The State of the U.S. Egg Industry – Safety, Nutrition and Marketing Implications for SA Producers

By Simon M. Shave, BVS, FRCVS, PhD, MBL, dip ACPV.

The U.S. Egg Industry is the oldest and most efficient in the world. Although not the largest, with China leading in numbers of hens, the U.S. has pioneered advances in breeding, nutrition, disease control and technology. Various factors which influence productivity and profitability in the U.S. are relevant to the needs of expanding egg industries. The current status, experiences and challenges faced by the U.S. Egg Production Industry are reviewed in relation to opportunities in producing eggs in the RSA.

The U.S. Egg Industry has undergone increasing intensification through growth and acquisition by the more aggressive and successful egg producing companies. Currently 31% of total production is controlled by the top-five entities which range in size from 12 million to approximately 30 million hens. Cal-Maine Foods Inc, www.calmainefoods.com is the only publicly traded company among the top-100 producers which are owned by families or are private corporations. Moark LLC is affiliated to Land O’Lakes a large dairy-based cooperative.

"Cost pressures have driven intensification with erection of company-owned, in-line units for shell production ranging in size from 1.0 to 1.5 million hens"

Historically the U.S. egg industry has been characterized by cyclic periods of over-production resulting in low prices, followed by either stagnation or reduction in output which effectively raises prices by modifying supply relative to demand. With increasing maturity of the industry, the amplitude of the cyclic fluctuations has been less evident since the mid-1990s and a situation of production stability has developed. Unfortunately seasonal fluctuation in prices persists associated with a decline in demand during summer months and immediately following the Easter and Christmas peaks in consumption.

Organization of the U.S. egg production industry

Recent statistics for production, per capita consumption and distribution of hens by state and producer are shown in Table 1. Generally the industry achieves acceptable levels of production with the most efficient producers approaching the genetic potential of the
Wow! What a beautiful and spectacular fall that we’ve had this year! It’s my favorite time of year. The colors were great, the weather was unbelievably nice. Perfect weather for those of us that hunt and enjoy fall outdoor activities.

I’ve had the opportunity to do more pheasant hunting this year than most years in the past, which has been great. It’s always a great way to spend time with friends.

It’s been a great year to be a Green Bay Packer fan! As many of you know, I’m a very loyal Packer fan and University of Wisconsin fan! It’s great to have bragging rights (10-0), but I live in a household that has very loyal and avid Viking fans, so I have to be careful if I want to have a place to lay my head at night.

The fall has been very nice, but things will change. Don’t get caught unprepared as we go into winter. Are you on track with your ammonia control program as cold weather approaches and buildings are closed up tighter?

If you have questions regarding an ammonia control program, please contact your BVS sales person in your area for information and help with a program that will work for you.

With ammonia control, also comes ammonia monitoring. We have a full line of ammonia monitoring devices from RAE Systems for you to use as a tool to see how you’re doing with your ammonia control program.

Also, take a look at what you need to do for rodent control. BVS has a rodenticide booking program that you can book product in till December 15th at special pricing. Rodent control is a very important part of your food safety program.

I hope that everyone has a great Christmas and new year with friends and family!

Till next year and God bless!

Randy
major white and brown-feathered strains as shown in Table 2.

<table>
<thead>
<tr>
<th>Year</th>
<th>Production</th>
<th>Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>6,522</td>
<td>258</td>
</tr>
<tr>
<td>2007</td>
<td>6,435</td>
<td>250</td>
</tr>
<tr>
<td>2008</td>
<td>6,403</td>
<td>249</td>
</tr>
<tr>
<td>2009</td>
<td>6,475</td>
<td>248</td>
</tr>
<tr>
<td>2010</td>
<td>6,550</td>
<td>247</td>
</tr>
<tr>
<td>2011 (estimate)</td>
<td>6,602</td>
<td>247</td>
</tr>
<tr>
<td>2011 (projection)</td>
<td>6,540</td>
<td>244</td>
</tr>
</tbody>
</table>

National flock, June 2011= 280 million hens in production (in flocks over 30,000 hens)

Table 3: Critical performance parameters for hybrid leghorn strains

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Average Flock Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pullet mortality to 17 weeks</td>
<td>5%</td>
</tr>
<tr>
<td>Feed consumed</td>
<td>5.2kg</td>
</tr>
<tr>
<td>Peak HD Production</td>
<td>94%</td>
</tr>
<tr>
<td>Cumulative eggs HH to 80 weeks</td>
<td>340</td>
</tr>
<tr>
<td>Mortality to 80 weeks</td>
<td>7%</td>
</tr>
<tr>
<td>Total egg mass HH to 80 weeks</td>
<td>20.2kg</td>
</tr>
<tr>
<td>Daily consumption 18 to 80 weeks</td>
<td>95g/hen</td>
</tr>
<tr>
<td>Feed conversion 18 to 80 weeks</td>
<td>1.9</td>
</tr>
</tbody>
</table>

Production cost for eggs ex farm or into packing plants is shown in Table 3. The June prices for eggs through the distribution chain are shown in Table 4.

