BVS POULTRY Talk

Best Veterinary Solutions, Inc.

Summer 2014

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Understanding EPA Labeling Regulations

Scientific & Regulatory Consultants, Inc.
www.srcconsultants.com

EPA Labeling

When consider the purchase or use of an antimicrobial product, regulated by the Environmental Protection Agency (EPA) as a pesticide, you may ask "what the required aspects of labeling are". Additionally you may ask what specific text is found on a standard label and what items I should look for in considering my specific use. Your product choice should be based upon an assessment of the product formula, warnings, handling and claims. In this overview, we provide a general template for the design of an EPA label in support of a product registration, required text stipulations, optional text that may be present and additional claims that should be avoided.

Label and Labeling

Both the product label and labeling are regulated by EPA. The product label is "the written, printed, or graphic matter on or attached to, the pesticide or device or any of its containers or wrappers". Labeling is "all other written, printed or graphic matter" accompanying a product. This is very inclusive and has been stated that this includes material accompanying or potentially used to procure purchase "at any time: or to which reference is made on the label or in literature accompanying the pesticide or device". In enforcement cases this has included web site information and collaterals or verbally expressed claims by a sales force to the potential purchaser.

Items Required in EPA Labeling

(Front Panel)

Product Name, Brand or Trademark - must be on the front panel of the label, may not be false or misleading, and must have been approved by the EPA through registration or supplemental registration. False or misleading names

continued on page 3

BVS

has manufactured, branded and private-labled water soluble vitamins and nutritional supplements!

MANAGE®

Get into the Manage Zone
Contains Buffered Acids
Plus Copper.

Omegamune®

Omegamune® Plus

Omegamune®GutPro

Omegamune®GutStart

Acid SOL
Water acidifier without copper

Starter Pak
New improved highly concentrated vitamins with citric acid

Vita Pak®
Highly concentrated vitamins & electrolytes

Solulyte
Balanced Electrolytes

Organic Iodine

Vitamin E

Dry Cider Vinegar

Citric Acid 410

Acidified Copper

Vitamin B Complex

Poultry Talk

Thank goodness spring has arrived, or should I say summer! Regardless it's great to have this past winter behind us.

There are a lot of things going on right now in the U.S. poultry industry. Our markets are strong. More and more production is being moved into ABF, NAU, and Organic.

As we move into these other areas of production, production people have to learn all over how to produce healthy broilers and turkeys. How to use preventative health products to our advantage and the right timing to help us manage gut health. Coccidiosis and Clostridium become our two biggest challenges that we face.

There are many new and old products on the market; probiotics, prebiotics, acidifiers, supportive care, essential oils, anti-oxidants, etc. The challenge is figuring out what works and when to use them. We at BVS have looked at many of these products and have and are doing our best to vet what's available to bring to our customers. So far we've found many products that work very well in these programs.

A list of what we've found that work if given at the right time are:

LC Energy, Manage, Omegamune Plus, Omegamune, Gut Start, Gut Pro, Biosupreme L, Biosupreme G, Diamond V's XPC, Dry Cider Vinegar, PLT, pH Safe, Mucusol, Unisol, AviCare, ProOxine

Another one that shows promise is a new MOS product derived from sugarcane from Brazil. It is very well absorbed into the gut and helps mature the gut quicker. It's fed only for the first two weeks of a chicks or poults life. It is supposed to increase gut villi length by up to 30%. We have some studies underway to look at this as we speak.

We will continue to keep you updated on new products as we vet them. Please contact the BVS sales person in your area for more information on these products and programs.

With summer, comes an increase in insects. Please review your insect control programs and let us know how we can help assist you in your planning and rotation of insecticides.

We have also just moved into a new warehouse in PA. We outgrew where we were at and have been looking for a new place for the past year. In March Wes and I closed on a new 37,000 square foot warehouse located in Mechanicsburg, PA. We are excited to have more room to operate out of and to better serve our customers in PA, the NE, and the Shenandoah Valley of VA.

Have a great summer and God Bless!
Randy

Visit us at: www.bestvetsolutions.com

EPA Labeling Regulations, *continued from cover*

are those that express or imply a higher level of efficacy then what the data submitted for registration support. There is an allowance for general superlative terms ("super", "superior", "ultra") however terms that imply heightened efficacy ("hospital strength", professional strength") are not allowed. Registrants are also restricted from using the exact same name for different products they hold registrations for. Supplemental registrants however may use the same product name as a parent product.

Ingredient Statement – must be on the front panel of the label (unless EPA has granted permission to appear elsewhere), preference is immediately below the product name. Active and Inert/Other Ingredients headings are to be of the same type size, aligned to the same margin and equally prominent. The name and nominal percentage by weight of each active must be placed under the Active Ingredient heading. The total percent of all remaining Inert/ Other Ingredients must be placed under the Inactive/Other Ingredient heading. Sum of percentages must be 100% and percentages must be in alignment with one another. Percentage "ranges" are not allowed.

Keep Out of Reach of Children (KOOROC) – must be on the front panel, on a separate line above the signal word. Required, unless waved by EPA due to special cases where contact with children in distribution, storage or use is extremely remote.

Signal Word – must be on the front panel, preferred below KOOROC statement. Determined by the most severe toxicity category I-IV assigned to the five acute toxicity studies (Danger (1), Warning (2), Caution (3), No signal word required (4)). Signal Word is required to be on supplemental labeling and also in Precautionary Statements section.

First Aid – general this should appear on front panel for all Category 1 products. However, the Agency allows placement on other panels with a reference statement on the front panel, close to the signal word, referring to where first aid statements appear.

Net Contents/Net Weight – preferred on front panel, bottom portion of label below company name and address. This declaration is required to be in U.S. measure with the option to declare in metric units. It is stated in the largest suitable unit (1 pound (lb.) 10 ounces as opposed to 26 ounces). Directions for use should not stipulate a quantity in excess of the Net Contents for the package.

(Front or Back Panel)
EPA Registration No., (EPA Reg. No.) – required on all pesticides, it may appear on any label panel.

EPA Establishment No., (EPA Est. No.) – may appear anywhere on the label or the immediate container. Number must appear on outer container or wrapper if it cannot be read through outer container or wrapper.

Company Name and Address – may appear anywhere on the label, preferred placement is on the front panel. If company name on the label is not the producer it must be qualified by "Manufactured for", "Produced for", Distributed by" etc.

(Back Panel)
Precautionary Statements – Hazard to Humans and Domestic Animals, First Aid, Environmental Hazard, Physical or Chemical Hazards (these describe hazard, route of exposure and appropriate precautions).

Directions for Use – instructions to user on use of product, pest controlled, application sites, application rates, contact time, required protective equipment. This section includes the standard text "It is a violation of Federal law to use this product in a manner inconsistent with its labeling". Section is a critical portion of labeling in establishing the proper use and application of the product.

Storage & Disposal – located in the directions for use section, set apart at the end of the section. This includes important information on the proper storage of pesticide product, disposal of unused pesticide product and the container. It also includes cleaning instructions for containers and disposal instructions for the rinsate.

Optional and Special Text

Warranty Statement – is not a requirement but if included it must NOT negate or detract from directions for use or other labeling language, extremely limit a buyers rights, be overly broad assessing buyer all liability, or disclaim manufactures control over use (is required to be used as labeled). It must make clear that warranty or disclaimer is from registrant or manufacturer and not from EPA.

Worker Protection Labeling – required when product bears directions for use on agricultural establishments or the production of an agricultural pesticide, if not exempted. These precautions are specific to this specific use and include Handler Personnel Protective Equipment, Statements for

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EPA Labeling, *continued from page 3*

Contaminated PPE, Engineering Controls, and User Safety Recommendations.

Additional Labeling Considerations

(General Claims)

Before a pesticide is sold it must be registered and have its labeling accepted by EPA. This "stamped labeling" is the base text from which all container and collateral labeling for the pesticide offering is to be generated. A product is considered misbranded (in violation) if it is not in compliance with the accepted labeling.

(Misbranded)

A product is considered misbranded if it makes any of the following claims:

- False or misleading statements in regards to the composition or effectiveness of the product, false or misleading value of the product for purposes other than as a pesticide or false and misleading comparisons with other pesticides or devices;
- To state or imply that a pesticide is recommended by or endorsed by an agency of the Federal Government;
- Naming a product which contains two or more principal active ingredients if the name suggests one or more but not all such principal active ingredients even though the names of the other ingredients are stated elsewhere in the labeling;
- A true statement used in such a way to give a false or misleading impression to the purchaser;
- Label disclaimers or warranty statements that negate or detract from required label statements;
- Safety claims of the pesticide, or its ingredients, including statements such as "trusted," "safe," "nonpoisonous," "noninjurious," "harmless" or "nontoxic to humans and pets" with or without such a phrase, as when used as directed;
- Non-numerical and/or comparative safety statements including but not limited to "contains all natural ingredients," among the least toxic chemicals known," "pollution approved"

Other unacceptable claims:

- Natural, naturally derived
- Contains plant-based ingredients
- Green certified
- Kills many insects
- Bio-based, eco-friendly
- "Green" certification logos not allowed on labels or in advertising

Additional Policy Considerations

EPA issued a document on March 29, 2012, titled "Determining If a Cleaning Product Is a Pesticide Under FIFRA." The website for this document is included below:

http://www.epa.gov/pesticides/factsheets/pest-habitat-claims.html

This regulatory background and policy elaborate on what EPA considers a pesticidal claim. It further provides specific examples of what claims they consider are Pesticidal Cleaners and which are considered Non Pesticidal Cleaners.

Pesticidal Cleaners (Must be registered)

- *Mitigates a pest directly or indirectly either by itself or by removing the pests food, food source or habitat*
- Pesticidal terms *(biofilm, scum, allergens)*
- Removal of *pest nutrients or habitat*

Non Pesticidal Cleaner

- *Remove dirt or other debris without linkage to mitigating a pest, its food, food source, or its habitat*
- Terms to use *(stains, dirt, soil, dust, debris, inanimate scum, inanimate nutrients, inanimate organic particulates, inanimate contaminants*
- *Can prepare surface for pesticide application*

OVERVIEW/SUMMARY

Understanding the Federal EPA labeling regulations is important in your assessment and decision making in the purchase of a pesticidal product. The base (Chemistry, Efficacy and Toxicity) data, required for registration, supports the formulation through the Federal registration process and is reflected in the resultant stamped label text. Chemistry data is reflected in the "Ingredient Statement" based upon the established levels of active and inert ingredients. Efficacy data is reflected in the organisms claimed in labeling and through the stipulated "Directions for Use". Toxicity data is reflected in the "Signal Word" assigned to the product (as sold in the container) with the associated hazards and warnings reflected under the "Precautionary Statements". Keying in on these portions of labeling is important in determining the specific product for your particular use.

As indicated in the claims area, there are certain claims to be avoided. Your product choice should therefore be based upon an assessment of the product formula (actives/inerts), warnings, handling and claims. This is important in determining the product offering which best fits your needs. It is also a proactive step in avoiding potential interruption of supply and penalties based upon misbranding.

Balanced Immunity.™

Take risk management to the next level.

Research correlates a well-balanced immune system and improved intestinal function with:

- **Animal health & wellness**
- **Food safety & sustainability**
- **Production performance**

Now is the time to add Original XPC™ to your management arsenal. Its unique metabolites support robust digestive health by balancing the immune system, gut microbiota and optimizing gut morphology.

To learn more, read the research reviews at www.diamondv.com.

Make smart, science-based decisions.

ORIGINAL XPC™

Diamond V®

The Trusted Experts In Nutrition & Health™

For more information call 800-373-7234. Subscribe to our *PoultryAdvisor* e-newsletter at www.diamondv.com

MERCK
Animal Health

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

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

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

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

MERCK
Animal Health

MERCK
Animal Health

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

BVS is the exclusive distributor and marketer of Merck turkey vaccines in the U.S.

