium Hypochlorite (Chlorine) to become Hypochlorous Acid which is 80 times more effective as a sanitizer compared to a Hypochlorite Ion. Choosing the appropriate acid is best said by a quote from Susan Watkins "Picking an acidifier is like picking a wife, shop around until you find one that suits your pocket book and does its job". Just make sure the acid drops the pH to the appropriate level and the water and birds like it. Most people in the industry use Citric Acid so if that works stick with it. It is important to understand that you need to use two different pump systems when using both Chlorine and Acidification; One to pump in the Acid and then one to pump in the Chlorine. You never want to mix the products together in the same open tank.

Chlorine can be very effective but there are some issues with the product as well. Chlorine is generally unstable and does not work well in the presence of organic matter. Chlorine will eliminate "free" floating bacteria in your water line but cannot remove biofilm. Since this is the case there could potentially be bacteria still present in your water line after treatments with Chlorine. Those with high minerals, TDS and other water issues will have to use more Chlorine to achieve desired ORP levels since Chlorine is fairly unstable. Overuse of Chlorine is not beneficial to anyone especially your animals and equipment. There is probably nothing more corrosive to your equipment than using Chlorine / Acid combination for sanitation. Most chlorine products used in the industry do not have a label or EPA approval to use with animals present. If you cannot achieve proper ORP readings with 4 to 5 ppm of Chlorine then it may be beneficial to look at an alternative sanitizer.

## Chlorine Dioxide:

All Chlorine Dioxide products are purchased in the Sodium Chlorite form. Sodium Chlorite is widely used as a sanitizer and can be effective. If you choose to use Sodium Chlorite as your sanitizer you will probably need to use 2x the amount of product compared to Chlorine Dioxide to see effective results. The nice thing about using a Sodium Chlorite like Aquatize as your sanitizer is you can immediately use the product from the jug to administer into your water system. It is important to understand that Sodium Chlorite solutions can carry anti-microbial claims listed as static or stasis by the EPA which means the solution has the ability to inhibit or prevent growth of present organisms. However it is also important to understand that using a chlorite solution as your sanitizer may not give you the same benefits as using a Chlorine Dioxide solution in tougher water conditions. When you use Chlorine Dioxide the product is then Cidal which takes on a "kill claim" and its sanitation and disinfection properties are much greater. The conversion from chlorite to an active solution containing CLO2 (Chlorine Dioxide) is achieved through the activation step. The % of conversion is governed by two dynamics, time and pH. This is often practiced by mixing the chlorite solution with citric acid which transforms the chlorite to chlorine dioxide. Simply mixing the two components together without adequate "dwell time" for activation results in little to no CLO2 being generated. The common practice of injecting the acid or activator through one pump and injecting the chlorite solution through another pump and introducing the two products in the water line is grossly inadequate for allowing the proper activation time to convert the solution to a preferred % of CLO2. The best way to activate chlorite is by having a pump system that automatically mixes the acid and chlorite solution, gives it appropriate time to activate and then introduces the chlorine dioxide into the water system at your desired rate. You can also mix the acid and chlorite solution manually into a separate bucket. Once you achieve activation you can then administer the product by mixing the desired rate into a stock solution and inject the product through a medicator or inject the activated solution through a pump. Activated product needs to be kept in a well-covered container to hold efficacy and the product should be covered up once initial activation is complete. Activated solution in a well-covered container will last 7 to 10 days. When using a 1:128 medicator mix 2 to 3 ounces of Chlorine Dioxide (5%) per gallon of stock solution. When using a pump system use between 1 and 5 ppm. The greater the water and health challenge the higher ppm you want to use. There are a variety of sodium chlorite / chlorine dioxide products available on the market. If you are going to activate the chlorite solution it is best to find a product that has 5% Chlorine Dioxide available after activation like Pro Oxine. The 5% Chlorine Dioxide products are more cost effective and overall better than the 2% Chlorine Dioxide products for sanitation.

Chlorine Dioxide has 2.5 times the oxidation power compared to Chlorine. Chlorine Dioxide works in a pH range of 1 to 10 and is not pH dependent like Chlorine. Chlorine Dioxide also has the ability to remove and eliminate biofilm / bioslim, work on Iron and take out odors from high sulfur / mineral water. Chlorine Dioxide is completely non corrosive which is good for your equipment. To test Chlorine Dioxide to make sure you are getting the desired results you need test strips which are available. Simply take a sample of water from the end of your line to see how much residual Chlorine Dioxide is available by using the test strips. Desired levels should be between 1 and 5 ppm. Also remember that when you use Chlorine Dioxide ORP readings are not a factor anymore. ORP readings are only important when you are using Chlorine.

*continued on page 10*

# New from CID LINES


## Hatchery hygiene DVD

### For interactive training

- Interactive tool to support the supply of quality chicks
- For hatchery owners & their employees
- To improve and maintain the hygiene level of a hatchery


## Keno™ san

### The new standard in cleaning

- Unique formula based on new technologies
- Sticky and long-lasting foam
- Extreme dirt penetrating capacity
- Very economical use
- Non corrosive


## Quat cid

### Single chain and twin chain combined QAC

- 5th generation QAC
- Synergistic formulation
- More efficacious in presence of hard water and organic matter


## Keno™ cox cleaner

### The missing link in coccidiosis control!

- Removes organic matter residues that can harbour oocysts (clean, rinse and disinfect before using)
- Unique formula without phenol, patent pending (PCT/ EP2009/000789)


## Cool cell

### Pad cooling systems, cleaning and regenerating

- Synergistic mixture of quaternary amonia and glutaraldehyde
- Compatible with the main cooling pads available on the market
- Allows longer life of the pad cooling with efficient capacity (100% instead of 50% after 4 years)

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# Water Sanitation

*continued form page 8*

Most sodium chlorite products are EPA registered, have label claims for various bacteria, fungi and viruses and have a label to use for drinking water with animals present. Another benefit to Chlorine Dioxide is most products are OMRI approved and can be used on organic farms.

The biggest problem for Chlorine Dioxide is on site activation. The gas emitted from activation can be unpleasant and you need to be in a well-ventilated area. The time required to successfully complete this process can be aggravating to the grower as well. There are pumps that can be installed to inject the chlorite solution and acid, achieve complete activation and then pump into your water system at the desired rate like explained above. The downside to that is those systems cost around $1,000. The pump system can treat up to 87,000 gallons of water per day so one can be used for an entire site. The costs of Chlorine Dioxide products are more expensive compared to Chlorine but since it is such a stronger oxidizer with more sanitation benefits you can usually overcome the initial cost difference by using fewer product and seeing better results.

## Hydrogen Peroxide:

Hydrogen Peroxide products can also be a very effective tool to sanitize your water system. Like Chlorine Dioxide, Hydrogen Peroxide is a powerful oxidizer up to 2 times more powerful than Chlorine. It is important to make sure you use a stabilized hydrogen peroxide product like Cid Clean compared to an over the counter peroxide type product. A stabilized product will be much less corrosive, you can use less product to achieve quality sanitation, able to stay in solutions longer without losing efficacy, and has the ability to not convert to water and oxygen before it finishes its job which is important in making sure you get complete sanitation to the end of your lines. To use another quote from Susan Watkins "Some of the most effective sanitizers, which are not damaging to the water systems, are the concentrated, stabilized hydrogen peroxides. The most common and best stabilized peroxide products to use would be a 50% peroxide blend like Cid Clean. Hydrogen Peroxide products can also remove and eliminate biofilm / biosilm in your water system, break down algae blooms that can pass through drinkers and is very effective against bacteria, fungi and viruses. Stabilized peroxide is also non corrosive to your equipment and water system. Stabilized peroxide is also very effective when minerals, iron and TDS levels are high in your water system. Hydrogen Peroxide is not pH dependent and can be effective from a pH range of 1 to 10. Hydrogen Peroxide can be measured with test strips to make sure you are getting the desired levels. To test the residual peroxide levels go to the end of your line and make sure you are getting between 25 and 50 ppm of available peroxide. In certain health and water challenged areas 100 ppm can be used which is considered a treatment level and should only be used for shorter durations. If you are mixing product into a stock solution and injecting the peroxide through a 1:128 medicator 2 to 3 ounces per gallon of 50% peroxide can generally be used to achieve 25 to 50 ppm. If you are using a pump system simply adjust your equipment to inject 25 to 50 ppm of product. Hydrogen peroxide can be used from the packaged container with no on site activation, special pumping systems or adjustment of pH to achieve quality sanitation. Once Hydrogen Peroxide is used it is close to 100% biodegradable. It is also important to find a 50% peroxide product that does not use silver nitrates to stabilize the product. The use of silver nitrates will leave heavy metals in your water system when the product biodegrades.