The U.S. Egg Industry comprises 70% shell egg and 30% egg products mainly from in-line breaking complexes. Approximately 5% of the industry comprises other than conventional caged hens on floor systems including barns, aviaries and organic production. Egg production is concentrated in six states which collectively represent almost 60% of national production. The reason for the concentration relates to the lower cost of ingredients in the mid-west which led to the development of large complexes to produce table eggs and products. Distribution of eggs is facilitated by the interstate highway system.

Cost pressures have driven intensification with erection of company-owned, in-line units for shell production ranging in size from 1.0 to 1.5 million hens. Each complex comprises a feed mill, in-line packing plant and various configurations of houses with units on average holding 100,000 hens. This situation is common for older high-rise complexes constructed during the 1970s through the 1980s in which manure is stored for up to 12 months in a pit under stair-step cages. More recent complexes comprise on-belt manure drying, compact cages with individual house capacities of up to 300,000 hens. Some in-line complexes dedicated to breaking have up to 4 million hens.

There are increasingly fewer independently-owned cage operations supplying white-shelled eggs to packing plants off-line. The majority of brown-shelled eggs produced from non-confined flocks are derived from independent contractors with eggs packed off-line. Recently complexes have been developed by companies comprising houses fitted with aviaries supplying both cage-free and certified organic eggs for special and enriched markets.

Approximately 20% of U.S. hens are molted for a second cycle. The extent of this practice varies according to region and is influenced by the price of feed, egg revenue and logistic factors. Generally white-feathered spent hens have no value and in many cases producers have to pay for hens to be depleted and transported to landfills or to rendering plants.

The industry functions with a price discovery system operated by Urner-Barry which posts daily quotations for grade and region. Additional transparency is provided by regular USDA statistics which are interpreted and analyzed by both producers and the buyers representing the large national supermarket chains. Some quick service restaurants contract with their selected and qualified producers to supply predetermined quantities and grades according to a cost-plus-margin basis using dedicated farms and plants.

Shell eggs are more commonly transported by producers to regional distribution centers operated by the large chains or alternatively local direct store distribution is required.

Table 4: U.S. ex farm production cost in July 2011

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed</td>
<td>4.05</td>
</tr>
<tr>
<td>Pullet depreciation</td>
<td>0.80</td>
</tr>
<tr>
<td>Labor</td>
<td>0.31</td>
</tr>
<tr>
<td>Housing</td>
<td>0.47</td>
</tr>
<tr>
<td>Miscellaneous costs and overhead</td>
<td>0.74</td>
</tr>
<tr>
<td>Total cost ex farm</td>
<td>6.37</td>
</tr>
<tr>
<td>Feed cost ex farm</td>
<td>2,642/m. ton</td>
</tr>
</tbody>
</table>

Issues facing the U.S. egg industry

Profitability is the most important factor influencing the long term survival of individual producers and the relative growth and stability of the industry. Traditionally over-production has been the major determinant of depressed margins. During the past three years, diversion of corn to ethanol has resulted in progressive increases in feed cost and this factor has influenced the supply side of the equation.

continued on page 5
Certi/ f i ed organic Yucca schidigera extract feed ingredient

The most powerful ammonia and odor control

BIOSUPREME®, to include in poultry feed

BIOSUPREME L®, to include in animal’s drinking water

Naturally enhance animal production and health…
• Reduces ammonia and other noxious gases
• Improves air quality in poultry production units
• Increases productivity parameter

BIOSUPREME L®

Baja Agro International S.A. de C.V. (AGROIN) is a Mexican corporation that has, since 1983, been dedicated to the cultivation, using natural resources, of Yucca schidigera, as well as the industrialization and commercialization of products made with its extract that are used as ingredients in feed and food for poultry, swine, cattle, pets, shrimp, fish as well as in agriculture as a natural soil conditioner and plant growth promoter.

AGROIN is a company with commercial presence in more than forty countries and in order to attend to the needs of our customers as well as satisfying our disposition to develop innocuous, safe, quality products we have implemented the Safety Management System (SGI), which, after having completed the formal auditing processes to be certified by SGS, the team of auditors have decided to recommend our system to obtain the International Certification ISO 22000:2005 and the HACCP Certification with UKAS accreditation.

As stated above, this certification will inspire confidence in our clients in the quality and safety of our ingredients, our processing, and finished products as this system allows us to have a better control over the raw materials, ingredients and materials that come in contact with the products as well as the entire manufacture process and finished product and not only comply with the highest quality standards but that the products are innocuous, safe for use and consumption.