MERCK
Animal Health

ARKO LABORATORIES

Swine and Poultry Biologics

SNICK GUARD

BORDETELLA AVIUM VACCINE

ARKO
Product Line

FOR POULTRY

- H.E. 1000
- H.E. 5000
- Ery Vac FD
- Cholera
- Snick Guard
- Pigeon Salmonella
- Autogenous Bacterin
  - Breeder Salmonella
- Autogenous Vaccine
  - Duck Parvo
  - Influenza
  - Adenovirus

FOR SWINE

- Edema Vac 100
- Edema Vac 200
- Edema Vac 500
- Entero Vac 100
- Entero Vac 200
- Entero Vac 500
- Ery Vac 100
- Ery Vac 500
- Nitro Ery
- Sal Vac FD

Vaccine Stabilizer

2000 Dose

5000 Dose

Aids in the prevention Bordetella Avium (coryza) infection in turkeys.

Prevention of B. Avium infections has been proven to help reduce the clinical signs of newcastle and pneumovirus outbreaks.

Administered at ages 10 and 24 days of age. Also has been administered at the hatchery.

Available in 2000 dose and 5000 dose vials.

Stored at refrigeration

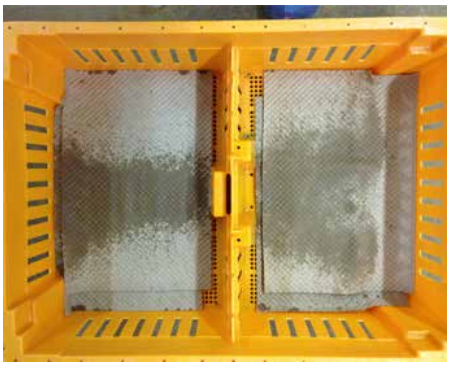
WWW.ARKOLABS.COM

Phone: 1-800-714-2756

Five key factors for success in hatchery spray vaccination

By Carlos González

Most broilers, layers, breeders spray vaccinated in hatchery, but is vaccination conducted as well as it could be?



An example of uneven spray distribution.

The importance of understanding how to achieve the highest efficacy possible when using spray vaccination should not be underestimated, especially given that more than 95 percent of the world's broilers and 100 percent of layers and breeders are now spray vaccinated in the hatchery.

There are five points that need particular consideration along the process.

1. Coverage: 80 is not 100

Ensure your equipment has the right capacity and is properly adjusted. Coverage must be as close as possible to 100 percent.

While obvious from a mathematical point of view, when applied to spray vaccination, the consequences of vaccinating only 80 percent of chicks in the crate, rather than 100 percent, can be dramatic. Spray vaccination equipment must be able to cover all of the crated chicks.

Often, spray units are not properly adjusted or of sufficient capacity; the spray nozzle positioning must be even with regard to the crate design and dimensions. In other words, spray systems must be able to adapt to the design of each crate to guarantee 100% coverage.

However, too frequently, an uneven spray distribution is achieved. Twenty percent less vaccination efficacy means that, for a normal 50 million-eggs-per-year hatchery (considering an average 80 percent hatchability), around 8 million birds per year may not be protected in the field.

2. Droplet size and homogeneity: A good average is not enough

If spray equipment cannot deliver a homogeneous and constant droplet size (at least 95 percent accuracy) it should be replaced.

A constant spray droplet size is essential for good spray vaccination.

Depending on droplet size, the vaccine will target different areas and tissues. The finer the droplet, the deeper it will penetrate, targeting the deep pulmonary tissues. A larger droplet will only reach the more exposed mucosa, such as the eyes and nostrils.

Depending on the type of vaccine (mild, intermediate, hot, etc.), and the targeted tissue, a corresponding droplet size must be defined.

Normally, most hatchery spray vaccination is performed with 150 micron droplets. But this value is not constant, it is simply an average of the total droplet sizes applied.

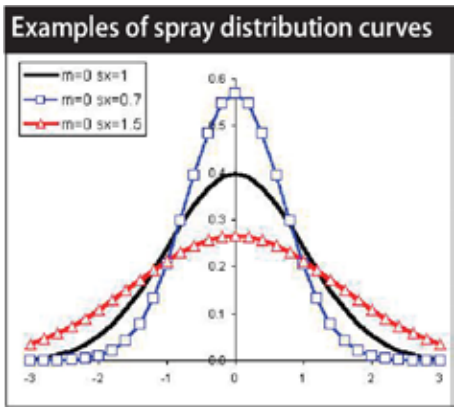
Why is this so important?

In picture 2, we can see different distribution curves with the same average (let´s consider 150 microns), but with different homogeneity. The lower the distribution homogeneity in the curve, the more variability in droplet size will be obtained from the nozzle. Keep in mind that, conceptually, if 20 percent of the droplets are, for example, 100 microns instead 150, and 20 percent are 200 microns, it does not mean that 60 percent of the chicks will receive an adequate droplet size of 150 microns. In fact, all the chicks will receive 20 percent of the dose with 100 microns droplets, which is too fine and can lead to post-vaccination reaction and economic losses, and 20 percent of the dose in very coarse spray, ineffective vaccination, poor protection, and economic loss.

3. Dose accuracy

Only use spray units with top-quality dosing units. Do not use disposable-plastic units. Develop specific monitoring and maintenance activities to audit the vaccination process, minimizing losses.

If we use the same example of a 50 million-eggs-per-year hatchery, overdosing by 15 percent would waste thousands of Euros, depending on vaccine price, by year-end. In this example, losses would reach Euro36,000 (US$49,500) per year on a vaccine cost ratio of Euro6 ($8.25) per 1,000 doses.



Although the average in the distribution curves is the same, the homogeneity differs.

However, 15 percent overdosing considering 10 ml volume per 100 DOCS, only means 11.5 ml, and losing 1.5 ml per cycle is not that difficult. Normally, what happens is that for a 150,000 DOCs-per-day hatchery, the operator has to prepare approximately 170,000 vaccine doses as the average dosing equipment could have, even in a best case scenario, a 5 percent scaling error. This may be due to poor pneumatic and vaccine line maintenance, leakage, vaccine waste due to priming, end-of-day waste, evaporation and air drift, and operator error.

Conversely, under-dosing by 15 percent can easily occur due to crate

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misalignment, uneven chick distribution, etc., and the economic consequences in the field can be quite significant.

The more precise the equipment and the processes, the smaller the impact on the bottom line.

4. Operational efficiency in the real world

Optimizing process performance and eliminating operator impact is economically beneficial. Invest in semi-automatic or automatic equipment not based on the push-and-pull approach.

Any technical input or considerations for spray application must be integrated into a device that is suited to the modern hatchery.

In the daily running of a 50 million-eggs-per-year hatchery, speed is as important as vaccination efficacy; operational costs are as important as droplet size.

Additionally, the impact of the operator on the process can be huge. For example, it is widely known that the push-and-pull effect on manual standard spray cabinets can reduce efficacy to 30 percent, meaning that only one-third of the chicks are correctly dosed.

Modern hatchery vaccination demands automatic or semi-automatic equipment with high outputs, high efficacy and minimum operator impact.

Operating a standard cabinet manually for more than six hours is tiring and operator performance declines, as does vaccination efficacy, after four hours of work. The return on investment when acquiring an automatic or semi-automatic unit is guaranteed within a few months.

5. Biosecurity: Getting more and more important

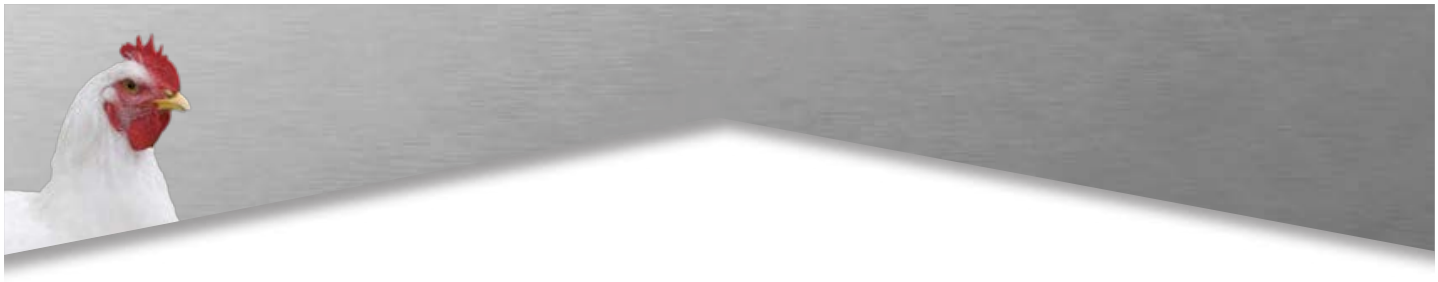
Bacterial contamination is likely to occur within spray equipment and vaccine preparation tools. Develop specific cleaning and disinfection protocols, as 100 percent of production will be exposed.

Traditionally, too little attention is paid to the cleaning and disinfection, with equipment simply used and stored day after day. The situation is worse when considering vaccine preparation (containers, shakers, jars, etc.).

Given that, most of the time, 100 percent of the DOCs are processed through spray units, the risk of cross-contamination and bacteria growth on the spray equipment is quite high. Our research shows that more than 25 percent of the spray cabinets and in-line units monitored in 2012 showed E. coli prevalence andPseudomonas sp. presence.

How should this issue be addressed? Cleaning and disinfection protocols must be applied. However, modern spray equipment should offer automatic cleaning functions, so strengthening sanitation and biosecurity.

Spray vaccination in the hatchery is an excellent tool to protect birds. However, if not performed properly, it can be a source of direct and indirect losses. From the biosecurity point of view, cross-contamination risk is always present. Investing in the best vaccination equipment and implementing strict monitoring routines are key for success.



PoultriMax®

THE SCIENCE OF PROBIOTIC PROTECTION

SCIENTIFICALLY SELECTED • RESEARCH PROVEN

PoultriMax® is a Lactobacillus Animalis product that enhances the health and productivity of Broilers, Turkeys and Layers while simultaneously helping protect our food supply through the use of sufficient levels of beneficial bacteria.

PURPOSE

Under typical commercial conditions, chicks and poults can be exposed to pathogenic bacteria on their day of hatch. If these organisms successfully colonize the guts of these naïve birds, then poor performance will likely follow. Producers with these flocks would be expected to see relatively high early mortality, runting and stunting, high feed conversions, poor rates of gain, and persistent morbidity associated with other opportunistic infections (e.g., Clostridium leading to necrotic enteritis, Coccidiosis, etc.).

Administering PoultriMax as a probiotic on the day hatch has been shown to significantly reduce the risk of colonization by pathogenic bacteria and to significantly improve subsequent gut health. Treated birds showed fewer intestinal lesions, better livability, lower feed conversions, higher rates of gain, and exceptional economic return. Furthermore, PoultriMax-treated birds had significantly lower concentrations of pathogenic organisms in their digestive tracts at the time of harvest; thereby reducing the risk of food-borne pathogens entering processing plants.

MODE OF ACTION

The probiotic strain used in PoultriMax was selected during an extensive screening of potential candidates at Oklahoma State University. This strain was chosen for its ability to thrive in the gut, to successfully colonize and achieve high numbers of viable organisms, to competitively exclude pathogenic organisms, including *E. coli*, and to exert a beneficial effect on the host animal.