One of the biggest drawbacks to Hydrogen Peroxide is the product in concentrate in not very user friendly. If you do not have a pump system that can inject product straight from the container and you have to handle the product you need to be careful while handling. Hydrogen Peroxide also has to be stored in proper areas because if left out in sun light or given the chance it can combust. No Hydrogen Peroxide products have a label or EPA registration to use with birds present so all usage is considered off label.

Some use products with a stabilized hydrogen peroxide and acetic acid combination like Cid 2000 to rotate with other sanitizers. This can be a good practice since these types of products are also very effective at sanitizing your water and giving you all the same benefits that Chlorine Dioxide and 50% stabilized peroxide do with control of biofilm / bioslim, iron and other minerals in your water. These products can be used successfully at 2 to 3 ounces per gallon of stock solution and injected through a 1:128 medicator.

The important thing to remember about these products is to only run them for 4 to 5 consecutive days and then rotate back to your chlorine or sodium chlorite product for 4 to 5 days. If there are spores of Trichoderma (yeast) present in the water, they will develop with slight acidification with any type of ORGANIC acid including vinegar, citric acid or acetic acid. When you run these type of products at that low of rate you're getting a slight acidification that my cause this problem.

Simply using more product would eliminate the problem but you do not want to back your animals off water. If you do have this problem run something with copper and / or an acid that does allow you to lower your pH to 4.5 and the problem will disappear.

The combination of stabilized peroxide and acetic acid type products like Cid 2000 are the best for cleaning and flushing lines between flocks at higher rates. Generally they can be injected at 2% or 1:50 and left in the water lines for 24 hours. These products have the ability to remove biofilm and scale / mineral buildup in one stroke. This combination has been tested and proven to have the fastest and greatest reduction in microbial presence in contaminated water compared to 50% peroxide products, chlorine and citric acid. These products have also been tested and proven to be non-corrosive and safe for your equipment and water system.

Make sure whatever sanitizer you choose it fits into your system, protocol and does its job properly. To make sure the sanitizer is working properly it is recommended to take water samples routinely. Simply go to the end of your line and get a clean, non-contaminated water sample with your sanitizer present in the water system. Have the company check for coliforms and bacteria counts while also checking for the usual suspects. Along with performance and health issues this will give you the best idea if your sanitation program is working.

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# Maintenance of Evaporative Cooling Pads


CID LINES
INNOVATIVE HYGIENE SOLUTIONS

## *takes* CARE *for* LONGEVITY *of your*

# EVAPORATIVE COOLING PADS

## Spend little Save a lot

**GENERAL MANAGEMENT TIPS TO IMPROVE EFFICIENCY AND LIFE OF EVAPORATIVE COOLING PADS**

**APPROPRIATE DESIGNING:**

- Evaporative Cooling (EC) Pads should be installed with appropriate supports/frame.
- Avoid water absorbing material (such as cement) at EC Pads' bottom guttering as such material exposes them to continuous humidity which shortens the life of EC Pads.
- Water Tank should be, properly, designed (divided into 2-3 portions) to avoid re-circulation of dirty water through the system which, gradually, keeps on clogging EC Pads. It would be of an additional significance, if capacity of water tank is kept in accordance with the requirements of circulating water, through the system. Proper covering of tanks is necessary to avoid surrounding contaminations to get in it.
- During construction of farm house, the side for the installation of EC Pads should be designed as to avoid their direct exposure to sunlight (as in a **"EC Pads Room"** or **"Doghouse Plenum"** or simply curtains, otherwise, in front at suitable distance from them) to prevent algae or bacterial growth. For directly exposed EC Pads, in farm environment, the installation of nylon net about 1 m before them is recommended to prevent small insects, dust, or unwanted particles to clog the air channels of EC Pads.

**FLOW AND QUALITY OF WATER:**

- **Required Water Flow Rate, for 7 mm ( 0.28 " ) flute height EC Pads, is 60 litres/minute/sqm (1.6 gal / min / sq ft ) of top surface for up to 2000 mm ( 7.9 " ) high EC Pads while Required Water Flow Rate, for 5 mm (0.2 " ) flute height EC Pads, is 90 litres/minute/sqm ( 2.3 gal / min / sq ft) . of top surface for up to 1000 mm high EC Pads.**

OR

- To supply water for EC Pads; **water pump capacity should be around 5.5 litres/minute** ( 1.5 gal / min) for 2000 x 600 x 150 mm ( 6 ½ ' x 23.6 " x 6 " ) EC Pads (7 mm or 0.28 " flute height) while the same for 1000 x 600 x 100 mm ( 3 1/3 ' x 23.6 " x 3.9 " ) EC Pads (5 mm or 0.2 " flute height).
- The proper water flow on the top and uniform distribution along the length of EC Pads would reduce the mineral build-up on them.
- Avoid operating EC Pads beyond range of **pH of water between 6 and 8**.
- Proper treatment of water is significant, on regular basis.
- Avoid water with high concentrations of calcium, bicarbonates or sulphates (more than 100 ppm). Proper bleed-off design and pre-treatment of water should be utilised to reduce the potential danger for the life of EC Pads.
- Avoid contaminating oxidising agents such as chlorine or copper compounds into the water.
- Allow EC Pads to completely dry, periodically (overnight), to reduce the bacterial/algae/fungus growth on them.
- Water tank and distribution pipes should be cleaned, on weekly basis.

**BLEED-OFF CONTROL:**
Bleed-off mode is designed not only to make up evaporated water from the system but it, also, supports in preventing the built-up concentrations within the water that could be harmful for the life of EC Pads. Bleed-off can, simply, be done by adding proper amount of fresh water into the circulating water. To control the proper bleed-off amount, the following is recommended.

**1-pH Control:**

- Water pH is the proxy of calcification residual in the water. The higher the pH, the lower the dissolvability of calcium and bicarbonates while the higher the concentration of residual in the water.
- The simplest way, to control the bleed-off amount, is that the pH of water, to be circulating in the system, is not exceeding 8.

**2-Concentration Control:**

- The analysis of ion-concentration (ppm) of water input such as calcium, bicarbonates, sulphates and water pH are necessary inputs for this method.
- The higher the concentration and the pH of water, the higher the bleed-off amount.

**BLEED-OFF RATIO:**

- General-rule-of-thumb is between 1-1.5 times of water evaporation, that is, if water is being evaporated at the rate of 100 litres/minute then the proper bleed-off amount would be 100-150 litres/minute (26 – 40 gal / minute)

CLEANING & TREATMENT OF EVAPORATIVE COOLING PADS by CID LINES' Products

To keep Evaporative Cooling System, running efficiently, the water in the system must be treated with a wide spectrum biocide. The correct chemical(s) also increases its life and reduce the risk of contamination that could lead to a disease problem, as well. The recommendations of manufacturer(s) should be kept in considerations that the chemical(s), being used, should not damage the EC Pads/Systems. Check the water filters (if being used) and should remove sediments build-up, on monthly basis.

**(I) Prior to Start-up of System:**
Examine the EC Pads to determine if they are fouled with algae or heavy mineral scales.

**To Clean Algae Build-up:**

- Spray or foam on EC Pads with **CID 20** @ 6.6 - 15.0 ml/litre (0.66 - 1.5%) OR **VIROCID** @ 3.3 ml - 7.5 ml/litre (0.33 - 0.75 % or ½ to 1 oz / gal) of water.
- Allow the product to remain on the surface of EC Pads for 10 minutes.
- Flush/spray off with clean water.
- Repeat, if necessary.
- Drain the system and flush with clean water.

(**CID 20 and VIROCID are bactericidal, fungicidal, virucidal, algaecidal that eliminates clogging up by algae or microbial contamination by "slime forming bacteria". These products have residual activity and inhibit bio-film as both of the products contain Quaternary Ammonium Compound and Gluteraldehyde**).

**To Clean Mineral Scale build-up:**
Choice of 2 methods;

(1) Add **PHO CID** to the system @ 7.5 - 15 ml/litre (0.75 - 1.5 % or 1 – 2 oz / gal ) of water; Let this solution to circulate through the system until EC Pads are cleaned; Drain the system and flush with clean water.
(2) Foam or spray with **TORNAX-S** @ 30 - 45 ml/litre of water (3.0 - 4.5 % or 5 – 6 oz / gal ) on the surface of EC Pads; Allow it to remain for 10 minutes; Rinse off with clean water; Drain the system and flush with clean water.

Refill the system with clean water.

**(II) Initial Treatment:**

Add **CID 20** @ 400 ml/1000 litres of water (0.04%) OR **VIROCID** @ 200 ml/1000 litres of water (0.02% or 1 oz / 40 gal ) within the system as to acquire the desired results.