PRESS RELEASE

Baja Agro International’s (AGROIN) Food Safety Management System has been certified by SGS under the ISO 22000:2005 and HACCP International standards.

Distributed in USA by: Best Veterinary Solutions, Inc, Willmar, MN 56201, TOLL FREE 1.800.533.1893

Top Ten Broiler Company

<table>
<thead>
<tr>
<th>Bio Supreme G</th>
<th>Control + Cocci Vac or Advent</th>
<th>Control + Bio Supreme G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. Weight (lbs)</td>
<td>5.55</td>
<td>5.60</td>
</tr>
<tr>
<td>F/G Adj. to 5.0 lbs.</td>
<td>1.835</td>
<td>1.820</td>
</tr>
<tr>
<td>Cal. Conv. Adj. 5 lbs.</td>
<td>2.6931</td>
<td>2.6737</td>
</tr>
<tr>
<td>Livability, %</td>
<td>96.42</td>
<td>96.51</td>
</tr>
<tr>
<td>Condemned, %</td>
<td>1.09</td>
<td>.60</td>
</tr>
<tr>
<td>Avg. Age of Birds</td>
<td>46.68</td>
<td>46.74</td>
</tr>
</tbody>
</table>

SFASU Poultry Research

Nacogdoches, Texas

September 2003

<table>
<thead>
<tr>
<th>Cocci Vac</th>
<th>Cocci Vaccine + Bio Supreme G</th>
<th>Cocci Vaccine + BMD</th>
<th>Cocci Vaccine + Staphac</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body Weight [lbs]</td>
<td>1.506</td>
<td>1.565</td>
<td>1.570</td>
</tr>
<tr>
<td>Feed:Gain Ratio</td>
<td>1.526</td>
<td>1.463</td>
<td>1.515</td>
</tr>
<tr>
<td>Days of Age</td>
<td>21</td>
<td>21</td>
<td>21</td>
</tr>
</tbody>
</table>

Southern Poultry Research

Athens, Georgia

October – December 2006

Cocci Vac – Day 1
Bio Supreme G & 3-Nitro fed 1 to 28 days

<table>
<thead>
<tr>
<th>Cocci Vac</th>
<th>Cocci Vaccine + Bio Supreme G</th>
<th>Cocci Vaccine + 3-Nitro</th>
</tr>
</thead>
<tbody>
<tr>
<td>Live Weight (lbs)</td>
<td>4.129</td>
<td>4.314</td>
</tr>
<tr>
<td>F/G Adj. for Mortality</td>
<td>1.885</td>
<td>1.835</td>
</tr>
<tr>
<td>Livability %</td>
<td>$4.85</td>
<td>90.0</td>
</tr>
<tr>
<td>Age of Birds</td>
<td>$42</td>
<td>42</td>
</tr>
<tr>
<td>Feed Cost / lb. of Meat</td>
<td>$0.1744</td>
<td>$0.1708</td>
</tr>
</tbody>
</table>
Since maize is linked to the price of crude oil, there does not appear to be any prospect for reduction in the price of this commodity over the next five years. Approximately 40% of the 2011-12 maize harvest, estimated at 335 million m. tons, will be diverted to ethanol despite the reduction in blender's subsidy and elimination of protective tariffs.

Welfare is the second most important issue currently facing the U.S. Egg Production Industry. During the past decade organizations such as the Humane Society of the United States have campaigned vigorously against confined housing. The 2008 California Proposition #2 will effectively ban cages in the State by 2013. The Humane Society of the United States (HSUS) embarked on a program of introducing ballot initiatives in the 24 states with constitutions which effectively allow legislation to be enacted by voters. Faced with extreme pressure and devoid of financial resources to oppose the HSUS, the principal industry association, the United Egg Producers negotiated an agreement with the HSUS in July to phase out conventional cages and replace all confined housing with European-style enriched cages by 2029. Even if this program goes forward, the industry will have to spend from $7 billion to $10 billion to convert as cages are expensive and stocking density will change from 430 cm² to 903 cm²/hen.

Salmonella Enteritis infection, although controlled by voluntary and state programs, is now subject to the U.S. Food and Drug Administration Final Rule introduced in July 2010. The Final Rule to prevent Salmonella infection in eggs requires that all producers prepare and follow a Salmonella prevention program which incorporates biosecurity, rodent control and environmental monitoring for Salmonella Enteritis. In the event of detecting SE in drog swabs of manure, samples of eggs are assayed to determine whether the flock is transmitting the pathogen in eggs. If this is confirmed the options are in-shell pasteurization, depleltion of the flock, or diversion of eggs to breaking at a considerable loss given current production costs. The Final Rule also mandates refrigeration of eggs at 9C but does not address vaccination. The entire industry has in fact adopted preventive vaccination including administration of 2 to 3 live mutant Salmonella Typhimurium vaccines during early rearing followed by 1 or 2 inactivated oil emulsion vaccines usually administered in the form of a trivalent product with Newcastle disease and infectious bronchitis antigens. Fortunately it appears that the prevalence rate of SE is less than 5% of flocks in the U.S. industry. It is anticipated that with diligent application of control measures the infection can be practically eradicated in commercial flocks within five years. Unfortunately the occurrence of SE in one large operation in the mid-west resulted in an extensive recall in August 2010 resulting in negative publicity. The episode resulted in a precipitous decrease in price over 3 months and collectively the industry lost over $125 million until prices were restored by pre-Christmas demand.