MAIN BENEFITS

- Improves gut health
- Increases liveability in day old chicks, turkey poults, broilers and turkeys
- Improves early chick and poult mortality
- Improves livability in broilers and turkeys
- Reduction of pathogenic and deleterious bacteria: *Salmonella* and *E.coli*
- Improved feed conversion
- Improved yield
- Reduction of food borne pathogens entering the processing plant

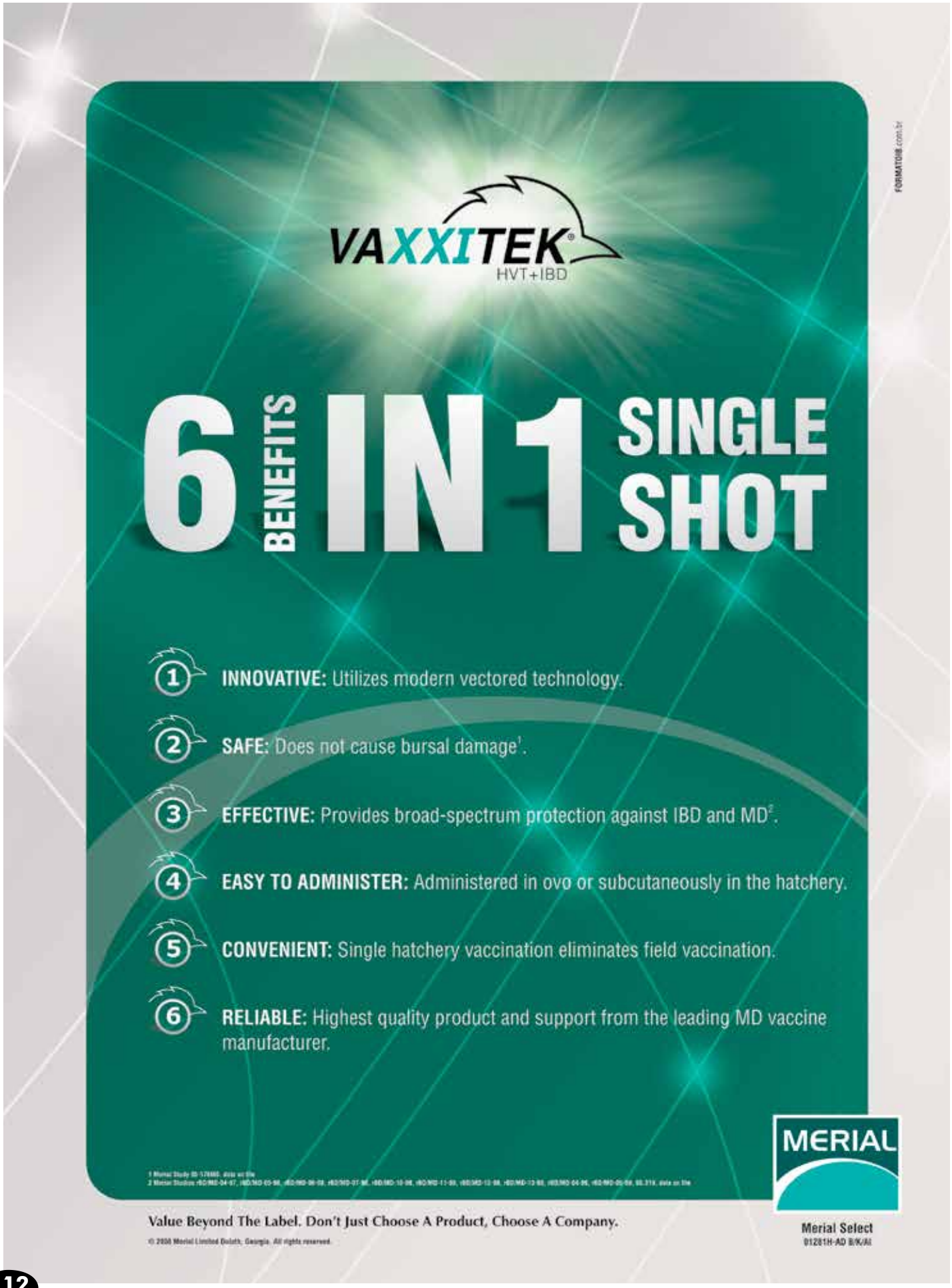
PRODUCT

The product line is comprised of:

PoultriMax Hatchery - a freeze dried powder that is mixed in water and then sprayed on day old broiler chicks and day old turkey poults in the hatchery.

PoultriMax - freeze dried product that when mixed with oil is sprayed on feed post pelleting

NUTRITION PHYSIOLOGY COMPANY, LLC
Overland Park, KS | www.poultrimax.com | 1-877-780-6300


VAXXITEK
HVT+IBD
6 BENEFITS IN 1 SINGLE SHOT
1 INNOVATIVE: Utilizes modern vectored technology.
2 SAFE: Does not cause bursal damage[1].
3 EFFECTIVE: Provides broad-spectrum protection against IBD and MD[2].
4 EASY TO ADMINISTER: Administered in ovo or subcutaneously in the hatchery.
5 CONVENIENT: Single hatchery vaccination eliminates field vaccination.
6 RELIABLE: Highest quality product and support from the leading MD vaccine manufacturer.
MERIAL
Value Beyond The Label. Don't Just Choose A Product, Choose A Company.
Merial Select
01281H-AD B/K/Al

OUR FAMILY IS

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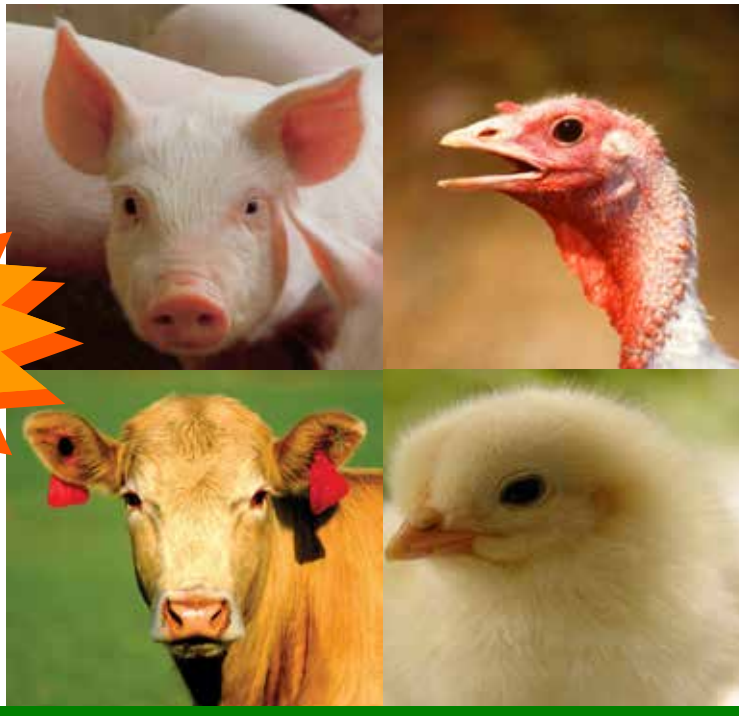

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Loss of Cell-Associated Marek's Disease Vaccine Titer During Thawing, Reconstitution, and Use

D. A. Halvorson[A] and D. O. Mitchell[B]
Received 12 March 1979

SUMMARY

Tests of the effects of mismanagement practices observed in hatcheries showed that very subtle deviations from the explicit directions accompanying Marek's vaccine can cause dramatic losses of vaccine potency. Such mismanagement was found to result in 14 to 97% loss of vaccine titer. It appears that procedures used in hatcheries for the handling of cell-associated Marek's vaccine should be closely monitored on a continuous basis to prevent a gradual drift from correct handling.

INTRODUCTION

The immunity conferred by Marek's disease vaccine has been recognized to be less than 100% since 1970, when the effectiveness of the turkey herpesvirus (HVT) as a Marek's disease vaccine was discovered (8,11). Factors found to affect that immunity have included methods of producing the vaccine (8,13,15), additives put in the vaccine at the hatchery (4), parental antibody against HVT in chicks (1,3,13), genetic constitution of the chicks (2,6,7,12,13,14), and early exposure to Marek's disease virus (2,5,8,9,10).

The senior author observed that hatcheries were failing to follow the explicit directions included in the directional leaflet accompanying the vaccine. A study was undertaken to determine whether such mismanagement procedures could cause a loss of vaccine titer.

MATERIALS AND METHODS

To mix cell-associated Marek's disease vaccine, the label directions (DeKalb HVT, DeKalb AgResearch, Sycamore Road, DeKalb, Illinois 60115) state: Remove one ampule at a time from the liquid nitrogen container and the remaining ampules in the cane should be returned to the liquid nitrogen. Thaw the single ampule within 30 seconds in room temperature (27 C) water using gentle agitation. Draw the vaccine with a syringe and 18-gauge needle from the ampule and gently inject into the room temperature diluent. Use some of this diluent to rinse the ampule and then inject it into the diluent bottle. Agitate gently and keep the reconstituted vaccine in an ice bath. Use within 2 hours.

Studies were undertaken to evaluate the effects of removing ampules from the liquid nitrogen container for 21/2 or 5 minutes and then returning them to the liquid-nitrogen container; thawing the vaccine ampules in cold water or hot water rather than roomtemperature water; leaving the ampules in the room-temperature water for 5, 10, and 15 minutes rather than 30 seconds; putting the thawed virus into cold diluent rather than room-temperature diluent; failing to rinse the ampules with diluent after thawing the vaccine; and using the vaccine within 30 minutes rather than 2 hours.

Each study compared three ampules individually treated in one of the above ways with three matched control ampules (from the same serial of vaccine) individually thawed and reconstituted according to label directions. It was necessary to thaw and reconstitute the ampules individually because it was not possible to do more than one ampule within the 30 seconds specified in the directional leaflet.

All results were determined by titrating the HVT virus on 20- to-24-hour secondary chick embryo fibroblast (CEF) monolayers in accordance with USDA publication SAM-406 (16). Falcon's 60-mm gridded plates were used. They were seeded with 5 ml of growth medium at a rate of 400,000 cells/ml and placed in a high humidity CO_2 incubator at 37 C. The growth medium consisted of 199-F10 plus Earle's salts, 4% fetal calf serum, 1% of a 10% $NaHCO_3$ solution, 1% HEPES buffer solution, mycostatin at 40 units/ml, penicillin at 100 units/ml, streptomycin at 100 mg/ml, and neomycin at 100 mg/ml.

Table 1. The effect on titer[A] of removing ampules of Marek's disease vaccine from liquid nitrogen and then replacing them.

Control	2.5 minutes out of liquid nitrogen	5 minutes out of liquid nitrogen
100%	25%	0%
100%	25%	4%
100%	30%	5%
Av.	27%	3%

[A]The vaccine titer of each ampule is expressed as a percent of the titer of the matched control ampule, which is given a value of 100%.

Maintenance medium, which was added 24 hours after virus inoculation, was the same except that 1% fetal calf serum was used instead of 4%. Once reconstituted, the vaccines were held for 2 hours at 4 C. At the end of the incubation period, appropriate dilutions were made and 0.2 ml was added to each of five plates containing the 20-to-24 hour monolayer. The CEF monolayer at this stage covered 85-100% of the plate.

Plates were then replaced in the 37 C incubator. The medium change occurred the next day. The plates were read 4 days after virus inoculation by counting the foci on each of the five plates, determining the average, and multiplying by the dilution. This yielded our titer results in focus-forming units (FFU)/dose. Control titers were given a value of 100%, and experimental results were then calculated and expressed as a percent of the control titer.

Table 2. The effect on titer[A] of leaving ampules of Marek's disease vaccine in the water used for thawing them.

Control (thawed & reconstituted in 30 sec)	Time before reconstituting		
	5 min	10 min	15 min
100%	66%	62%	45%
100%	94%	75%	44%
100%	89%	67%	52%
Av.	83%	68%	47%

[A]The vaccine titer of each ampule is expressed as a percentage of the titer of the matched control ampule, which is given a value of 100%.

RESULTS AND DISCUSSION

When ampules were removed from the liquid nitrogen and replaced, it was observed that after 2½ minutes at room temperature the ampules were covered with a thick layer of frost and the contents were only partially thawed. After this procedure, the ampules were individually thawed, reconstituted, titered, and compared with control ampules. Table 1 shows the drastic

Table 3. The effect on titer[A] of the temperature of the water used to thaw Marek's disease vaccine.