**(III) Maintenance Treatment:**

Add **CID 20** @ 110ml/1000 litres of water (0.011%) OR **VIROCID** @ 55 ml/1000 litres of water (0.0055% or 1 oz / 150 gal ) within the system, continuously, with the help of medicator or treat this way, in general, on weekly basis.
(**Average consumption per US 22,000 broiler house is 7.6/3.8 litres/year ( 2 – 1 gal) while per 100,000 layer house 15.2/7.6 litres/ year ( 4 – 2 gal) respectively, for (II) and (III) combined**)

---

Chemical Name: **Virocid or CID-20**
Chemical Family: Quaternary Ammonia and gluteraldeyde
Active ingredient level: 36%
Manufacturer's Recommended Doseage:
VIROCID- initial treatment 2.5oz per 100 gals; maintenance treatment 1.25oz per 100 gals weekly, or as needed.
CID 20- initial treatment 5oz per 100gals; maintenance treatment 2.5oz per 100gals weekly, or as needed.

**With little EFFORTS and nominal EXPENSES;**
**Let's assure you that you can save thousands on Evaporative Cooling Pads**

# Cleaning and disinfection of layer house systems for table egg production

*By Karel Bossuyt and Lieven Dambre, CID LINES, Waterpoorstraat 2, 8900 Ieper, Belgium*

The poultry sector is a dynamic one and the egg producers, who are part of it, are no exception to the rule. The traditional cage ban that was imposed in the EU at the beginning of 2012 is a prime example of how the poultry production industry needs to be flexible and ready for changes in order to be sustainable today and in the future.

The main goal of the ban on traditional cages is to raise the hen welfare standards, but what about the hygiene standards in alternative layer housing systems?

The cages scored well on egg and hen hygiene and had relatively less dust flying around them.

However, hens are occupying the layer house for up to 58 weeks and a high level of soiling (manure, feed, dust, scale, etc.) can be expected.

Which layer housing systems will also score well in terms of hygiene and are they easy to clean? The possibility to thoroughly clean and disinfect the layer house only occurs every 12-13 months.

Farmers should take this opportunity to aim for a pathogen free (salmonella, etc.) house during the new flock into the layer house.

## Trial of different systems

A trial was conducted by Karel Bossuyt where five different housing systems were cleaned and disinfected. A comparison was made in labour, water consumption, product consumption and cleaning and the disinfection results between the different systems.

The same cleaning company cleaned and disinfected all houses. In this way the modus operandi in terms of people and equipment they used could not negatively influence the cleaning and disinfecting (C&D) results.

The C&D results were analyzed by swabbing (RODAC plates). After incubation the remaining colony forming units were counted in order to analyze the hygiene result. Some 25 plates were taken per layer house and this took place twice – once after cleaning and once after disinfection.

***A simple foaming cup lance is used to apply the disinfectant.***

These plates consisted of: 3 on the drinking system (pipe and drink cup), 1 on the egg belt, 1 on the hopper, 1 in the egg storage room (floor), 1 on the air inlet (grid), 3 in the laying nest grid, 3 on the laying nest side panels, 2 on the ceiling, 4 on the floor, 3 on the feeding system, 2 on the wall and 1 in the packing area.

The number of colony forming units (cfus) per plate were categorized by range and were given a score:

- 0 cfus per plate = 0
- 1-40 cfus per plate = 1
- 41-120 cfus per plate = 2
- 121-400 cfus per plate = 3
- More than 400 cfus per plate = 4
- Too numerous to count = 5

The swabbing, the incubation, reporting and interpretation of the scores were executed by an official and independent laboratory. In this case it was done by DGZ (Animal Health Care, Flanders, Belgium).

There are three possible interpretations:

- Score: ≤1.5: The C&D procedure has been done properly and is approved.
- Score: >1.5 and ≤3: The C&D procedure has to be done again before a new flock can be introduced to the layer house.
- Score: >3.0: The C&D procedure has to be done again and this time by a professional cleaning company, before a new flock can be introduced to the layer house.

## Dare to compare

The five systems that were compared were:

- An enriched cage system with a central egg collection belt (A).
- A traditional cage system (B).
- An organic free range system (C).
- An enriched cage system with colony housing (D).
- An alternative housing system with winter garden (E).

It is clear that each system has its own specific design and therefore the critical points for each housing system will differ.

These critical points will influence the cleaning results in terms of labor costs. The time and personnel spent on dry and wet cleaning was taken into account. Some systems were more easy to clean than others. Of course when something is difficult to clean the risk of it not being cleaned properly is bigger.

This will reflect in the disinfection results. In addition, excessive organic soiling will influence the disinfection negatively. This cause and effect mechanism creates a vicious circle where some spots can really become infection sources that recontaminate each new flock over and over again.

The detergent used for cleaning was Kenosan at 1.5%, except for the traditional cage system. Here only water was used for cleaning. The detergent was applied by foaming.

For disinfection two products were used – Virocid or CID20. Both products are well tested and have a strong bactericidal, virucidal and fungicidal action. The difference was in the application of the disinfectant. Some fogged the disinfectant (at 20-25%) and others foamed it (wet disinfection at 1%). In Table 1 the different methods are specified.

In the enriched cage system (A) the laying mats had to be pulled out of the nests and cleaned outside the layer house. As this is a two floor system the dust and manure that comes from the second floor

| Company | Capacity | Dry Cleaning | | Wet Cleaning | | Product consumption | Average cleaning score | Disinfection method | Product consumption | Disinfection | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | hours | people | hours | people | | | | | hours | people |
| **A** – Enriched cage + egg belt | 60,000 hens 1920m² | 36 | 5 | 278 | 5 | 60 litres | 3.9 | Thermo fogging | 30 litres | na | na |
| **B** – Traditional cage system | 13,500 800³ | 20 | 2 | 60 | 5 | water | 4.6 | Sprayer nozzles | | na | na |
| **C** – Organic free range | 7,200 hens 1,200m² | 10 | 2 | 100 | 3 | 40 litres | 3.8 | Thermo fogging | 10 litres | na | na |
| **D** – Enriched colony two floors | 24,000 hens 780m² | 25 | 3 | 120 | 3 | 20 litres | 3.1 | Foaming | 40 litres | 30 | 2 |
| **E** – Alternative + winter garden | 30,000 hens 3,500m² | 70 | 2 | 130 | 3 | 60 litres | 2.7 | Foaming<br>Thermo fogging | 40 litres<br>20 litres | 3.5<br>na | 2<br>na |

***Table 1. The different methods of application.***

needs to be evacuated to the first floor.

A lot of dirt gets stuck between floors. These are the main two reasons why this system is more labor intensive in terms of cleaning.

The traditional cage system (B) was cleaned only with water which resulted in a poor average cleaning score of 4.6. In the organic system (C) grids, drinkers and feeders were dismantled and cleaned outside the house.

This explains the high amount of hours and people needed to clean a relatively small surface.

The colony housing system (D) proved to be fairly easy to clean. It scored on average 3.1. The critical points were the laying nests. The manure pit system (E) had no automatic manure belt, but the drinking and feeders could be winched up which made the evacuating of manure easier.

However, all the floor grids needed to be dismantled and cleaned outside the layer house.

The laying mats were also evacuated and cleaned in an automatic system outside. The cleaning score was 2.7, so a dry cleaning phase, which is very labor intensive, resulted in a very good cleaning score if done properly.

Labor costs and product consumption is one thing but, needless to say, it is the score at the end of disinfection that needs to be equal or below 1.5 (the DGZ norm) in order to consider the C&D protocol successful. Table 2 shows the disinfection scores for each swab point and the average disinfection score for each system.

## Disinfection results

If we look at the disinfection results we see that in the traditional cage system and the organic free range system the disinfection was not successful enough with a score of 1.7 and 1.6 respectively.

In the traditional cage only water was used to clean. The organic load was too high when the disinfection phase started. The belts still scored very high. The automatic sprayer system did not reach the nests efficiently.

The organic system only fogged 10L of CID20. With such a high level of soiling, a wet disinfection is absolutely imperative. It will improve the contact of disinfectant with the surface dramatically. The grids were made of wood and therefore scored the worst at 3.5.

The enriched cage system with a central egg collection belt (A) just performed at the norm with 1.5. The floor and packing room scored above the norm.

The best scores were definitely achieved with the enriched cage colony system (D) and the manure pit system with winter garden (E) with 1.1 and 1.3 respectively.

The bad score on the drinking system (3.3) in the alternative layer house (E) was due to the fact that the swab was taken underneath the drinking cup.

The drinking lines were winched down at the moment the disinfection was done. This place was not reached by disinfectant. Without this error the score would be 0.7.