Consumer acceptance is based on perceptions of value and quality. During the recent recessionary period there was a marked downward shift in protein purchases from beef to pork to chicken and to eggs. Many of the lower income segments of the U.S. population purchase large packs of up to five dozen eggs at reduced prices in club stores and supermarkets catering for their needs. Egg consumption per capita has remained fairly stagnant despite the promotional activities of the American Egg Board using funds for education research and promotion which are derived from a check-off program administered by the USDA. The perception that the cholesterol content of eggs is deleterious is gradually waning following publication of research papers which demonstrate that healthy consumers can eat an egg each day without materially raising blood lipid levels. The American Egg Board has also announced that large eggs now contain 175 mg cholesterol compared to the previously overstated erroneous level of 220 mg.

Messages for the Southern African industry
Unity among producers is critical for realistic communication with consumers and to effectively lobby for acceptable legislation at the provincial and national levels.

Product diversification is necessary to increase consumption. The U.S. industry has been negligent in their failure to introduce new products. In comparison the U.S. Broiler Industry has been successful with their programs of product development directed to convenience foods for consumers and quick service restaurants. Effectively the emergence of the breakfast market in fast-food outlets using both fresh eggs and derived products has bolstered demand and hence prices.

In the context of the U.S., exports are not significant and account to approximately 2% of total production.

Branding is an important factor in enhancing unit revenue. Eggland’s Best, a franchise cooperative operation, www.egglandsbest.com has a small but significant penetration of the total market but dominates specialty eggs. While shell egg consumption has declined at a slow and consistent rate, Eggland’s Best has posted double digit increases in sales, month over month for the past ten years. This is attributed to the perception of superior quality and taste and the image is supported by an aggressive national program using TV and print media.

All industries faced with opposition from vegans and activists opposed to intensive animal production must adopt a pro-active policy incorporating welfare programs based on scientific input from independent authorities.

Application of emerging science to the control of disease affecting flocks is critical to survival of individual producers. Suppression of foodborne infections of public health significance is essential to maintaining a suitable image and the confidence of consumers and regulators.

Cost reduction can be achieved through incorporating enzymes into feed to increase the nutritional value of ingredients allowing less expensive formulations. Nutritionists should critically evaluate nutritional specifications since providing excess energy or amino acids in relation to production levels and housing increases the cost of production. Many companies now apply economic feeding programs which shift the emphasis on formulation for least-cost per ton of feed to least-cost per dozen saleable eggs or kilogram of product.

Antibiotics are regarded by consumers and regulators as a potential public health issue. It is possible to rear flocks of pullets and to maintain hens without antibiotic administration. Antibiotic therapy is seldom cost effective and strict regulations should constrain administration of these products during the production cycle. Diseases can be effectively prevented by biosecurity and vaccination.

Production control either by consultation or agreement, (if this is legal), or by independent interpretation of production standards by the larger farmers is essential to maintain price stability. Elasticity results in significant downward movement in price with moderate increases in supply relative to consumer demand.

Active in aspects of US and international broiler and egg production with special emphasis on biosecurity, economics and food safety, Dr. Simon M. Shane is an Emeritus Professor of the Department of Epidemiology and Community Health, School of Veterinary Medicine, Louisiana State University. He currently holds appointments as an Adjunct Professor in the Department of Poultry Science, and the College of Veterinary Medicine North Carolina State University. He obtained his veterinary degree from the University of Pretoria in 1964, and holds a PhD in Poultry Nutrition from Cornell University, and a M.B.L. from UNISA. The Bulletin features a monthly column by Professor Shane covering various aspects of poultry and poultry related matters direct from the U.S.A.

The State of the U.S. Egg Industry, continued from page 3
**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

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**NEWHATCH-C2®**

TSP-V-053805  10,000 dose vials

Newcastle Vaccine  
(B1, Type, C2 Strain, Live Virus)

NEWHATCH-C2® is the patented, virtually nonreactive C2 strain of B1 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 B1 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

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**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 hemorrhagic 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 ensure protection of every vaccinated bird, flock after flock  
- Recommended administration at 6 weeks of age or older helps assure no maternal antibody interference

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**NEWCASTLE CLONED N-79**

TSP-V-066953  1000 dose units

Newcastle Disease Vaccine  
(B1 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 B1 Type, LaSota strain Newcastle disease virus. This virus has the ability to stimulate protection against a wide variety of Newcastle field strains while causing a milder reaction, in healthy chickens and turkeys, than other LaSota strain vaccines.