Control (thawed in 27 C water)	Water temperature	
	17 C	40 C
100%	69%	76%
100%	79%	79%
100%	77%	85%
Av.	75%	80%

[A]The vaccine titer of each ampule is expressed as a percent of the titer of the matched control ampule, which is given a value of 100%.

loss of vaccine titer with those procedures.

To evaluate the importance of the specified time limit for thawing vaccine, the vaccine ampules were left individually in the water for 30 seconds, 5 minutes, 10 minutes, and 15 minutes and then reconstituted. The results (Table 2) show very clearly the importance of getting the vaccine thawed and reconstituted quickly.

Table 3 shows the results of thawing vaccine in cool tap water (17 C) and in hot tap water (40 C) compared with room-temperature water (27 C). Since it took longer to thaw the vaccine in cold water, the effect of water temperature was confounded with the time required to thaw the vaccine.

Table 4. The effect on titer[A] of the initial diluent temperature into which the Marek's disease vaccine is added.

Control (room temperature diluent)	Refrigerated diluent (4 C)
100%	80%
100%	75%
100%	80%
Av.	78%

[A]The vaccine titer of each ampule is expressed as a percent of the titer of the matched control ampule, which is given a value of 100%.

Further directions indicate that the vaccine virus should be placed in diluent that is at room temperature, so room-temperature diluent was compared with refrigerated diluent. The results are shown in Table 4.

It is also stated that diluent should be used to rinse the ampule and then be injected back into the diluent bottle. Failure to rinse the vaccine ampule results in a loss of titer (Table 5). The extent of the loss naturally depends on the amount of vaccine one is able to get out of the ampule the first time.

Table 5. The effect on titer[A] of failing to rinse the Marek's disease vaccine ampule.

Control (rinsed)	No rinse
100%	92%
100%	75%
100%	92%
Av.	86%

[A]The vaccine titer of each ampule is expressed as a percent of the titer of the matched control ampule, which is given a value of 100%.

It is recommended that vaccine be used within 2 hours of mixing. Titers reported by the vaccine manufacturers are required by the USDA to be taken 2 hours after reconstitution. A comparison was made between vaccine titer at 2 hours after mixing and at 30 minutes after mixing, since many hatcheries are able to use the vaccine within the 30-minute period.

Table 6 illustrates the benefits of using the product within the 30-minute period. It seems advisable to encourage hatchery employees to use all the vaccine as soon as possible after mixing.

Table 6. The effect on titer[A] of using the Marek's disease vaccine in less than two hours.

Control (titered 2 hours after reconstituting)	Titered 30 minutes after reconstituting
100%	115%
100%	104%
100%	107%
Av.	109%

[A]The vaccine titer of each ampule is expressed as a percent of the titer of the matched control ampule, which is given a value of 100%

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Maintenance of Evaporative Cooling Pads

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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**)

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Active ingredient level: 36%
Manufacturer's Recommended Doseage:
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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
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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)

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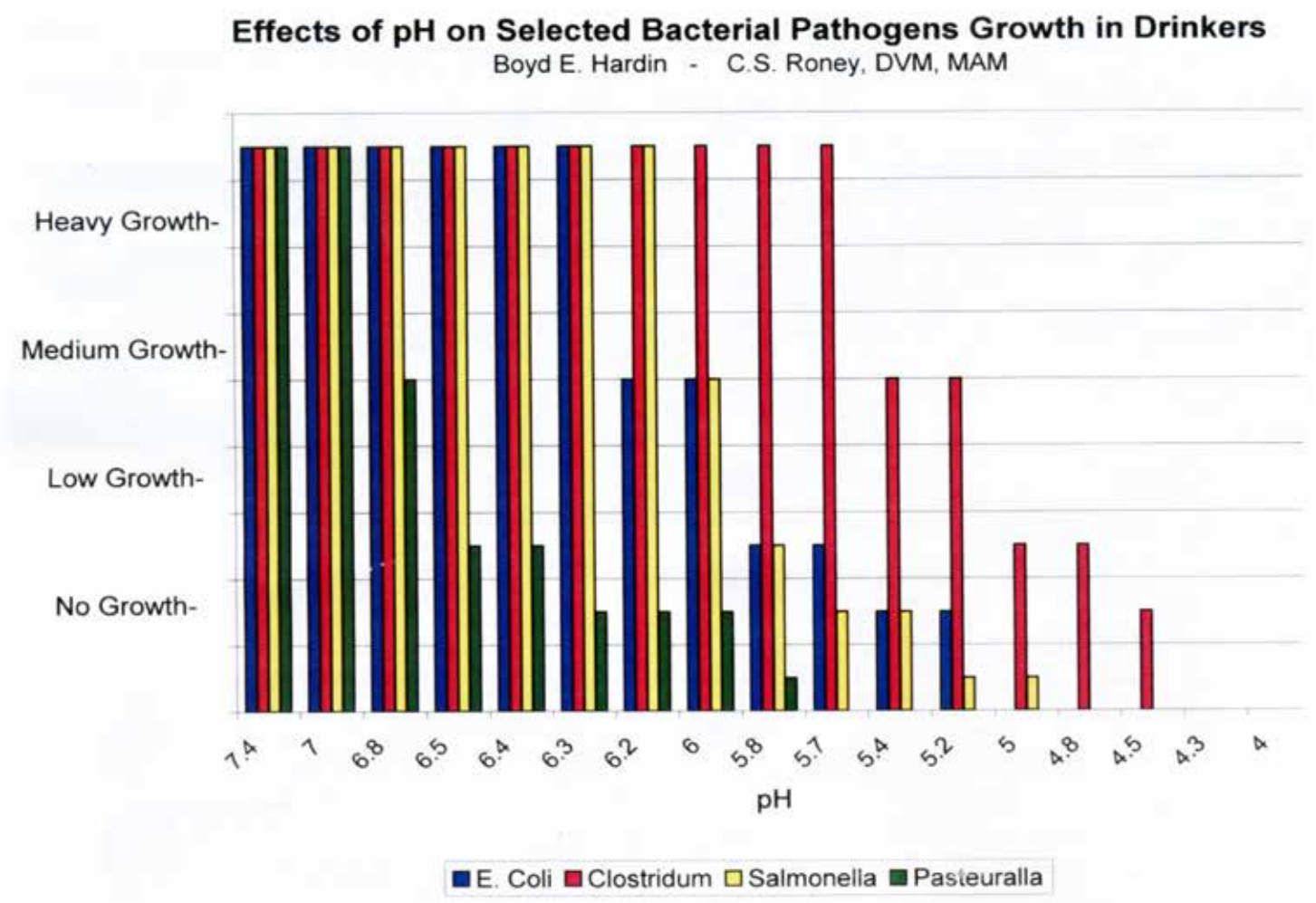

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- For animal use only; not for human consumption
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MIXING DIRECTIONS

Standard Dosage - 1:1024 gallons drinking water. Administer 1 part Omegamune-Plus in 1024 parts drinking water. For injectors/proportioners administer 1 oz. stock solution per gallon drinking water. Prepare stock solution by mixing 1 gallon Omegamune-Plus with 7 gallons water.

Optimum Dosage - 1:512 gallons drinking water. Administer 1 part Omegamune-Plus in 512 parts drinking water. For injectors/proportioners administer 1 oz. stock solution per gallon drinking water. Prepare stock solution by mixing 1 gallon Omegamune-Plus with 3 gallons water.

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- fits well into an antibiotic free program.
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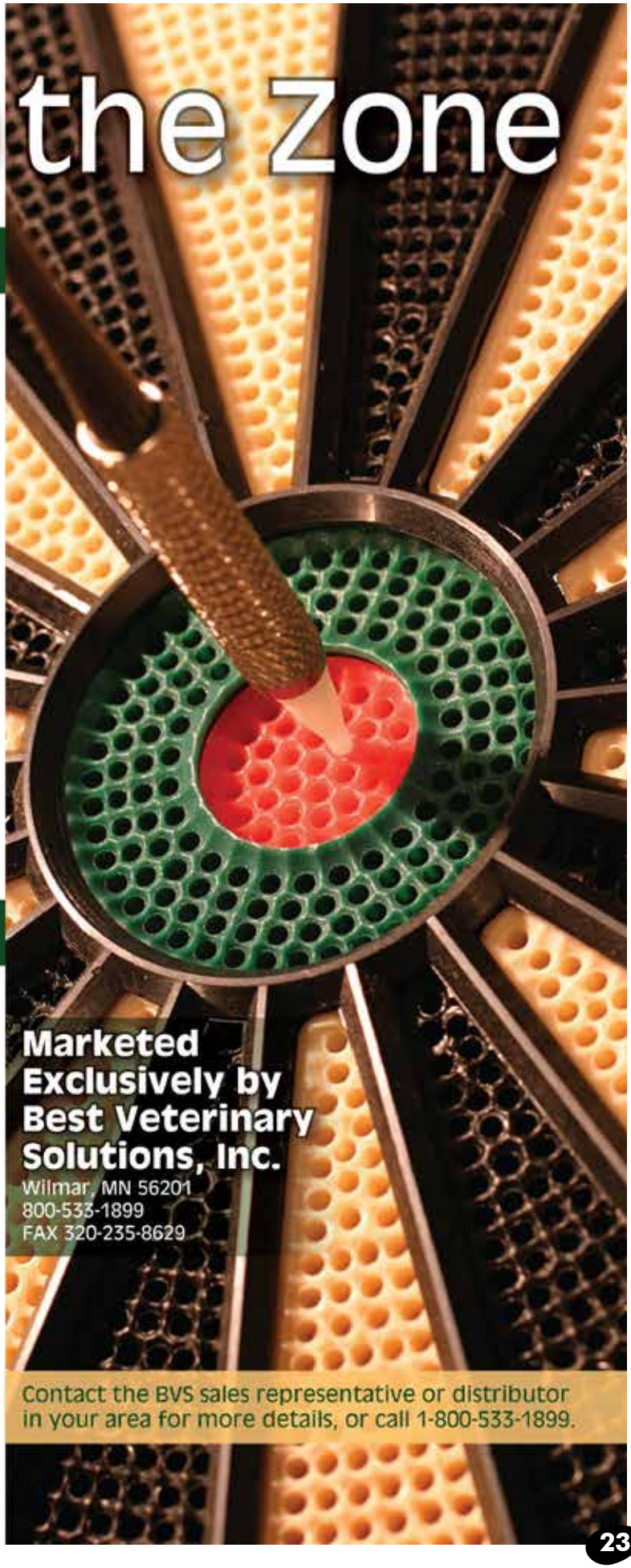

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SPRAY-VAC®

IMPROVES NEWCASTLE DISEASE VACCINE STABILITY

Spray-Vac® Improves Newcastle Disease (ND) Vaccine Stability

Vergil S. Davis[1] and Ryan Izard[2]

Vaccinating poultry via mass spray systems has become the predominant way to immunize birds in many poultry production units. Spraying gives poultry integrators more positive control over the timing and administration of ND virus vaccine than vaccinating in drinking water. One spray-vaccination drawback is the lack of convenient, safe and inexpensive water to dilute the vaccine for delivery. Readily available public and farm water sources are obvious choices; however, these water supplies routinely contain oxidizers, including chlorine, nitrates and mineral elements which rapidly inactivate ND vaccines. To avoid the risk associated with using tap water as the spray solution, vaccine manufacturers typically recommend distilled water as the diluent.

Distilled water is free of potentially harmful oxidizers, but it is neither convenient or inexpensive compared to public or farm water. Distilled water is also more acidic than many people realize which is not ideal for vaccines. Supplying a large enough volume of distilled water to spray typical commercial poultry farms is a significant logistical challenge. Previous work with infectious bronchitis vaccine showed Spray-Vac2, a vaccine-stabilizing water additive, helps poultry vaccinators overcome both the logistical challenges of distilled water and concerns over vaccine inactivation in tap water. Davis and Lasher (2000) added Spray-Vac to water containing chlorine at concentrations similar to those typically found in tap water. Spray-Vac stabilizer protected the vaccine, permitting the use of convenient, low-cost farm water while guarding the vaccine against oxidation. The present series of experiments sought to answer if Spray-Vac exerts the same stabilizing influence on ND vaccine.