Both applied the disinfectant Virocid by foaming. A simple foaming cup lance was used. In the alternative housing system (E) a fogging phase was also done after the wet disinfection. The score afterwards dropped from 1.3 to 0.8.

The different layer housing systems can influence the dry and wet cleaning phase but when this is done properly the disinfection results should not be influenced by them.

Foaming the disinfectant when correctly applied (dosage) proved to be crucial for a clean and pathogen free layer house.

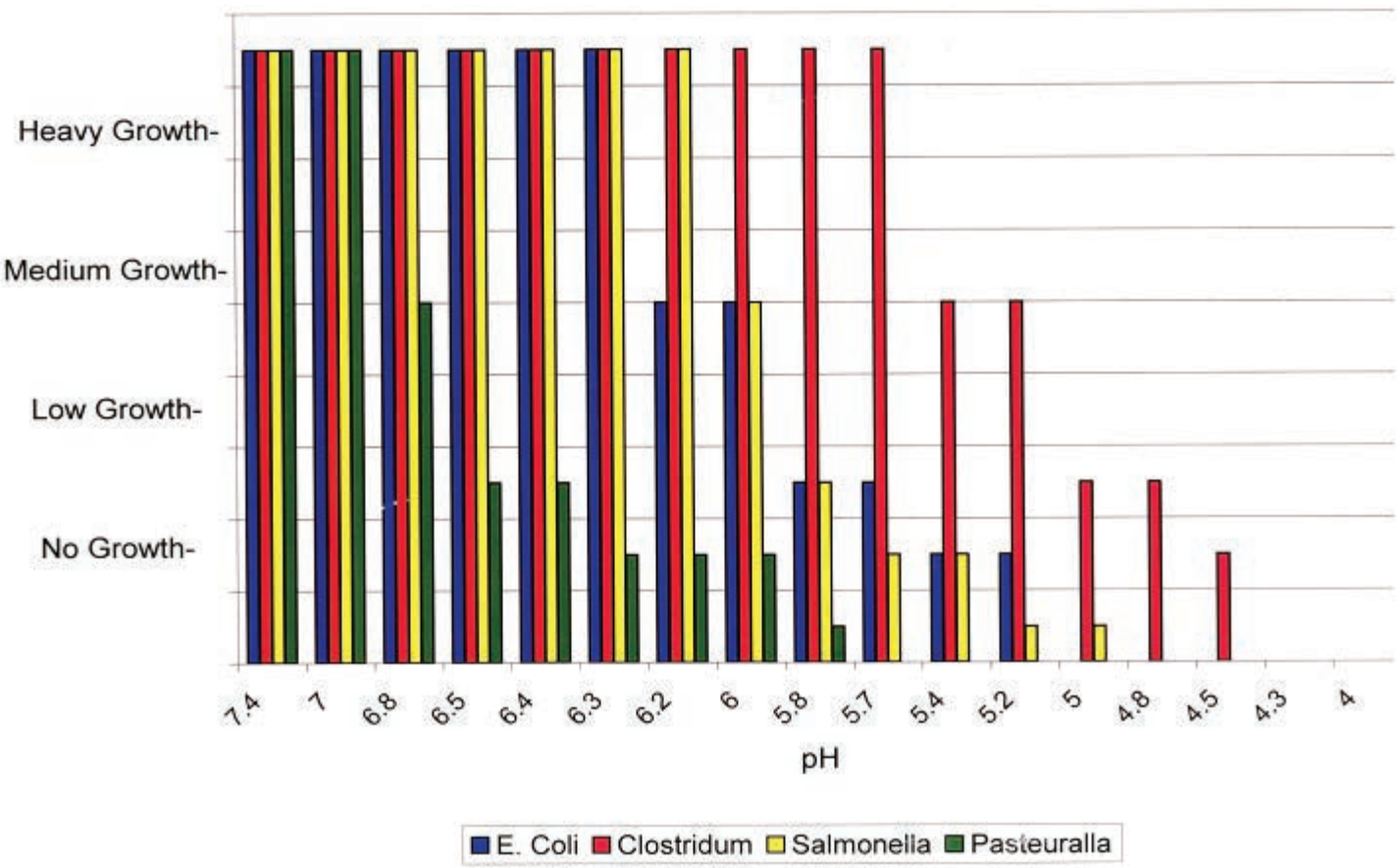
Fogging should be seen as an additional measurement for disinfection executed after the wet disinfection.

***Table 2. The disinfection scores for the different layer housing systems (the DGZ average was 1.5).***

| | Drinking system | Egg store | Laying nest | Hopper | Air inlet | Bottom of cage | Side of cage | Egg Belt | Ceiling | Corridor | Grid | Floor | Feeding hopper | Feeding system | Packing room | Side panels |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **A – Enriched cage system (average score = 1.48)** | | | | | | | | | | | | | | | | |
| Score | 2.0 | 2.0 | 1.3 | 0.0 | 0.0 | na | na | na | 0.5 | na | 1.0 | 2.7 | na | 0.7 | 3.0 | 1.5 |
| **B – Traditional cage system (average score = 1.7)** | | | | | | | | | | | | | | | | |
| Score | 2.0 | 2.0 | 2.7 | 2.0 | 1.0 | na | na | na | 1.0 | na | 1.5 | 1.0 | na | 1.3 | 1.0 | 2.0 |
| **C – Organic free range system (average score = 1.6)** | | | | | | | | | | | | | | | | |
| Score | 1.0 | 4.0 | 0.7 | 1.0 | 0.0 | na | na | na | 0.0 | na | 3.5 | 2.7 | na | 1.3 | 3.0 | 1.0 |
| **D – Enriched cage system with colony housing (average score = 1.1)** | | | | | | | | | | | | | | | | |
| Score | 2.0 | na | na | na | 0.0 | 0.3 | 1.0 | 1.3 | 0.5 | 1.0 | na | na | 1.0 | 1.0 | 3.0 | na |
| **E – Alternative housing system (average score = 1.3)** | | | | | | | | | | | | | | | | |
| Score | 3.3 | 1.0 | 0.5 | 0.0 | 0.0 | na | na | na | 0.5 | na | 0.7 | 1.0 | na | 1.0 | na | na |

## Effects of pH on Selected Bacterial Pathogens Growth in Drinkers

Boyd E. Hardin - C.S. Roney, DVM, MAM



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## The Acid Sol® Zone
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- is considered GRAS (generally recognized as safe).
- has a pH of 1.3.
- when mixed at recommended levels will reduce drinking water to pH 3.5-5.5.
- will hold pH down longer than other commercially available acidifiers.
- can be used in place of Chlorine or Iodine.
- is a red solution that stays in solution without any settling out like that of competitive products.
- fits well into an antibiotic free program.
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- Extremely fortified probiotic for poults and chicks containing 6 strains of live (viable) naturally occurring micro-organisms
- Applied at the hatchery at 1 day of age (Hatch Day) or at placement
- Probiotic is applied with a gel spray diluent to provide better uptake and uniform coverage
- Gel appears as droplets on poults or chicks and is visible and readily picked up by the birds which increases the amount of product getting to the birds and the amount of birds that get the product.
- All droplets are gone within 2 or 3 minutes
- Unlike water spray, the gel spray does not soak the poults / chicks , keeping them dry and warm
- Can easily be mixed with IMMUCOX vaccines for same time application
- Contact your poult / chick supplier and ask them to apply Gut Start on your next order

# OMEGAMUNE® GUT PRO POULTRY PROBIOTIC

***Contains a source of live (Viable) naturally occuring micro-organisms and stabilizing agents to help contain viability of product through administration.***

***Use Gut Pro to supply naturally occuring micro-organisms to poultry in the first 1 to 5 days of placement, at periods of unusual stress, before and after moving or after therapeutic antibiotic treatment***

**DIRECTIONS FOR USE:**

**For starting birds** supply one Gut Pro 4 oz. jar per 5,000 birds in first 8 hours of morning drinking water for 3 consecutive days.

**For periods of stress**, before and after moving or therapeutic antibiotic treatment supply one 4.0 oz. jar of Gut Pro per 5,000 bbirds in first 8 hours of morning drinking water as needed.