**Advantages:**  
- Clone-selected LaSota strain stimulates strong immunity against Newcastle disease, while producing only mild reactions  
- Product of choice for immunization of turkeys against Newcastle disease  
- May be used to revaccinate broilers in areas with strong Newcastle disease challenge
BVS is the exclusive distributor and marketer of Schering-Plough turkey vaccines in the U.S.

**PM-ONEVAX**<sup>®</sup>-<sup>C</sup>

**Pasteurella multocida Vaccine**  
(Avirulent Live Culture, Avian Isolate)

PM-ONEVAX<sup>®</sup>-<sup>C</sup> vaccine. The seed culture used to make this vaccine has 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 occurring field strains of *P. multocida*
- Easy wing-web administration in broiler breeders, layers and turkey breeders

**ART VAX**

**Bordetella avium Vaccine**  
(Avirulent Live Culture)

ART VAX<sup>®</sup> 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**<sup>®</sup>-<sup>C</sup>

**Pasteurella multocida Vaccine**  
(Avirulent Live Culture, Avian Isolate)

M-NINEVAX<sup>®</sup>-<sup>C</sup> 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
You've noticed the sunshine drifting south. Now you're trading daylight for dark as your days grow shorter and nights grow longer. Listen close and you'll soon hear the telltale sound of migrating geese, their honks filling the airways and ringing in a cooler season. It's a season that also brings vocal sounds from different airways, and if you're on the farm you won't have any trouble hearing it. Pigs coughing or thumping and poultry snicking and raling alerts you to a more threatening season—here it comes—flu season.

Cool nights, temperature swings and reduced ventilation conspire against you, setting the stage for respiratory troubles. Breathe easier though, there's a pair of products bringing pigs and poultry respiratory relief. Respiratory distress is a combination of airway inflammation and congestion caused by a multitude of infectious agents and irritants shown in the nearby table. Regardless of the infectious agent, the root causes of respiratory problems are airway inflammation and congestion. When you control inflammation and congestion, you’ve controlled the problem. In this case you’ve got two powerful problem stoppers… the top-performing anti-inflammatory Uni-Sol, and MucuSol, the market’s newest and strongest expectorant. When flu or other respiratory problems threaten to plug-up your production, Uni-Sol and MucuSol clear it out with both barrels.

### Tackle prostaglandins and inflammation

Injured airway tissues respond by releasing prostaglandins, responsible for the problems you see like fever, fluid accumulation, swelling and congestion. Prostaglandins also create problems you don’t immediately see. Prostaglandins suppress immunity; they depress white blood cell and antibody production. In addition to its traditional use as a potent anti-inflammatory, Uni-Sol at higher doses blocks harmful prostaglandins. This means Uni-Sol not only relieves redness, fever, edema and swelling, it also supports healing by opening the gate to allow more natural defensive white cells into the fight. The types of white cells that respond best to Uni-Sol are lymphocytes, the specialized ones that create memory, recognize pathogens and rally protective antibodies.

USDA-ARS researchers in Fayetteville, Arkansas successfully used Uni-Sol to increase resistance to respiratory disease. Scientists injected disease-causing E. coli bacteria into 5-week-old turkey poults’ air sacs to infect the bird’s airways. In their research, this respiratory infection reliably produces air sac lesions, spreads to injure and swell up other organs and results in high mortality. Half the poults in this research received a protective dose of Uni-Sol liquid concentrate (1.75 ounces per 1,000 lb bodyweight daily) diluted in their drinking water throughout trial. The other half served as unprotected controls.

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Knock the Snot Out of Respiratory Disease

Respiratory diseases are among the major group of diseases affecting poultry today. Consequently, losses incurred by these diseases make a major economic impact on U.S. poultry producers. Respiratory disease is not caused by a single virus or bacteria. It generally is caused from a combination of both, or a host of air quality issues, making treatment and prevention more complicated.

MucuSol™, from Animal Science Products, contains the highest concentration of Guaifenesin—the most efficacious mucolytic agent available today. MucuSol™ thins mucus, allowing the animal to easily expel it, and rapidly improve breathing efficiency. At the first sign of respiratory congestion utilize MucuSol™ to eliminate the costly secondary effects of respiratory disease.

Advantages of MucuSol:

• Most concentrated form of the premiere mucolytic agent Guaifenesin.
• Thins mucus, lubricates and drains respiratory tract.
• Makes coughs more productive.
• Improves respiratory efficiency.
• Reduces breathing discomfort.
• Helps expel trapped irritants and infectious agents in mucus.
As is typical, mortality was elevated, reaching 13% in infected control poults, while none of the birds receiving Uni-Sol died (Fig. 1). Significantly higher air sac scores in control turkeys confirmed the respiratory disease’s effects (Fig. 2). After two weeks the researchers found live E. coli had spread to 17.4% of the control turkeys’ livers, compared to none being isolated from the livers of birds drinking Uni-Sol (Fig. 3). Importantly, Uni-Sol also reduced the body weight loss that affected the challenged controls.