ND Prevalence and Risk

As an acute viral infection, ND poses a significant risk to global poultry production, with the potential to result in trade restrictions. Also termed avian pneumoencephalitis, it is seen primarily as a mild to severe respiratory disease. However, it can also manifest itself as a more serious disease, inducing diarrhea, nervous symptoms and variable mortality. The virus spreads within flocks via air, respiratory fluids, feces, and contaminated food. People and equipment inadvertently carry the virus between flocks. Virulent strains are found among the poultry populations of Asia, Africa, and some Central and South American countries. The U.S. and Canada maintain import restrictions and eradication programs to prevent infection by virulent strains. Live vaccines are mass-administered to flocks in the drinking water, by spray, or as nasal or eye drops.

Research Objective

Scientists conducted research at two laboratories to determine if Spray-Vac exerts a stabilizing influence on a live ND vaccine rehydrated in chlorinated water. Study locations were Charles River Avian Products and Services (SPAFAS) Laboratory, Storrs, CT, and Lasher Associates, Inc., Millsboro, DE.

Materials and Methods

In the first study conducted by SPAFAS, one vial of a live commercially available ND vaccine was reconstituted and then further diluted in sterile distilled (DI) water to obtain an initial titer; DI water containing chlorine (negative control) and DI water containing chlorine plus Spray-Vac. The vaccine in water was titered immediately. The vaccine in the other two preparations was titered after 30 and 120 min. In the second study conducted by Lasher Associates, the basic protocol used at SPAFAS was repeated for the vaccine in water only and in water containing chlorine[3].

Titrations

Titrations were conducted using specific-pathogen-free (SPF) embryonated eggs. The method was one commonly used by vaccine manufacturers described in Title 9, Code of Federal Regulations §113.329. Embryo deaths occurring during the first

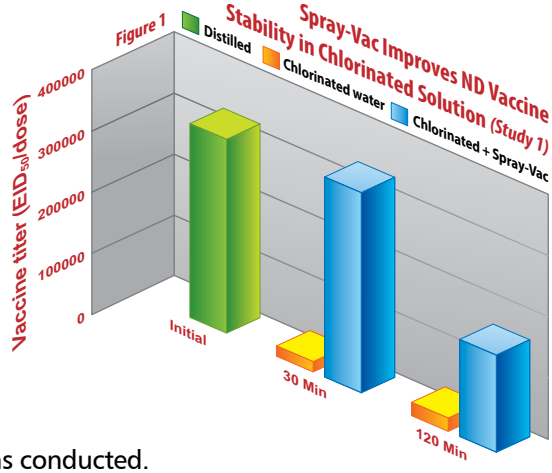
1 Lasher Associates, Inc. Millsboro, DE provides consulting services worldwide to manufacturers of poultry vaccines.
2 Animal Science Products, Inc. Nacogdoches, TX manufactures a variety of stabilizing additives designed to improve the successful application of poultry vaccines.

24 hours after inoculation were disregarded. After 7 days incubation, surviving embryos were tested for HA activity. A titer was considered satisfactory when at least one dilution had 50 to 100 percent positives, and at least one dilution had 0 to 50 percent positives. Embryos were counted as positive if they had died, or if they were HA-positive. The method of Reed and Muench was used to calculate the EID^{50} per dose.

Results

Study 1: Effect of Spray-Vac stabilizer on the titer of ND vaccine in water chlorinated at 4 ppm (figure 1). The titer of the ND vaccine at time zero with no exposure to chlorine was $10^{5.5}$ EID^{50}/dose. Exposing the virus to water containing 4 ppm chlorine and no Spray-Vac stabilizer reduced titers to less than or equal to $10^{4.5}$ EID^{50}/dose, which is a loss of 90% or more of the vaccine titer. Stabilizing the vaccine with Spray-Vac prevented reduction in titer at 30 minutes, with titers of $10^{5.5}$ EID^{50}/dose equaling those found in the initial inoculation. After 120 minutes incubation, the stabilized ND vaccine maintained titers ($10^{5.2}$ EID^{50}/dose) more than five-times greater than non-stabilized vaccine. Although Spray-Vac greatly improved ND vaccine performance, the range of dilutions used in the trial allowed nonstabilized vaccine titers to fall below the lowest quantification limit. Because this prevented the final titer-destroying effect of chlorine from being calculated, a second study was conducted.

Figure 1

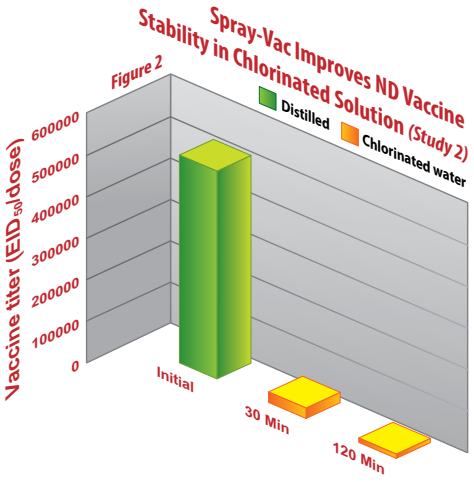


Study 2: Effect of chlorinated (4 ppm) water on the titer of ND vaccine (figure 2). In the second study, the titer of the vaccine with no exposure to chlorine at time zero was $10^{5.7}$ EID^{50}/dose. After 30 minutes exposure to chlorine at 4 ppm, the titer dropped to $10^{4.2}$ EID^{50}/dose. Then, after 120 minutes, the titer had fallen further to $10^{3.0}$ EID^{50}/dose.

Discussion

Water on poultry farms is commonly chlorinated to aid in reducing numbers of potentially harmful microorganisms. In general, a chlorine level of 4 ppm is considered the practical upper limit, as higher levels have been found to adversely influence water intake. Because the chlorine in drinking water systems is also virucidal, it inactivates live vaccines, such as ND vaccine. To avoid inactivating vaccines in spray solutions, many poultry growers resort to the inconvenient use of relatively expensive distilled water as the spray solution. As seen in these studies, Spray-Vac protects ND vaccine from the harmful effects of tap water and eliminates the need for distilled water in the spray solution. Adding 4 ounces of Spray-Vac to each gallon of tap water (30 ml/liter) shields vaccines and rescues them from inactivation for longer than typical spray application times.

Figure 2



In the first study for thirty minutes incubation, Spray-Vac completely preserved the vaccine's effectiveness, providing at least ten times more live ND vaccine per dose than the non-stabilized solution. At 120 minutes, Spray-Vac still bolstered virus survivability by at least fivefold when compared to non-stabilized chlorinated water. Ultimately, the severe titer-destroying effect of chlorine was below the lower quantification limit of the first study. It was only possible to calculate that Spray-Vac preserved at least 5 or 10 times more vaccine, but not precisely how much more.

The second study was designed to determine precisely how much vaccine was inactivated, so the stabilizer's true improvement could be calculated. The second study demonstrated that exposure to chlorine at 4 ppm for 30 minutes induced a 30-fold reduction in ND vaccine titer as compared to the initial titer at time zero. Then after 120 minutes, the titer had been reduced a full 500-fold from its initial value. Applying these more precisely determined minimums to data from both studies. It is anticipated that at 30 minutes, chlorinated water stabilized with Spray-Vac would have 30 times more live virus than chlorinated water alone. In fact, no titer loss at all would be expected at this time interval. Furthermore, at 120 minutes, use of Spray-Vac is projected to yield approximately 250 times more live vaccine virus.

Spray-Vac was previously shown to completely rescue a fragile infectious bronchitis vaccine held in spray solutions for 30 and 120 minutes. The non-stabilized IB vaccine in the previous research lost 60 to 80% of its original titer. The non-stabilized ND vaccine used in the present study lost a much greater percentage of its initial titer, suggesting more sensitivity to oxidation and emphasizing the importance of proper stabilization.

3 In the first study, the full effect of chlorinated water on the vaccine was not determined. The second study was conducted to determine such by using lower virus dilutions to inoculate the embryos.

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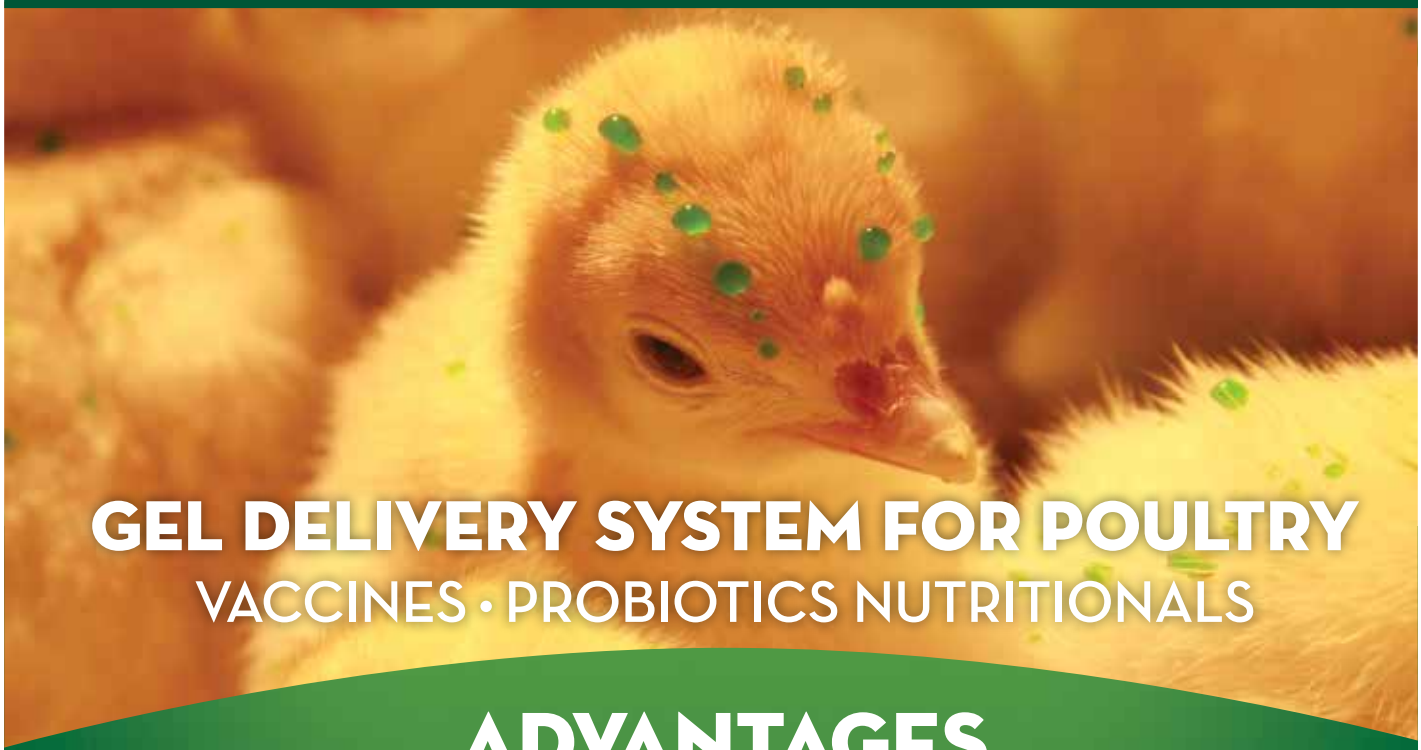

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Why Chlorine Dioxide should be your choice for Water Sanitation

By Ross Thoreson
ross.thoreson@bestvetsolutions.com

Chlorine Dioxide technology has really taken off over the past couple of years in the poultry industry and has shown to be a great alternative to Chlorine and even stabilized Hydrogen Peroxide for continuous water sanitation. As we have tried to utilize the Chlorine Dioxide technology there are a lot of things we have learned along the way. I still think there are plenty of things to learn about this technology and I certainly don't know all of it but I am going to share some of the things I know about Chlorine Dioxide and why I feel it is the best choice for water sanitation / disinfection on your farm.