**Turn off chlorine or** water sanitizer and neutralize water system with Vaccine Stabilizer before use of Gut Check.

**Make sure the entire watering system and** stock solution are free of any anti-microbial agents.

**GUARANTEE**
11.2 billion CFU/gram total lactic acid producing bacteria
11.2 billion CFU/gram Bacillus cultures

INGREDIENTS: Milk products, sodium thiosulfate, magnesium chloride, gelatin hydrolysate, Enterococcus faecium fermentation product, Lactobacillus casei fermentation product, Lactobacillus acidophilus fermentation product, Lactobacillus plantarum fermentation product and Bacillus subtilis fermentation product and Bacillus licheniformis fermentation product, sucrose

Net Weight: 4.0 oz. (113.4 grams)

*Manufactured for:*
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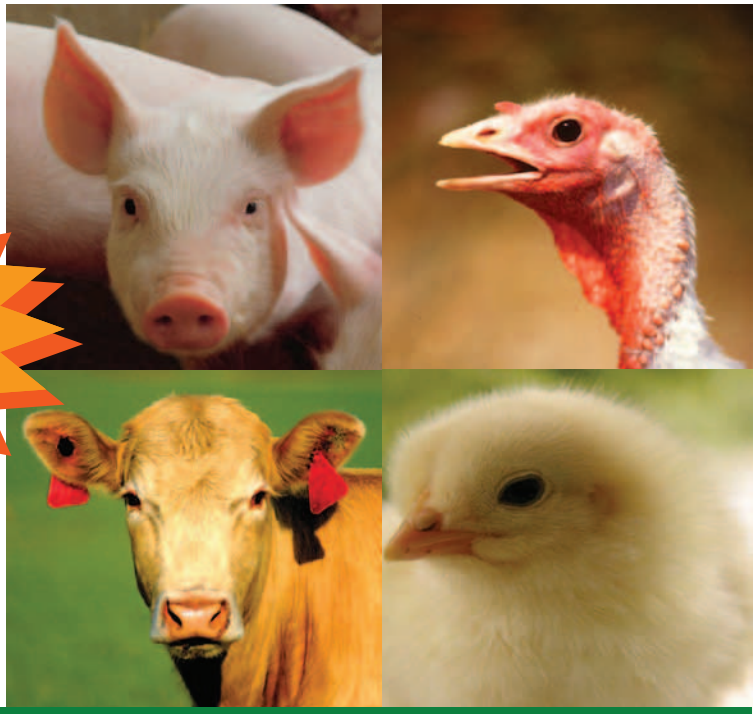
We are grateful and proud that as we work together, we are able to provide proven and dependable products that help our nation's livestock and poultry producers grow safer, healthier and more affordable food.



For more information about Huvepharma products contact customer service toll free at 877.944.4883 or email customerserviceusa@huvepharma.com

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# A true alternative to formaldehyde for egg disinfection

***by Lieven Dambre, Product Manager, CID LINES, Waterpoorstraat 2, 8900 Ieper, Belgium.***

The hatchery industry is a very international business which is very much in tune with new developments in the market worldwide. This is also reflected in the way information is shared by specialists communicating through scientific seminars, world congresses and specialist press.

Banning formaldehyde out of the hatchery for egg disinfection is definitely one of those hot topics today. It is a well known fact that legislation in terms of the exposure limit of formaldehyde to the people working in the hatchery is getting stricter by the day for many years now.

There are two ways of defining the exposure limits to formaldehyde. The first way gives a combination of a time-weighted-average concentration over eight hours (TWA) and a short-term-exposure-limit during 15 min (STEL), from which the values can vary from country to country. The TWA in the Netherlands for example is 0.12ppm, whereas in France it is 1ppm. The STEL has more or less the same variation.

The second way is the MEL, the maximum exposure limit. This is the strictest legislation which states that nobody can be exposed to more than 0.3ppm formaldehyde at all times. Belgium, Canada and Denmark for example have implemented this legislation.

It is fair to say that the exposure limits to formaldehyde and according legislations have become stricter every year, regardless which method of monitoring (TWA, STEL or MEL) is opposed.

Therefore, the difference between several years ago and today is that the hatcheries are not only talking about it, but are also taking action.

Tests are set up everywhere with various products and applications in order to find a true alternative for formaldehyde.

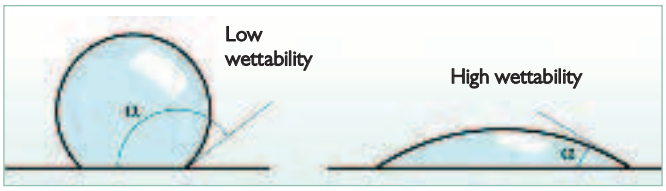



***Fig. 1. The contact angle of small and large droplets.***

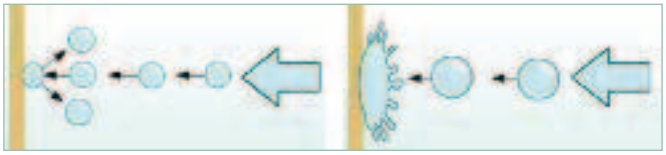


***Fig. 2. With an ultrasonic fogger the droplets are so small they bounce against the surface without touching it and the eggs remain dry.***

## Standing still is moving back

It is clear that these human health issues are putting a lot of pressure on the current formaldehyde protocols implemented in the hatcheries.

In 1953 Lancaster & Crabb found that, in order to kill S. pullorum on the eggshell using a 20 minutes fumigation period, a minimum concentration of 600mg formaldehyde per m³ (10g paraformaldehyde or 45ml 40% formalin and 30g KMnO4 ) at 21°C is necessary.

However, this protocol has proven a certain degree of efficacy on eggs that were contaminated ≤log4 (eggs with ≥log5 contamination, complete disinfection of the shell surface by fumigating formaldehyde at 10g/m³ is not possible), it is quite remarkable that still today, well over 50 years later, most of the hatcheries are still following this same protocol!

It is needless to say that the human health issue in 1953 was not taken-into account or was less relevant. So the question lingers: how well does this 'old' formaldehyde protocol relate to the very low exposure limits of today's legislation?

## The only way is out!

The reason why this amount of 10g paraformaldehyde per m³ was never exceeded, is because research has shown a significant relationship between embryonic mortality, duration of fumigation and the concentration of formaldehyde.

A significant decrease (8%) in hatchability was reported when the formaldehyde fumigations were used at higher duration (40 minutes) and higher concentration (12.5g/m³).

So, from an economical point of view, using more formaldehyde was never an option. Now with a MEL of 0.3ppm it is definitely out of the question. In fact, a lot of hatcheries are already struggling to maintain the same levels of formaldehyde (10g/m³) and at the same time be in compliance with legislation.

Basically the problem lies with infrastructure difficulties. If the same amount of formaldehyde is used it will mean that bigger air evacuation systems must be implemented and a much longer air evacuation time needs to take place before people can enter the fumigation rooms. In practice this turns out to be an almost impossible nut to crack.

Two hours after air evacuation and fumigation of only 5g/m³ of paraformaldehyde, the STEL of 0.3ppm was still exceeded by 14 times! Therefore, using less formaldehyde does not really make it any easier to stay working within the allowed exposure limits. It also of course raises questions on its bactericidal efficacy.

## A true alternative

On 11th October 2011 CID LINES was invited to the first CEVA hatchery university in Madrid to give a lecture on VIROCID as an alternative for formaldehyde for the disinfection of hatching eggs before setting.

More than 40 supervising veterinarians, plant managers and quality supervisors from the entire Spanish hatchery industry attended this seminar.

The presentation was based on an extensive trial where beside the efficacy of VIROCID (combination of glutaraldehyde and multi chain quaternary ammonium) the safety aspect for human health and the hatchability were also included as

*Continued on page 13*

***Table 1. Summary of methods and results of several trials.***

| | Dilution (%) | Consumption | Fogging time | Circulation during fumigation | Circulation time after fogging | Ventilation time (air extraction) | Log reduction |
|---|---|---|---|---|---|---|---|
| Formaldehyde (paraformaldehyde) | | 450g | 20 | YES | NO | 40 | 2.11[a] |
| VIROCID ultrasonic fogging | 20 | 420ml | 20 | NO | 10 min | 30 | 2.21[a] |
| VIROCID cold fogging 1 | 10 | 220ml | 20 | NO | 25 min | 15 | 2.86[b] |
| VIROCID cold fogging 2 | 20 | 420ml | 20 | NO | 25 min | 15 | 3.12[b] |

*Continued from page 11*
parameters. VIROCID was applied by ultrasonic fogging and cold fogging. The major difference between these two fogging principles is the droplet size of the fog that is generated. Ultrasonic foggers output between 1-5µm and the cold fogger that was used gave droplet sizes ranging from 20-25µm.

## Trial set-up

The trials took place in a commercial hatchery with full disinfection rooms. The room held about 30 trolleys. For each of those testing groups, 60 eggs were swabbed, each time out of five trolleys that were always located at the same place in the fumigation room.