The severely infected control birds suffered from enlarged organs, with bursa, spleen, liver and heart swelling 54-64% heavier than their normal, non-challenged controls. Uni-Sol significantly reduced swelling among the same organs in challenged turkeys, limiting them to a 5-18% increase over non-infected birds (Fig. 4).

Uni-Sol also boosted white blood cell status in challenged birds. Compared to non-infected birds, total white blood cells (leukocytes) in infected poults increased 10%, while counterparts receiving Uni-Sol increased white blood cells by 20%. A much more dramatic improvement occurred among the memory- and antibody-building lymphocytes. Uni-Sol increased these cells to a concentration 69% higher than non-challenged controls, an increase that was over seven times higher than infected turkeys without Uni-Sol (Fig. 5).

The researchers concluded that using Uni-Sol “during an infectious challenge can guard against the debilitating effects of stress and infection.” Uni-Sol overwhelmingly protected the birds from the primary infection in their airways and organs, but Uni-Sol also needs a partner to help clear out the mucus congestion responsible for the secondary effect of poor breathing efficiency.

**Blown away by MucuSol**

Irritating coughs come with airway infection, or dust and gas in houses with poor quality air. If the cough is a dry one, it is not productive, meaning it irritates the respiratory tract further instead of dislodging phlegm and expelling the irritant.

If respiratory disease is a cage fight, then MucuSol and Uni-Sol are your “Respiratory Tag-Team.” Uni-Sol holds the animal’s prostaglandins down while MucuSol knocks the snot out of ‘em.

MucuSol simply makes coughs more productive. MucuSol is a stable water-miscible syrup that delivers more phlegm-loosening power to eliminate the congestion during respiratory problems. That’s because MucuSol contains the richest concentration of water-soluble guaifenesin, the most recognized expectorant for human and animal use. The potent expectorant increases mucus volume and thins phlegm in the airway. By pulling water into the respiratory tract, MucuSol lubricates and stimulates the flow of secretions, allowing cilia to carry irritants up and generating a hearty cough to send them out. Thinning the mucus and promoting reflex movement increases the cough’s efficiency and speeds recovery, eliminating the costly secondary effects of respiratory disease.

Guaifenesin is originally extracted from gum guaiac, a GRAS plant resin, and it does not naturally dissolve well in water. This is why powdered expectorants (“anti-tussives” or “mucolytic agents”) marketed for animals contain only a small amount, along with soluble carriers. Low concentrations and poor solubility make traditional animal health expectorants disappointingly ineffective. These powdered products generally provide only 12.5% of the effective dose compared to MucuSol for pigs and poultry, or Mucinex for humans.

So this season you can breathe easier knowing your pigs and poultry can too. When you control inflammation and congestion, you’ve controlled the problem; and ASP’s two powerful problem stoppers… Uni-Sol and MucuSol can give you a clear advantage.
One serving of Rodentex™ can be a rodent’s last meal.

Rodentex™ Rat & Mouse Bait is a second-generation anticoagulant with a delayed action that prevents bait shyness. Norway rats, roof rats and house mice can consume a lethal dose in just one feeding. Rodentex™ Rat & Mouse Bait is available in place packs (pellets) and chunks. Use it in burrows, on runways and in the hard to reach areas where rodents live and breed.

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PLT is a registered trademark of the Jones-Hamilton company in the U.S. and other countries.
SUMMIT, New Jersey, September 26, 2011 — INNOVAX®-ND and INNOVAX®-ND-SB, two one-dose recombinant vaccines widely used by the U.S. poultry industry, have been shown to aid in the protection of Newcastle disease for at least 60 weeks, according to a study recently accepted by the United States Department of Agriculture.

“This study confirms that the vaccines provide lifelong protection against the world’s most prevalent poultry disease in broilers, as well as long-lived birds such as broiler breeders and layers,” said Charlie Broussard, DVM, US poultry technical service director for Merck Animal Health, which developed and markets the vaccine.

History of success

Launched in 2010, INNOVAX-ND is a recombinant vaccine that eliminates the need for stress-causing, oil-based, inactivated BD vaccines. It also can replace conventional, live ND vaccines, which are associated with rolling reactions, as well as added time and labor costs when they are applied in the field. The vaccine can be administered in ovo to 18-day-old embryos or subcutaneously to 1-day-old birds.

INNOVAX-ND-SB, which has been available since 2008, helps prevent ND and Marek’s disease, but also contains the SB-1 strain of chicken herpesvirus (serotype 2) to prevent very virulent Marek’s. INNOVAX-ND-SB is approved for in ovo administration only.