I have continuously seen this technology used incorrectly on the farm while growers think they are using Chlorine Dioxide they truly are not. There are a lot of different opinions on how to administer this technology correctly. I am going to go over some of the things I have seen on the farm and how to properly use Chlorine Dioxide that I have seen work better than most alternatives.

There are a lot of reasons why people have started to use Chlorine Dioxide (disclaimer: I will continue to refer to Chlorine Dioxide as CLO2 for the rest of this article) as their choice for water sanitation. CLO2 is chemically quite different from Chlorine. CLO2 only has 2/3 the oxidation potential of Chlorine or stabilized Hydrogen Peroxide but it has 2.5 times more oxidation capacity compared to both of those chemicals. CLO2 is NOT pH dependent like Chlorine and can disinfect your water from a pH of 2 to 10. It is far less corrosive on equipment compared to Chlorine. CLO2 can work on and eliminate biofilm, take out sulfur odors and helps eliminate mineral build up and filtering iron out of your water becomes more effective. The biggest reason why CLO2 has become more popular is ***most*** products on the market are EPA registered and have claims to 'disinfect water supply for poultry, swine, cattle and other livestock'. Most chlorine products are not EPA registered to run with poultry present and **NO** stabilized hydrogen peroxide product is EPA registered to run with poultry present.

Most CLO2 products on the market are purchased in the Sodium Chlorite form and are not actually Chlorine Dioxide. This is very important to understand when trying to utilize these products to their fullest potential. Depending on the percentage of CLO2 you buy will depend on what percentage of Sodium Chlorite is in the jug or drum. If you buy a 'stabilized' 5% Chlorine Dioxide product (Pro Oxine, Anthium Dioxide, MaxKlor), you are actually getting a 8.35% Sodium Chlorite product in that jug or drum. If you buy a 2% CLO2 product (Oxine), you are actually getting a 3.35% Sodium Chlorite in that jug or drum. It is essentially a 1.67 multiplier from the percentage of CLO2 that product claims.

Sodium Chlorite is widely used as a sanitizer and can be effective at inhibiting bacteria. It is important to know that chlorite solutions can carry anti-microbial claims listed as static or stasis by the EPA. That means chlorite solutions can inhibit or prevent bacteria growth of present organisms. It is also important to know that Sodium Chlorite solutions are NOT Chlorine Dioxide. In order for the product to become biocidal and make disinfecting and sterile claims you have to show efficacy with activated product. Activated product is the process of taking the Sodium Chlorite solution and changing some of that chemistry to Chlorine Dioxide. The 'activation' step is the part of CLO2 I believe gets misunderstood the most when working with these products and generally results in no activation taking place or needing to run the product over label usage rates to achieve some activation to generate CLO2.

The most common 'activator' that is used to convert chlorite to CLO2 is generally a single acid product like Lph 100 (Acidic Calcium Sulfate) or some kind of liquid inorganic acid. You can also use Citric Acid (liquid or dry) and that can be effective but we have found the liquid inorganic acids work best and allow for less acid to be used with higher conversion to CLO2.

When working with Sodium Chlorite solutions it is important

to understand that there are TWO dynamics that determine the percentage of conversion you achieve from Sodium Chlorite to CLO2. Contact time with your acid or 'activator' and pH of the working solution your acid is creating. Those two dynamics will determine how much Chlorine Dioxide you actually generate. If you do not allow enough contact time with your 'activator' and the pH of the solution is not low enough you will get little to no activation generating no biocidal activity in your water. If you do not have biocidal activity you are not truly 'disinfecting' your water supply as per the label statement.

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. Mixing the chlorite solution and acid into a 'T' station before entering the water system has shown to work in some cases at generating CLO2 but is very inconsistent and takes a tremendous amount of acid to generate some or if any CLO2. The times you are able to generate CLO2 your total working solution is generally higher than what label usage rates allow. Remember these are EPA registered products and running them at label usage rates is very important to follow.

When using 5% stabilized CLO2 products like Pro Oxine after you achieve proper activation you will convert about 25% to 30% of that solution to CLO2. 70 to 75% of that solution will remain chlorite and be a part of your TOTAL working solution. The remaining sodium chlorite is important and will play a critical role in how well your product works over time. Only converting 25% of your overall solution to CLO2 is NOT a bad thing. The TOTAL working solution only tells you how much 'potential' active solution you could have. Your TOTAL solution in truly only telling you how many ppm's of sodium chlorite you have in the water. When you see the label on these products that tell you to run up to 5 ppm of total solution that is telling you nothing in terms of FREE CLO2 (activated product) and is referring to total sodium chlorite solutions. Most labels allow up to 5 ppm of total working solution and out of that working solution you want to generate around 1 ppm of FREE CLO2. Being able to measure some FREE CLO2 in your water is the most important part of utilizing CLO2 technology properly.

It is also important to note there is a difference in 'tech' grade chlorite products compared to in house generated chlorite solutions like Pro Oxine. Bio-Cide who is the manufacturer of Pro Oxine is able to manufacture formulations that are of very high purity through an in house patented process. This expertise in manufacturing also makes BCI the only chlorine dioxide producer whose products are FDA approved for human pharmaceutical use. Simply put 'tech' grade chlorites use different buffers and stabilizers to generate their chlorite solution making it more difficult to properly activate and generally needing a more aggressive acid and more total acid to achieve activation. Pro Oxine's product is buffered to an 8 to 8.5 pH solution while most tech grade products are buffered to an 11 to 12 pH solution, therefore the higher pKa acids perform poorly with tech grade chlorites. That is why you generally need more chlorite and more acid to generate FREE CLO2 with tech grade chlorites. Remember the two dynamics: Contact time and pH of your working solution. You want your working solution to generally be around 2 to 2.5 pH for it to be effective at generating FREE CLO2. One can simply look at the products labels to see the difference. With tech grade chlorites it calls for at least 15 minutes of contact with your acid or 'activator' before being administered into the water system. With Pro Oxine it calls for 10 minutes of contact time before being administered into the water system. This means it was able to generate the FREE component of the solution (actual CLO2) quicker. Pro Oxine was also able to get a FREE component at a lower TOTAL solution. Pro Oxines label shows it was effective at 3 ppm while tech grade chlorites show they were effective up to 5 ppm TOTAL solution to generate any biocidal or FREE activity. Remember you need the FREE component to generate any disinfecting properties in your water system. If you have 5 ppm TOTAL solution with no FREE activity you are essentially just running chlorite solution and not CLO2.

PROPER ACTIVATION IS THE KEY:

On farm activation as mentioned earlier has seemed to be the biggest hurdle in using CLO2 properly and effectively. To achieve enough 'dwell' time and pH in your solution you can manually mix the two products together but this creates a very unfriendly environment for the users due to the CLO2 gas that is created when activating the product. Bio-Cide International has come up with a very user friendly way of properly activating the solution

continued on page 30

Chlorine Dioxide, *continued from page 29*

before entering the water system that does not require manual mixing. Bio-Cide's AANE system which stands for Automatic Activation Non Electric is a government patented system to delivery product without ever having to mix products but allows for proper contact time and pH in your working solution to generate FREE CLO2 in your water system. The system is very easy to set up and can be used with any pump system you already have on your farm including a 1:128 medicator. We generally recommend using a Stenner pump system with a Flow Meter pulsing to the pump. Having the pump run off the flow meter allows for consistent amounts of product being injected into the water system and using a Stenner pump allows you to adjust the amount of product being injected into the water system. Each farm has different water so that will determine the amount of total solution required to achieve free CLO2 in your water system. We have been able to get consistent FREE CLO2 readings of up to 1 to 1.25 ppm FREE CLO2 while only having 3 to 4 ppm TOTAL solution. This system allows for very little acid being used to generate CLO2 and requires fewer product to be used to achieve desired results. Below is a picture of an AANE system set up on a farm with a Stenner pump and flow meter.

When testing for ppm levels you can use 3 different things. Test strips: Remember most test strips will only tell you what your TOTAL solution is in the water. Test strips are not good to test for FREE CLO2. They are essentially testing the Sodium Chlorite solution in your water. Reagent Test Kit: Test kits can test for both TOTAL and FREE but are generally not very accurate for testing the levels of FREE we are looking for on the farm. Spectrophotometer: These are the best for testing FREE CLO2 levels in your water. They can accurately test levels of FREE from .05 to 5 ppm. I recommend at least 1 ppm FREE and 3 to 4 TOTAL. If you are using a non EPA registered product without poultry drinking water usage claims or using the product in human drinking water you can only have .8 ppm FREE in your water. This is allowed under the 'safe drinking water act' that any CLO2 product can be used for human drinking water systems at .8 ppm FREE or less. Do not mistake this for potable water administration since these two are different usages.

THE BEST THING ABOUT CLO2 FOR POULTRY GROWERS:

One of the biggest reason I like CLO2 technology over other products is because of CLO2's ability to be a 'selective' oxidizer when working in your water system. As I mentioned earlier CLO2 has 2.5 times the oxidation capacity compared to Chlorine or stabilized Hydrogen Peroxide. The reason CLO2 has 2.5 times the capacity is because CLO2 is a 'selective' oxidizer generally limiting their oxidative capacity to pathogenic organisms which allows it to be useful at much lower ppm's or dilutions in your water system. Hydrogen Peroxide will oxidize a wide spectrum of substances in your water line which will not always be beneficial. Because Hydrogen Peroxide oxidizes a wide spectrum of substances in water it is generally not recommended to run any other product if you are using Hydrogen Peroxide as your continuous sanitizer. If you want to run Vitamin D for example while using Hydrogen Peroxide the peroxide will most likely oxidize out the active ingredients in the Vitamin D before getting to the bird rendering the product useless. The same is true for a lot of other products. That is why you most likely see reactions and plugged lines or nipple drinkers if you run Hydrogen Peroxide with other products. The peroxide will oxidize those products creating an unfavorable environment in your water system and plug drinking lines. So if you want to run those supportive care products, which most growers like to do from time to time, you need to turn off your water sanitation to run those products. This will then compromise your water system by allowing biofilm and other bacteria to grow and thrive in your lines which will then likely compromise bird health down the road. It has been documented that leaving your water sanitation off for 12 to 24 hours can create an environment for biofilm and bacteria to thrive and grow in your water system. This is also true for Chlorine / Acid, one or both needs to be turned off to run other supportive care products or water soluble antibiotics which negatively affect your overall water sanitation program. I think it has been well documented that a consistent water sanitation program is one of the best things a poultry grower can do to achieve better overall performance. Using stabilized Hydrogen Peroxide or Chlorine doesn't allow you to achieve that consistent program.

When utilizing the CLO2 technology you never have to turn off your system to run other supportive care products or water

soluble antibiotics. Since CLO2 is a 'selective' oxidizer it doesn't seem to negatively affect these other products and the other products don't negatively affect the FREE or TOTAL solution of the CLO2. I have documented TOTAL and FREE solutions in grower's water lines while they are running other supportive care products with CLO2. I have not found one product yet that lowers the FREE or TOTAL solution ppm's to a point that would determine the product to not be properly sanitizing the water system. The ONLY time you need to turn off your CLO2 system is when you want to vaccinate or run a probiotic. It is still necessary to turn off your system when using a live organism like a vaccine through your water system. However, with the advancements in vaccine stabilizer technology it should allow you to have your CLO2 system off for no more than 12 hours to run these types of products. This to me is a HUGE advantage of CLO2 over other water sanitizers and something that gives the growers more freedom without compromising their water system. When using other supportive care products never mix them in the same solution or bucket with your chlorite and acid solutions. Always run the products through a separate pump or medicator.