In addition, the trays from which the eggs were swabbed were always the same: middle tray, three trays up and three trays down. Using fixed locations will not only tell something about the dispersing of the fog and its disinfection power, but also minimises unwanted variations between the trials.

***The swab method.***

The temperature in the fumigation room was always the same between trials as well as the temperature of the eggs at the start of fumigation.

The eggs were swabbed with 'wet-cotton-swab method' (COPAN, rinse kit). In this way 95% of the egg shell surface could be swabbed which gives a much higher, but also a much more accurate, bacteria count than would have been the case if eggs were sampled by contact agar plates.

For every egg new gloves were used to avoid contamination between eggs by the fingers of the swab taker.

Every time the two batches, one that was fumigated with formaldehyde and the other fogged with VIROCID, were swabbed. The eggs compared within the batches were originated from the same flock/house with the eggs having a similar age.

After fogging and air evacuation times, the air was sampled in the fumigation room to measure the remaining glutaraldehyde in the air.

For glutaraldehyde (VIROCID) the maximum exposure limit is 0.05ppm. Thus, in order to be in compliance with legislation people cannot enter the fumigation room before the MEL is below 0.05ppm.

| Group | Trial group | Control group |
|---|---|---|
| Animal type | Layers | Layers |
| Hatching eggs | Broilers | Broilers |
| No. of flocks (origin) | 7 | 7 |
| No. of houses | 13 | 13 |
| Age range | 32-48 | 31-45 |
| Total amount of eggs | 863,100 | 1,389,150 |
| Candling (%) | 12.33 | 12.18 |
| Hatchability (%) | 81.73 | 81.17 |

***Table 2. Comparison of eggs disinfeted with VIROCID and those disinfected with formaldehyde.***

## Disinfection

Several trials were done repetitively. We have chosen to keep the complete procedure limited to one hour, from start of fogging to taking out the trolleys for setting (personnel entry).

In Table 1 the methods and results are summarised. There is a significant difference between the log reduction of formaldehyde and VIROCID. In ultrasonic fogging VIROCID has the same disinfection value as formaldehyde. In cold foggers VIROCID is even significantly better than formaldehyde. This can be explained by the different droplet sizes of both fogging principles. A very small droplet has a big contact angle, a bigger droplet a smaller contact angle (see Fig. 1).

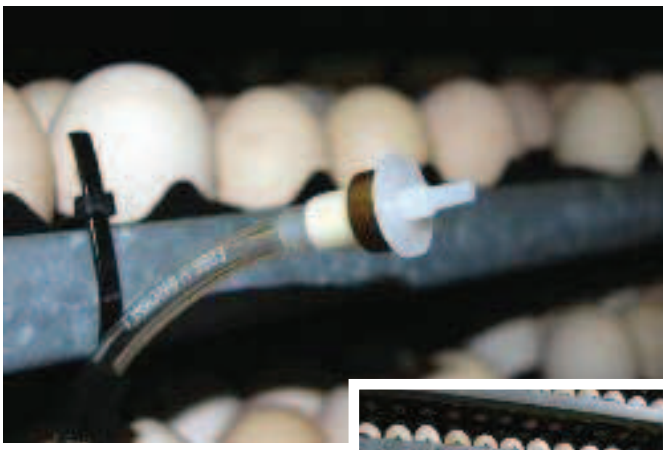
The contact angle will determine the wettability. The wetter a surface gets by a disinfectant solution, the more the solution can act upon that surface, and therefore disinfect. That is also why the eggs when fogged with an ultrasonic fogger stay dry. The droplets are so small they bounce against the surface without touching it (see Fig. 2). With cold fogging the eggs are slightly moist.

## Creating an ideal protocol

Furthermore, we can learn from these trials that a double disinfection could be the ideal protocol for well disinfected eggs and unharmed embryos.

Given the fact that the actual log reduction with formaldehyde is relatively low and even with a double concentration – which is for today's strict exposure limits absolutely not feasible – eggs with a bacterial contamination ≥log 5 are impossible to disinfect completely, we should start the first disinfection on farm level.

After separation from the hen at oviposition, the egg is constantly exposed to contaminations. It is crucial to destroy micro-organisms while they are still on the egg shell.



***Sampling the air in the fumigation room.***

Once micro-organisms penetrate the shell, they reach the shell membrane within minutes and are protected from the disinfectant.

Ideally, the first disinfection should take place on farm level as soon as posssible, preferably when eggs are still warm. The second best option is to disinfect during transport. Afterwards the second disinfection can take place in the hatchery.

Trying to disinfect properly (log4-log5) in only one phase is asking for trouble.

## Hatchability

The trial batches were also followed up to hatching, where candling and hatchability was analysed.

The ultimate goal is to obtain a high hatchability percentage and quality chicks. The eggs disinfected with VIROCID were compared to those disinfected with formaldehyde. The results are shown in Table 2. There is no significant difference between the trial group and the control group, thus no negative effect on hatchability can be noted in this trial when eggs are disinfected with VIROCID compared to formaldehyde.

## Maximum exposure limit

The determination of MEL was done by air sampling. The aim is to define if personnel entry after 30 minutes active ventilation is possible and in compliance with legislation.

With VIROCID we stay under the 0.05ppm exposure limit and the disinfecting procedure from start to finish can be concluded within the hour.

In conclusion, VIROCID is a true alternative for formaldehyde for egg disinfection, where log reductions are equal or significantly better then formaldehyde, hatchability is not influenced negatively and is in compliance with MEL legislation. ■

*References are available from the author on request*

***Table 3.***

| Measured volume: 3,004 L | Result ppm | Confidence interval ppm | TLV ppm | MEL ppm | Notation | LOD ppm | LOQ ppm | CVan % | CVtot % |
|---|---|---|---|---|---|---|---|---|---|
| Glutaraldehyde | 0.049 | ±0.006 | - | 0.05 | M | 0.003 | 0.013 | 4.0 | 6.4 |

# Grower - Beetle Information Sheet

**How much are the beetles costing?**

- Destruction of insulation and wooden structures in the house
- Reduced weight gains and feed conversions
- Increased disease problems and mortality

**How fast will the insecticides begin killing the beetles?**

- Some insecticides will kill the beetles in just a few hours and others may take a few days to begin killing the beetles.

**What is the best way to know how well the insecticide worked during the flock grow out?**

- When the birds are 4-5 weeks old look under several feed pans and see how many beetle adults and larvae you find. If you only find a few beetles you got good control.
- The number of beetles killed in the first 24 hours is not the best indication of how many beetles you have killed for every dollar you have spent. But near the end of the flock if you do not see many beetles you definitely got more "bang for your buck". Some insecticides may start killing more slowly but continue killing the beetles for the entire grow out!

**How can we kill the most beetles for each dollar we spend?**

- Apply the label recommended amount of each insecticide. Using less than the recommended amount will lead to increased resistance to the insecticide.
- If you are seeing large populations of beetles apply an insecticide before placement of each flock. This will keep the beetle populations under control in every flock.

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- Apply the insecticide using as little water as possible! It is best not to exceed 15 gallons of water in a 5000 square foot house. Change your nozzle tips (flat-fan 04-06) to get a fine mist instead of a coarse spray in order to use less water.
- Make sure to apply the insecticide under the feed lines and along the walls. These are the areas beetles tend to migrate. By focusing the insecticide applications to the areas where the beetles are living when the birds are in the house will offer much better control.
- Apply the insecticide on top of the old litter after caking out (if you apply fresh shavings on top of old litter after removing cake apply insecticide before fresh shavings and on top of older litter), or on top of fresh shavings after complete clean out. The beetles crawl on top of the litter as they are making their way to the feed line areas after bird placement. You will not get as good of results if you apply the insecticide on the bare floor after complete clean out.
- After caking out or clean out apply insecticide to any litter stored in the stacking shed. This will prevent the beetles from migrating right back into your houses.

# START CLEAN.....STAY CLEAN

● Administer a 1:128 dilution directly from Cid 2000 jug through a medicator and leave it in the lines for 12 -24 hours OR Administer a 1:50 (2%) dilution directly from Cid 2000 jug through a pump or adjustable medicator and leave in the lines 6-12 hours. 2% dilution administration is recommended.

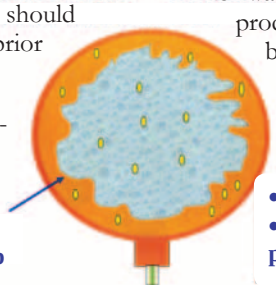
Ideally, trigger the nipples for one second (per 10 'section) so the solution can get through the nipple.

*Flush abundantly afterwards! When flushing 24-48 hours prior to placing birds initially flush with plain water then continue flushing with water containing an appropriate sanitizer that will be available at the nipple from day one!! Chlorine or Chlorine Dioxide can be used for this.*

● It is recommended to flush lines as soon as birds are moved and again 24-48 hours prior to placing birds in the barn.