Both vaccines utilize the turkey herpes virus (HVT) as a vector or carrier for the ND virus that stimulates immunity against ND; HVT is well recognized as a safe virus for chickens and also protects against Marek’s disease, another serious herpesvirus disease of poultry that can result in widespread morbidity and mortality.

For more information, producers and veterinarians should contact their Merck Animal Health representative or call Customer Service at 1-800-356-7470. Product information is also available at www.innovax-vaccines.com.

About Merck Animal Health

Today’s Merck is a global healthcare leader working to help the world be well. Merck Animal Health, known as MSD Animal Health outside the United States and Canada, is the global animal health business unit of Merck. Merck Animal Health offers veterinarians, farmers, pet owners and governments one of the widest ranges of veterinary pharmaceuticals, vaccines and health management solutions and services. Merck Animal Health is dedicated to preserving and improving the health, well-being and performance of animals. It invests extensively in dynamic and comprehensive R&D resources and a modern, global supply chain. Merck Animal Health is present in more than 50 countries, while its products are available in some 150 markets. For more information, visit www.merck-animal-health.com.

Legal Notes

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5. CONVENIENT: Single hatchery vaccination eliminates field vaccination.
6. RELIABLE: Highest quality product and support from the leading MD vaccine manufacturer.

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---

**GUARANTEED ANALYSIS**

CuSO₄ ........................................................................... 18%

**INGREDIENTS:** Copper, Organic Acids, BioSupremeL, Buffers, Dye #40, Extract from Essential Oils.

**Omegamune-Plus Precautions**

- Acidic solution
- Corrosive to galvanized and mild steel equipment, piping
- Wear goggles or full face shield when handling
- For animal use only; not for human consumption
- Keep out of the reach of children

**WARNING:** Follow label directions

---

**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.

**Available in the following packaging:**

- 4 x 1 gallon cases ......................................................... (Product # 100801)
- 5 gallon pails ................................................................. (Product # 100810)
- 55 gallon drums .......................................................... (Product # 100820)

---

**WITH ANTIOXIDANTS FOR TURKEYS & BROILERS**

For Use in Closed Drinking Water Systems for Poultry

---

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1-800-533-1899 • FAX 320-235-8629
“Marketed Exclusively by Best Veterinary Solutions”

Contact the BVS sales representative or distributor in your area for more details.
The Acid Sol® Zone
Dietary Agent for Poultry and Swine

✔ is considered GRAS (generally recognized as safe).
✔ has a pH of 1.3.
✔ when mixed at recommended levels will reduce drinking water to pH 3.5-5.5.
✔ will hold pH down longer than other commercially available acidifiers.
✔ contains higher levels of copper than other liquid copper products on the market.
✔ can be used in place of Chlorine or Iodine.
✔ is a red solution that stays in solution without any settling out like that of competitive products.
✔ fits well into an antibiotic free program.
✔ works very well to maintain waterlines. Prevents scale and slime build up.
✔ is friendly to the environment. 40% less copper excreted by using Manage versus feed grade copper.
✔ Is the only Patented product of its kind!

The Manage® Zone
Dietary Agent for Poultry and Swine

✔ is considered GRAS (generally recognized as safe).
✔ has a pH of 1.3.
✔ when mixed at recommended levels will reduce drinking water to pH 3.5-5.5.
✔ will hold pH down longer than other commercially available acidifiers.
✔ contains higher levels of copper than other liquid copper products on the market.
✔ can be used in place of Chlorine or Iodine.
✔ is a dark purple solution that stays in solution without any settling out like that of competitive products.
✔ fits well into an antibiotic free program.
✔ works very well to maintain waterlines. Prevents scale and slime build up.
✔ is friendly to the environment. 40% less copper excreted by using Manage versus feed grade copper.
✔ Is the only Patented product of its kind!

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DIETARY SUPPLEMENT FOR POULTRY & SWINE

INGREDIENTS:
Antioxidants from Essential Oils, Organic Acids and Inorganic Acids.

For Use in Closed Drinking Water Systems for Poultry

**Omegamune Precautions**
- Corrosive to galvanized and mild steel.
- Acidic solution. Wear goggles when handling.
- For animal use only.
- Keep out of the reach of children.

**MIXING DIRECTIONS**

*Standard Dosage* - Administer 5 oz per 128 gal of water. For medicators use 5 oz per 1 gal of stock solution.

*Optimum Dosage* - Administer 10 oz per 128 gal of water. For medicators use 10 oz per 1 gal of stock solution.

**WARNING:** Follow label directions

Available in 4 x 1 gallon cases (8.5 lb per gal)

Product # 200100

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OMEGAMUNE GUT START
Contains a source of live (viable) naturally occurring micro-organisms, Gel-Spray diluent and dye which is designed to uniformly deliver and increase uptake of micro-organisms.