The fact that you can consistently run your CLO2 system while utilizing other supportive care products is one of the best things that has happened to a poultry grower in a long time. One of the biggest challenges for growers is to keep their water sanitation program consistent and keep it running from start to finish. The AANE system allows for growers to set up a water sanitation system that utilizes the CLO2 technology properly and keeps it simple for them to use on their farm from START to FINISH which is the key to any water sanitation program. As I mentioned at length in this article there is a lot to understand about CLO2 and how to properly use those types of products. We are all still learning and as time goes I am sure more will change with these types of products. It is kind of like Apple's technology, just wait 6 months and something new or different is on the market. I know reading this article may have probably made things more confusing but there are people that can help. Contact your local BVS representative and they can help sort through the difficulties of understanding CLO2 and how to best utilize its technology. As I have worked with this technology and have seen first-hand what it can do for growers overall performance including helping with respiratory diseases and improving their overall water sanitation program, there is no doubt that CLO2 is the best option for any poultry grower. As time goes I know we will continue to find ways to better utilize this technology on the farm.

Pictured below:
*Example of the AANE system set up on a farm using a Stenner pump. Note: Only one Stenner pump is necessary and being used with this system. They had two set up because the farm was using Chlorine and an acid before Pro Oxine.

The AANE system has a 15 gallon tank that acts as the holding tank allowing for proper activation before entering the water system. The AANE set up has two 'floats' in the tank that allows you to determine how much solution you want mixed up at one time. Once the solution gets to a low enough point, the system automatically kicks on mixing fresh water through the hose attachment, Pro Oxine and LpH 100 or the acid. Once it mixes enough product, which is determined during set up, it will stop and that solution will sit and 'activate' before entering the water system. The Stenner pump tube put down into the 15 gallon tank and based on settings and water flow will inject the activated solution into your water line. Once the solution is mixed it can work off that solution for 3 or 4 days depending on water consumption and usage on that farm. Most growers will set this up at a point that will treat the entire farm or complex so only one system is necessary. Once the system is set you never have to mix or touch the system again. You only have to replace the empty jugs when necessary.

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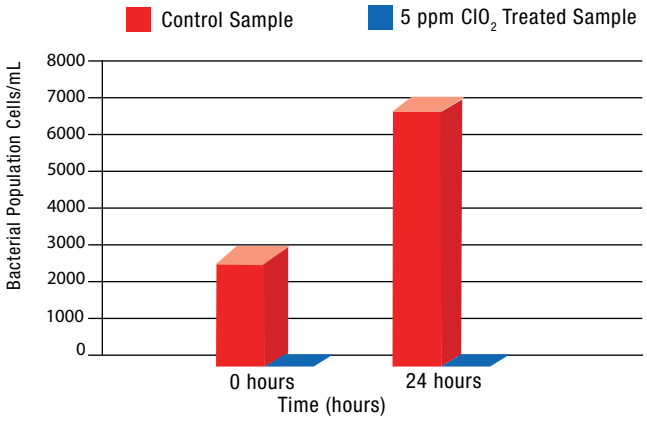
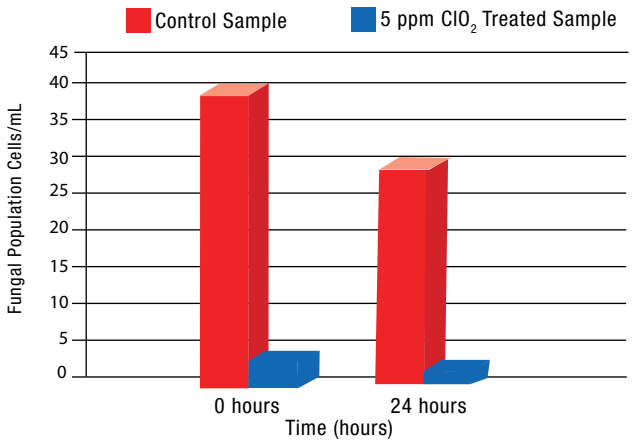
0 Hour	3000	30
24 Hours	7000	2



CONTROL EFFECT OF 5 ppm ClO_2 AGAINST BIOFILM FUNGI

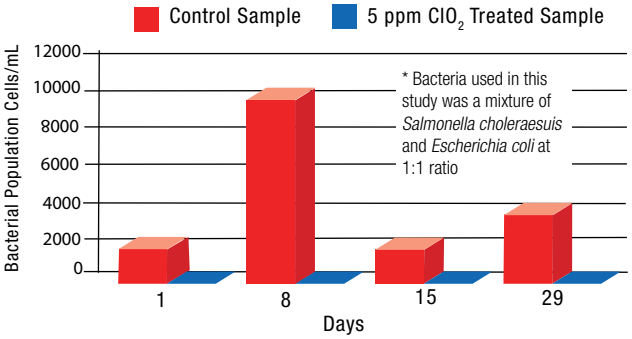
On Fungi	Control Sample	5 ppm ClO_2 Treated Sample
0 Hour	40	4
24 Hours	30	2



Efficacy of ProOxine® against Salmonella and E-coli

REDUCTION OF BACTERIAL POPULATION* IN WATER AFTER CONTACT WITH 5 ppm CHLORINE DIOXIDE

On Bacteria	Control Sample	5 ppm ClO_2 Treated Sample
1 Day	2000	20
8 Days	10000	2
15 Days	2000	2
29 Days	4000	2



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The Ag forum
by JONES-HAMILTON CO.
The Science of Litter Management®
FALL 2013

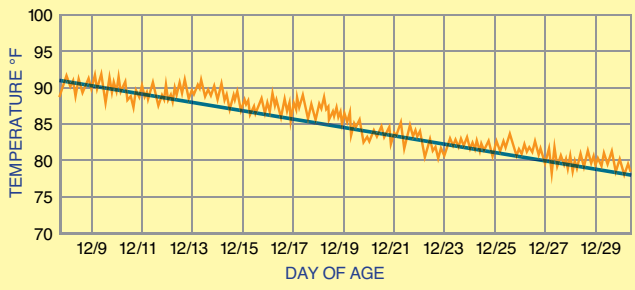
Status of Animal Welfare Initiatives in the Commercial Poultry Industry

Contrary to consumer perception, broiler's welfare status is better than at any time in the history of modern poultry production. The advent of new technology such as solid sidewall, tunnel ventilation and automated housing provides birds with comfortable living conditions. This new technology allows for unprecedented temperature consistency, humidity control and air quality for the betterment of bird welfare.

Temperature Control

The ability to maintain a consistent temperature is likely the most important welfare advantage of modern poultry housing. Current house design and ventilation strategies provide the ideal environment for birds with less than a 5°F temperature variation in a 24-hour period; therefore birds are able to stay in their thermo-neutral zone at all times (Figure 1). This is especially important during the first week of life when birds are not yet thermo-competent and are unable to self-sustain core body temperature. By providing the ideal ambient and floor temperature at all times during the production process, the welfare of birds is greatly enhanced.

Contrast this to the curtain sided houses of the past, where temperature swings of 20˚F were common as fans cycled on and off and birds had difficulty maintaining core body temperature. A significant amount of the increasing efficiency of current production can be attributed to the bird's stasis. Energy is not needlessly expended in achieving ideal body temperatures.



Properly Ventilated House: Only Achieved with Adjustable Inlets
Less than 2˚C temperature & 5% RH variation in 24 hours

Figure 1. Temperature variation through adjustable inlets

Brooding Equipment

Improvements in brooding equipment have also greatly improved bird welfare. Baby chicks maintain body temperature through their feet. Therefore, litter temperature is much more important during the first week than air temperature. The use of radiant brooders has given producers the ability to properly cure litter during the pre-heating process. This assures a uniform floor temperature and allows heat to penetrate deep into the litter core. Another benefit is the ammonia purging, from pre-heating, occurring while the house is empty. In the past, when forced air heaters and pancake brooders were the only available options, a 20-30˚F temperature differential across the floor of the house was not uncommon, meaning that birds had to huddle in feed pans and clump in groups for extended periods of time. This resulted in ascites, higher chick mortality due to starve-outs and dehydration, and slow growth due to low 7-day weights. Today, such conditions are primarily a thing of the past as modern brooding practices provide birds with an ideal environment to thrive, encouraging both bird activity and feed intake from the very beginning.

The ability to sustain appropriate temperatures within the thermo-neutral zone is also evident during the last few weeks of a flock. The improvements in evaporative cooling and the capacity to achieve increased wind speeds, through better tunnel ventilation, allows for the cooling necessary to keep larger birds comfortable at the end of the flock. Cooler temperatures prevent weight loss and undue bird stress resulting from rises in core body temperature. Before the advances of modern solid wall housing, producers were unable to efficiently cool birds in hot weather and heat-related deaths were common. This is just yet another example of how modern day practices and house design enhance animal welfare rather than detract from it.

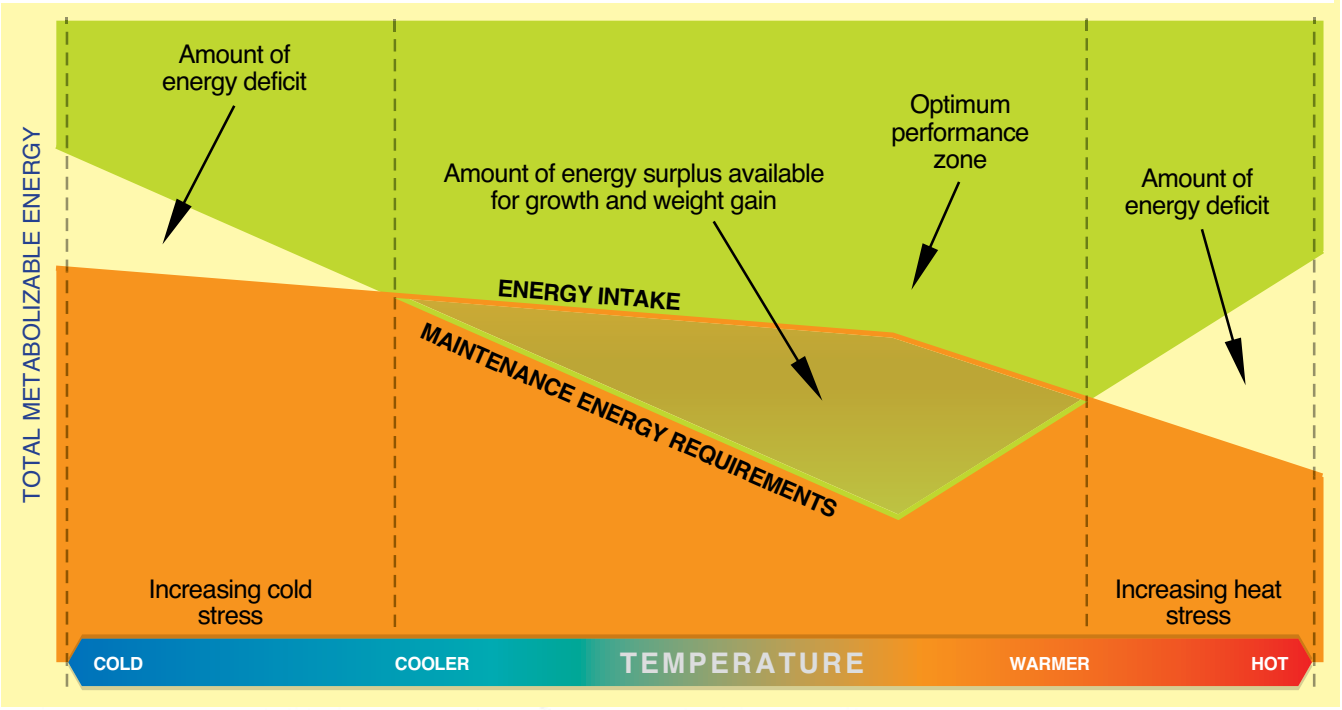


Figure 2. Thermal comfort zone

Humidity Control

Humidity control is also important in achieving better bird welfare. Previously, when birds were raised in curtain sided houses without inlets, humidity control was nearly impossible. Ventilation systems were unable to generate sufficient static pressure to properly control the direction and movement of air into the house. Cold air would enter the house via a curtain crack and promptly fall to the floor, dumping moisture along the way. Subsequently, relative humidity would get quite high at the air-litter interface, causing the litter to get sticky and cake over. This tackiness induced footpad lesions as litter stuck on the bird's feet.