● Brooder training drinkers or any water line source that is introduced after initially placing or moving birds should be flushed and cleaned with Cid 2000 24 hours prior to access.

This is very important to maintain adequate sanitation levels and remove any potential bacteria source that would be introduced to the birds.



**Remove Biofilms and Scale build up**

● Water line sanitation during flocks when using Chlorine should be tested by continually measuring the ORP. ORP readings should be between 650 and 750.

To get the most out of your Chlorine it is recommended to adjust your pH lower in high pH water. Desired pH should be between 5 and 6. Injecting an acid (Citric Acid or Acid Sol) through a separate pump or medicator can achieve this. Depending on your starting pH will determine how much product you need to achieve your desired pH. Check and monitor your pH consistently with a pH meter. Adjusting your pH will allow you to get higher ORP readings while using less Chlorine. Inject your acid or acidify your water first then inject your Chlorine second. Do not mix your acid and Chlorine in the same solution!!

● Chlorine Dioxide (Aquatize, Oxine) can also be used for water line sanitation. Chlorine Dioxide is a very effective product. Chlorine Dioxide needs to be tested and measured by using testing strips. Desired Chlorine Dioxide levels should be between 1 ppm and 5 ppm depending on health issues and water quality on the farm.

- **Use Cid 2000 as soon as birds are moved**
- **Use Cid 2000 again 24-48 hours prior to placing birds in the barn**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# Poultry Water Management and the Role of Water pH

Water management for poultry operations is a subject of much conversation between growers, veterinarians and live production personnel. The usage of water acidification as a preventive or treatment tool for disease management or to improve bird performance is probably one of the most poorly understood areas of poultry husbandry. This stems partly from the fact that until recently, no controlled research had been done investigating the preferred pH for poultry water consumption. Water acidification protocols for the prevention or management of certain bacterial diseases had been developed, but in many instances required a drinking water pH at bird level of 4.0 or below to be effective. Due to the lack of solid information on what type of water turkeys and chickens preferred, many within the industry were reluctant to acidify the drinking water to those biologically effective low levels. A high-pH crop environment (pH greater than 7.0) favors microflora that can hurt poultry performance. Poultry water treatment through acidification of the drinking water acidifies the crop, thereby encouraging the growth of favorable microflora while discouraging microflora that can harm intestinal integrity and function. Water acidification is most critical during the establishment of intestinal microflora and at each feed change when nutrient shifts can create instability in the normal intestinal microflora ecology. Using an animal feed grade mineral acid such as sodium bisulfate (PWT® water acidifier, Jones-Hamilton Co.) to reduce the pH of drinking water to 4.0 during the critical periods of intestinal development helps the birds maintain the stability of intestinal microflora throughout the growing period. The establishment and maintenance of healthy intestinal microflora improves live production performance and cost.

## How Crop Acidification Works

The reduction of Salmonella, Staph and Clostridium at the farm level focuses on creating a hostile environment to reduce horizontal spread from bird to bird and to reinforce the bird's natural protection mechanisms. This is most critical when the birds are first placed into the house, when they are moved into the whole house or to the growout barn, and when they are withdrawn from feed.

Acidifying drinking water for poultry with sodium bisulfate for the first seven days of life provides a second layer of protection to the lactic acid producing bacteria (LAPBs) that are part of the crop's normal ecology. This helps the newly hatched poult to maintain a low crop pH until it has established its own population of stable LAPBs. A low crop pH reduces the number of Salmonella or Clostridium that pass farther along the digestive tract and enables the bird to colonize with normal gut flora first. Once the crop's LAPB population has been established, the bird will be able to maintain a low crop pH on its own as long as feed is available. When feed is withdrawn or turkeys are not eating for any reason, the normal population of LAPBs dies off and Salmonella will multiply in the crop. Acidifying the drinking water to a pH of 3.5 or below during times when feed is not available will prevent the crop pH from becoming too high.

## Necessary Characteristics to Acidify Water without Affecting Consumption

A target pH of 3.5-4.0 is critical for bacterial control programs to work. Therefore, it is important to choose a mineral acid that birds will drink readily at that low pH. If the birds refuse to drink the water at the proper pH for crop acidification, the program will not work.

PWT® water acidifier is the first FDA approved feed grade mineral acid water treatment available to the poultry industry. Due to the unique chemistry of PWT®, the consumption of treated water is not decreased at higher concentrations as has been reported for organic acids. This advantage gives producers the flexibility for administration in a wide range of applications in all livestock and poultry species. All of the acids currently marketed to the poultry industry are weak organic acids, i.e. citric, acetic, lactic, that have poor taste profiles and limited pH reducing capabilities. Because PWT® has a low pKa, it has a cleaner taste profile and profound acidification properties that should overcome all of the issues of using the weak organic acids.

An organic acid is an acid that has carbon in it such as lactic, acetic (vinegar) or proprionic acids. Organic acids are often characterized as being sour due to their pKa being above the solution pH (a lazy acid). Some suggest that organic acids will work anyway at a high pH but research on bacterial killing ability shows that final pH is the determining factor and not organic acid concentration. Field experience seems to support this as the final pH at bird level seems to be the determining factor of efficacy rather than organic acid concentration.

The ability to significantly reduce water pH without impacting water consumption is also of great advantage in cleaning water lines during the flock. The periodic cleaning of water lines with birds in the house is very desirable especially in areas with high levels of iron in the water. The use of organic acids to clean the water lines with birds in the house results in decreased water consumption during the cleaning period. With PWT® water acidifier, the lines can be cleaned frequently without negatively impacting bird health or performance. In most houses a shift in pH is sufficient to clean the lines. In houses with iron water, the pH of the water at bird level should be a 4.0 or less during cleaning in order to reduce the negative impact of the iron content.

Finally, it is critical to use an animal feed grade or human food grade acid in the drinking water. Industrial grade liquid acids are not approved by FDA for animal consumption. PWT® water acidifier contains Sodium Bisulfate Animal Feed Grade and is produced under the guidelines for "Manufacturing, Packaging and Distribution of Animal Feeds and Feed Ingredients." It is produced in a manner that assures the quality required for consumption by food-producing animals and meets requirements that are necessary to minimize the potential for contamination. PWT® is approved by the FDA for use in animal feed and water.

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# Hatchery Managers Turn the Tide

Looking out the hatchery door you feel a pressure moving toward you. There is a steady force pushing global poultry vaccination to earlier and earlier ages. Like an ocean tide, this flow persistently and irresistibly shifts a higher proportion of vaccinations toward hatcheries. Newcastle Disease (ND) vaccination is one being impacted.

ND virus, with its highly-contagious nature, affects all of the important commercial poultry species. It is endemic in many countries and is being battled worldwide. International trade barriers resulting from ND prevalence is a threat. Guarding birds from airborne ND virus, direct contact, and even contaminated hatchery shells is important; and the earlier the better. Some key reasons for earlier spray vaccination ages are:

- Birds with faster-growing genetics do not have as much time to develop immunity under traditional vaccination programs.
- Live ND vaccine in day-old chicks builds defenses very quickly. Local respiratory immunity rapidly appears within 4 hours following vaccination in day-old chicks, offering crucial early protection while priming antibody production for longer-lasting defense.
- Simple, inexpensive and accurate spraying equipment for hatcheries makes vaccination more convenient and dependable, compared to time-consuming and inconsistently-applied grower vaccinations.
- Fast-growing poultry companies find it easier and safer to train and manage hatchery vaccinations than growing-house vaccinations.
- Independent growers that buy day-old-chicks press their commercial hatcheries to supply birds with their immune systems already stimulated and their defenses against prevalent diseases like ND under development.

Live antigens in spray vaccines must completely survive in order to provide the fullest immunity. Early vaccine manufacturers recommended that, if hatcheries planned to spray the live vaccine, they use distilled water. This recommendation came about because the vaccine manufacturers lacked the ability to manage tap water quality throughout their global customer base. Vaccines perform best when they are shielded against tap water containing natural or added oxidizing mineral

elements, inappropriate pH and unbalanced electrolyte concentrations. Modern, new-generation vaccine stabilizers are designed to counteract these risks, rescuing vaccines so hatcheries can conveniently and safely vaccinate with local water sources instead of costly and cumbersome bottled water. New stabilizer technologies nurture vaccines in local

tap water, make spraying more convenient and efficient, and reduce the logistics of sourcing and storing bottled water. They also reduce the plastic containers that must be disposed or recycled. Carbon-footprint-conscious poultry companies are taking note, eliminating distilled water as part of their "green initiatives."

Earlier research in Lasher Associates' lab confirmed the protective effect Spray-Vac® had on a fragile bronchitis vaccine. Now a more recent report describes research to learn if the new-generation vaccine stabilizer also rescues a live ND vaccine in water with high oxidative potential.

**Research Summary**

A live freeze-dried ND vaccine rehydrated in water was introduced into (a) more water alone, (b) water containing free available chlorine at 4 ppm, or (c) water containing free available chlorine at 4 ppm plus Spray-Vac® Stabilizer at the point-of-use concentration. Vaccine virus was titrated in specific-pathogen-free (SPF) embryos at 0 and 60 minutes for the water-alone treatment, and at 30 and 60 minutes for both the chlorine and chlorine plus Spray-Vac treatments. It was determined that Spray-Vac® fully protected the vaccine virus from the deleterious effect of free chlorine at 4 ppm.

Principals:
Jiang Zhang, Shanghai College of Forestry and Agriculture Vergil Davis, Lasher Associates, Inc.

Location:
Lasher Associates, Inc., Millsboro, DE

**Materials and Methods**

The researchers chose the same long-standing experimental model used by ND vaccine manufacturers to validate the initial potency of each production run of their vaccines. The method is prescribed by USDA regulators, published in Title 9, U.S. Code of Federal Regulations §113.329, and is used world-wide by regulatory authorities for vaccine potency assessment. Although this research discusses ND vaccine stability in the context of hatchery spray, the results apply equally to field boost sprays in grower facilities.

***Spray vaccine preparation***. In this ND vaccine stability study, a representative vial of commercial freeze-dried vaccine containing 1000 doses was rehydrated according to label directions as a hatchery normally would with 10 ml of sterile water. The vaccine vial was gently agitated to uniformly disperse solid particles. To prepare for titrations, the vaccine was then further diluted to 1 label dose per ml in each of 3 prepared spray solutions and held at room temperature throughout the experiment:

1. Positive control- Distilled water common to hatcheries.
2. Negative control- The same distilled water with added oxidizer standardized at 4 ppm chlorine to replicate hatchery tap water.
3. Stabilized- The same water as the negative control with Spray-Vac[1] liquid stabilizer concentrate added at the recommended concentration of 32 ml per liter of spray.

[1] Spray-Vac® Stabilizer. The stabilizer was supplied by Animal Science Products, Inc., Nacogdoches, TX 75963.

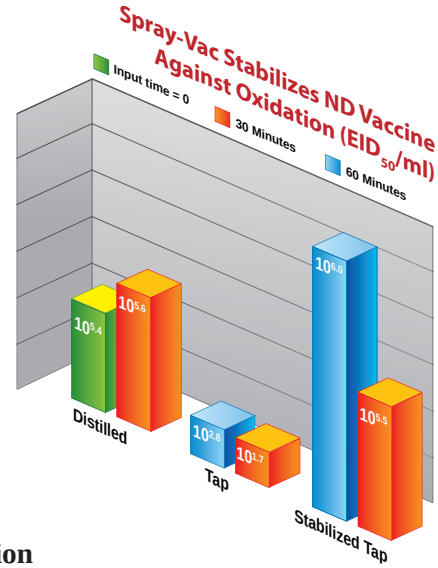
***$EID_{50}$ vaccine titrations.*** Each of these 3 initial spray solutions served as the $10^0$ dilution, and was then 10-fold serially diluted with separate transfer pipettes for embryo inoculations. Titrations were conducted using specific-pathogen-free (SPF) embryonated eggs. Each titration was replicated 3 times, inoculating 6 10-day SPF eggs at each dilution.

The distilled water positive control was titered immediately to measure the amount of live vaccine virus input at time 0, then again at the 60-minute endpoint. The negative-control-replicating tap water and its stabilized counterpart were both titered after 30 and 60 minutes in the spray solutions.

All incubating embryos were candled daily. Embryos that died within the first 24 hours following inoculation were considered unrelated to virus effects and were disregarded. Thereafter dead embryos were refrigerated immediately after candling. After 7 days incubation, surviving embryos and dead ones in the highest dilution that also contained live embryos were tested for HA activity using a 5% suspension of red blood cells, comingled from 3 adult SPF chickens, in phosphate buffered saline. Embryos were counted as positive if they had died, or if they were HA-positive. A titer was considered valid when the most concentrated dilution had 50 to 100 percent positives, and the least concentrated dilution had 0 to 50 percent positives. The method of Reed and Muench was used to calculate the $EID_{50}$ per dose.

## Results

The effect of Spray-Vac® Stabilizer on the titer of ND vaccine in chlorinated water is illustrated graphically in the figure. Geometric mean titers (GMT) of the ND vaccine in distilled water (positive control with no exposure to chlorine) at the input time zero and after 60 min were $10^{5.4}$ and $10^{5.6}$ $EID_{50}$/ml, respectively. This is the baseline titer a hatchery would expect under normal conditions when spraying with distilled water. The GMT of the replicated-tap-water negative control (vaccine exposed to water containing chlorine and no stabilizer) were $10^{2.8}$ and $10^{1.7}$ $EID_{50}$/ml at 30 and 60 minutes, respectively. The 2.8-log reduction after only 30 minutes means the non-stabilized vaccine had already lost over 99.7% of its value. In contrast, the titers of the stabilized solution (vaccine diluted in water containing 4 ppm chlorine and Spray-Vac) increased at the 30-minute interval to $10^{6.0}$ (+74%) and $10^{5.5}$ $EID_{50}$/ml at 60 minutes (+26%).




## Discussion

In order to successfully immunize chickens via spray, one of the most important considerations centers on delivery of live virus at the recommended dosage. To accomplish adequate delivery, spray equipment must be fully functional, the operator must uniformly deliver the spray over the chickens, the virus must be rehydrated to the proper dilution and the virus must remain viable in the diluent, which is commonly drawn from a distilled water bottle or a water tap. The steadily increasing number of hatchery vaccinations places a greater burden on sourcing and storing distilled water, and disposing of the bottles.

# Hatchery Managers Turn the Tide

Spraying with tap water that is readily available, convenient and inexpensive is naturally a better choice; however, water quality always poses some risk to the vaccine unless it is first stabilized. Water can challenge a vaccine's immunizing potential if harmful oxidizing elements are present. Sometimes it is easy to see the impact of oxidation, like steel being rusted by the tide. But vaccines are not steel. Very small concentrations of oxidizing elements can inactivate fragile vaccine, eroding the foundation of a poultry health and food safety program, unless the vaccine is stabilized.

This trial was conducted to assess both (1) the degree of ND virus inactivation induced by water containing a common amount of oxidizer and (2) the rescue effect of Spray-Vac® Stabilizer on ND virus in the same water. ND vaccine virus was chosen as the specimen virus because of its wide-spread use in chickens by the spray route. The chlorine concentration of 4 ppm was chosen because it is an oxidative element within a range normally encountered in municipal or well water systems. A pilot study previously conducted in this laboratory had confirmed the ND vaccine's sensitivity and helped establish the appropriate titration dilutions for the present experiment.

Spray-Vac was very effective in preserving the viability of ND vaccine virus in the presence of 4 ppm free chlorine, even up to one hour. At 30 minutes, the stabilized chlorine solution had over 1500 times more live virus than the same solution without stabilizer. At 60 minutes, Spray-Vac bolstered virus survivability by over 6000-fold when compared to the effect of chlorine alone.

On the other hand, the viability of the virus degraded rapidly in non-stabilized spray water containing normal concentrations of oxidizer, and continued to do so through the 60-minute incubation. In addition, Spray-Vac itself had no adverse effect on the virus when compared to the effect of distilled water alone.

Although the difference between the two time points for both the distilled water and stabilized water treatments varied three-fold to four-fold, this variation is within the biological variation, or "noise," of expected titer results when only a few titers are compared. In general, biological variation becomes significant in terms of virus titer as it approaches 10-fold (one-log) differences. Similarly, of the four titers for these groups, the titer in distilled water alone at time zero was the lowest. Although precautions were taken to avoid vaccine aggregates, one possible explanation is that upon rehydration of the freeze-dried vaccine cake, inconspicuous small clumps may remain in suspension, containing more viral particles than expected. Testing this explanation will require many more titration studies and thus, remain a continuing focus of investigation.

Hatchery managers feel the increasing tide of vaccinations pressing them. Spray-Vac relieves some of the pressure by safely permitting vaccines to be sprayed with local tap water, nurturing vaccines better than distilled water. In addition to shielding against oxidizers, Spray-Vac buffers the spray to a more perfect pH and balances electrolytes better than distilled water. Adding Spray-Vac to local hatchery tap water makes an ideal solution.

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