Today, the use of inlet machines and solid sidewall housing allows producers to control airflow direction within a house so that cold air shoots across the ceiling upon entry thereby warming up and drying out before it contacts the litter

(Figure 3). The litter stays dry throughout the entire house, minimizing caking and preventing paw lesions. This directional airflow is also the reason house temperatures can be contained within such a narrow range. Paw lesions are frequently used as an indicator of overcrowding or other animal welfare issues when in reality, paw lesions are only indicative of poor humidity control during brooding due to either inappropriate ventilation or drinker system management.

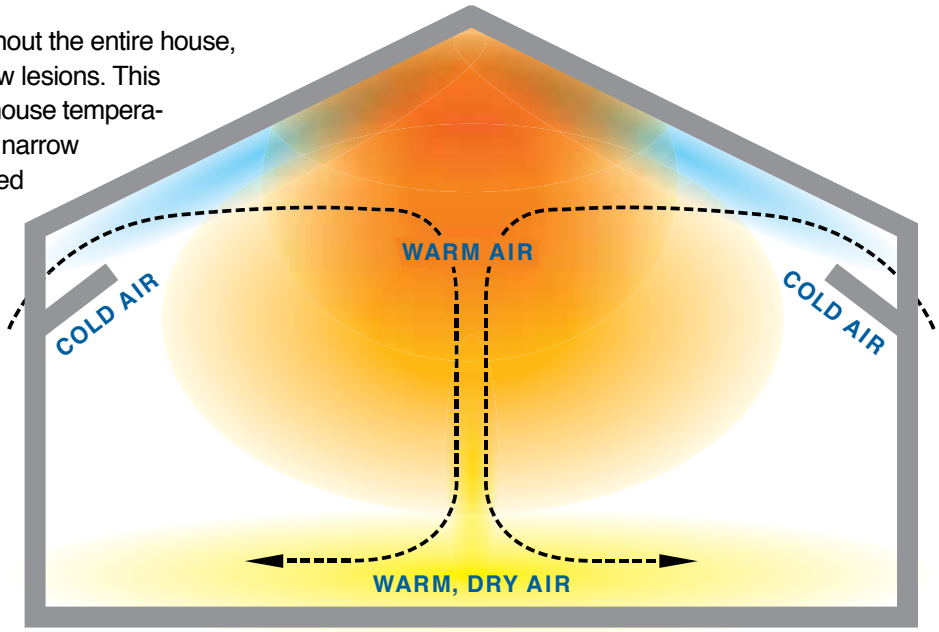


Figure 3.
Controlling air flow through inlets

Litter Amendments

The use of litter amendments in modern poultry production has also dramatically improved the air quality within poultry houses. Proper floor heating through the use of radiant brooders and the ability to control the direction and velocity of air flow into the house have allowed producers to minimize cake formation and ammonia production. While air quality is improving, higher bird weights and subsequent manure production have increased, creating challenges due to increased ammonia. Ammonia levels above 25 PPM are detrimental to bird health, welfare and productivity. Integrators and producers have embraced the use of litter amendments like sodium bisulfate, PLT® Litter Acidifier, to bind the ammonia within a poultry house and maintain appropriate ammonia levels. Initially, products like PLT® were only used in the brood chamber to control ammonia. Now it is not uncommon to see integrators and producers treating the whole house at placement and then following up with a second mid-flock application sometime between 14 and 21 days in order to maintain the safe ammonia levels for an extended period of time. This second mid-flock application of PLT® not only enhances animal welfare by maintaining air quality for a longer period of time, it also improves bird productivity by increasing weights and lowering feed conversions.

Bird Density

Bird density within houses is a particular issue that draws significant criticism from people outside the industry. Bird density is especially scrutinized in European poultry production; however, the real issue is not bird density as much as it is about moisture control. The high quantity of birds within a house, the more humidity pressure is placed on the housing environment. So the real issue isn't bird density, but the need for greater attention to moisture control as bird density increases. One prominent example occurs in brooding. For a small Cornish Hen bird program, there may be 30,000 chicks in a 10,000 sq ft brood chamber while in a roaster program, there are 20,000 birds in a 10,000 sq ft brood chamber. In the house with the larger number of birds, relative humidity will build more quickly and require an increase in ventilation several days sooner. The greater the bird density within a house, the higher the risk of error in controlling relative humidity during minimum ventilation. As long as the producer is monitoring relative humidity and ventilating appropriately, higher density does not negatively affect bird welfare. In American production houses, the nearly universal presence of dirt pads and built-up litter make a house far more forgiving in terms of moisture control. These two features are often viewed as sacrilege to those on the outside but they provide great advantage to raising birds at a higher density without any concurrent welfare issues. Houses with concrete floors and new litter make it difficult to control relative humidity and moisture, causing litter conditions to deteriorate quickly. So it is not the density that is detrimental to bird welfare, it is the lack of moisture control to maintain litter conditions that is truly the problem. If moisture and relative humidity are maintained, the higher density is of no concern to the welfare of the bird.

Conventional House vs Free Range

Retail and activist driven animal welfare programs are increasingly dictating bird management in the United States. In some ways, they have caused the industry to turn a more critical eye towards management practices and have helped refine management programs; however, in other ways they have resulted in reality-distorting perceptions to become prevalent. For example, the increasing popularity of free-range poultry and the ensuing requirement for outdoor access in order to participate in the organic market. While this may sound enticing and beneficial, in reality it often decreases the welfare of poultry. Increasing the amount of openings in the house for outdoor access has the unintended consequence of making houses very difficult to ventilate properly by lowering the static pressure or breaking tunnel ventilation. This reduces bird welfare by causing temperature fluctuations and an increase in relative humidity because directional airflow and wind speed can no longer be maintained as shown in Figure 4. The loss of ventilation integrity precipitates greater heat stress on the bird, potentially resulting in death.

Injury rates often increase as well due to outdoors access. Inside a conventional house, chickens are safe from the dangers of the outside world. In the free-range pens, however, there is the chance of predation from birds of prey, foxes, and other mammals. The use of enrichments such as hay bales and wooden boxes that are required by some of the most stringent animal welfare programs often result in a high rate of leg injury and bone breakage. Certain enrichments make it easier for small birds to be bullied and preyed upon by larger chickens. So again, the perception of improving animal welfare does not match reality.

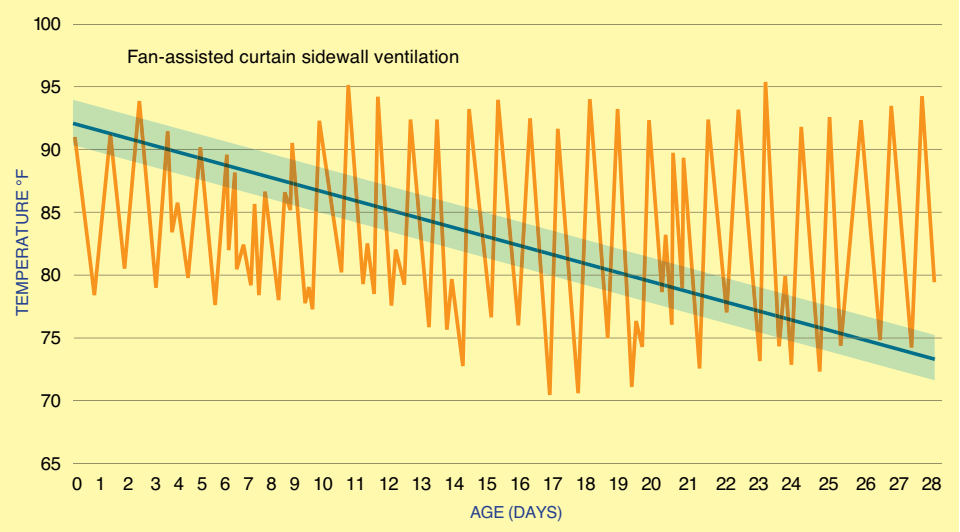


Figure 4. Temperature fluctuations

Antibiotic Use

Additionally, a number of the more aggressive animal welfare programs restrict the use of feed delivered antibiotics and/or coccidiostats in a misguided attempt to improve the welfare and health of the birds. In reality, gut integrity is often compromised, mortality increases and there is a higher incidence of pathogens within flocks. Birds raised on gut-modifying antibiotics have a much lower incidence of disease and processing condemnations because of the maintenance of gut integrity. Lower disease incidence and gut preservation are important for the welfare and health of the bird.

Conclusion

Modern technological advances in housing, litter amendments, and feed formulations have transformed the poultry industry in a manner conducive to improved bird welfare. The ability to strictly control the bird's environment allows for exponentially better housing conditions, enhancing animal welfare in a fashion unimaginable to most consumers and retail-level animal welfare activists.

GentaPoult®
(Gentamicin Sulfate Injection)

Sterile Injection Veterinary
For Day-Old Chickens and 1 to 3 Day-Old Turkeys

Gentamicin Sulfate Poultry Injection is recommended for the prevention of early mortality in day-old chickens associated with *Escherichia coli*, *Salmonella typhimurium* and *Pseudomonas aeruginosa* susceptible to gentamicin sulfate, and as an aid in the prevention of early mortality of 1 to 3 day-old turkeys associated with *Arizona paracolon* infections susceptible to gentamicin sulfate.

Features and Benefits

- Approved for use in day-old chickens and 1 to 3 day-old turkeys.
- Does not require refrigeration.
- Approved for subcutaneous use only.
- Each 100 mL vial treats 50,000 chickens or 10,000 turkey poults.
- GentaPoult® approved formulation and indications are equivalent to Garasol®-100.

Dosage and Administration

Each day-old chicken should be aseptically injected subcutaneously in the neck with GentaPoult® diluted with sterile, physiologic saline solution to provide 0.2 mg gentamicin in a 0.2 mL dose.

Each 1 to 3 day-old turkey should be aseptically injected subcutaneously in the neck with GentaPoult® diluted with sterile, physiologic saline solution to provide 1.0 mg gentamicin in a 0.2 mL dose.

RESIDUE WARNING: For use in day-old chickens and 1 to 3 day-old turkeys only. Chickens injected with GentaPoult® must not be slaughtered for food for at least five (5) weeks following treatment. Turkeys injected with GentaPoult® must not be slaughtered for food for at least nine (9) weeks following treatment.

FOR ANIMAL USE ONLY
NOT FOR HUMAN USE
KEEP OUT OF REACH OF CHILDREN

Packaging

100 mL vial, 12 vials per case

Store at controlled room temperature 20°-25°C (68°-77°F).

Please refer to label for complete directions and dosage information. For further technical information, please call Bayer Veterinary Technical Services at 1-800-422-9874. For customer service, please call 1-888-229-8745.

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Flyzine is the newest feed-through cyromazine product on the market. Distributed by NOVIL, Inc. of Georgia, Flyzine is an effective suppressor of flies in poultry operations. This product should be mixed in the feed for four to five consecutive weeks in order to control house fly development and affect fly reproduction. It can be used in all types of poultry operations and, when used with beneficial insects, can often give full control of flies throughout the rest of the flock. This is especially important in breeder and high rise egg layer houses where birds are kept for a year or more and manure management is critical.

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- ✓ Red & Gray Plastic Feed Lids
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