Use Gut Start to supply naturally occurring micro-organisms to poultry at 1 day of age (hatch day) or at placement. One 2,000 / 10,000 dose pack will treat 2,000 / 10,000 chicks or poults.

**Directions for use:**
Mix the contents of one 2,000 dose pack of Gut Start in .5 L (17 ounces) of warm water. Mix contents well with a hand-held blender. Administer topically by spray at 1 day of age (hatch day) or at placement at 25 mL (.85 ounces) for every 100 birds through a gel-spray machine or device.

**Directions for use:**
Mix the contents of one 10,000 dose pack of Gut Start in 2.5 L (85 ounces) of warm water. Mix contents well with a hand-held blender. Administer topically by spray at 1 day of age (hatch day) or at placement at 25 mL (.85 ounces) for every 100 birds through a gel spray machine or device.

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

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

Net Weight: 4.0 oz. (113.4 grams)

Manufactured by:
Best Veterinary Solutions, Inc.
Willmar, MN 56201
Best Veterinary Solutions, The Solution Company
OMEGAMUNE
GUT START

- Extremely fortified probiotic for poults and chicks containing 6 strains of live (viable) naturally occurring micro-organisms
- Applied at the hatchery at 1 day of age (Hatch Day) or at placement
- Probiotic is applied with a gel spray diluent to provide better uptake and uniform coverage
- Gel appears as droplets on poults or chicks and is visible and readily picked up by the birds which increases the amount of product getting to the birds and the amount of birds that get the product.
- All droplets are gone within 2 or 3 minutes
- Unlike water spray, the gel spray does not soak the poults / chicks, keeping them dry and warm
- Can easily be mixed with IMMUCOX vaccines for same time application
- Contact your poult / chick supplier and ask them to apply Gut Start on your next order

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Ellsworth, IA   888-378-4045
Washington, IN  877-254-3410
Dagsboro, DE    877-732-3894
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- HOSTAZYM X
- HOSTAZYM X C
- OPTI-BAC L
- SACOX
- TYLOVET SOLUBLE

For more information about Huvepharma products contact customer service toll free at 877.944.4883 or email customerserviceusa@huvepharma.com
Tylovet® Soluble for Poultry (Tylosin tartrate)

The Disease
Mycoplasma infections are considered a major worldwide disease in the modern poultry industry and are mainly caused by:
- *Mycoplasma gallisepticum*
- *Mycoplasma synoviae*

Mycoplasma bacteria are transmitted vertically and establish long life infections in their host. Severity of clinical signs is strongly influenced by concurrent viral or bacterial infections and environmental factors. *Mycoplasma gallisepticum* infected chicken flocks will suffer from respiratory symptoms, decreased performance and increased condemnations at processing.

In recent years, *Mycoplasma synoviae* is believed to be of growing importance as a cause of economical losses due to synovitis and respiratory disease.

In turkeys, *Mycoplasma gallisepticum* causes infectious sinusitis, synovitis, pneumonia and airsacculitis. Clinical signs consist of nasal and ocular discharge; typically the paranasal sinuses will be swollen. Furthermore, animals may suffer from tracheal rales, coughing, labored breathing and loss of condition.

Solubility
The solubility of Tylovet Soluble was evaluated by comparison to a reference (competitive) sample of tylosin soluble powder. This comparison was made using both soft and hard water at different temperatures, i.e. 39°F or 68°F until a clear solution was obtained for both products. Tylovet Soluble dissolved quicker regardless of drinking water.

Product Specifications
Tylovet Soluble is composed of uniformly sized granules that are white to creamy-white in color, free flowing, tasteless, and dust free. Granules are produced by a fluid bed granulator with fast heat transfer technology to prevent the loss of chemical activity or any alteration of physical characteristics (e.g. color) resulting in flawlessly formed, highly uniform granules.

Origin of the molecule
Tylovet® Soluble (tylosin tartrate) is a macrolide antibiotic produced by a strain of *Streptomyces fradiae*. This strain was originally isolated by McGuire et al. in 1961 from soil samples collected from a rice field in Thailand where the antibiotic obtained its name.

Structure and activity
Tylosin is a mixture of four macrolide antibiotics (tylosin A, B, C and D). The main component of the mixture (> 80%) is tylosin A. All four components contribute to the potency of tylosin, which is not less than 900 IU/mg.

Mode of action
Macrolide antibiotics are bacteriostatic compounds that inhibit protein synthesis of susceptible micro-organisms. The tylosin spectrum of activity includes Mycoplasmas, Gram-positive bacteria and some Gram-negative bacteria.

Indications for use
Chickens (Broilers and Replacement Chickens)
As an aid in the treatment and control of chronic respiratory diseases (CRD) associated with *Mycoplasma gallisepticum*. For control of CRD associated with *Mycoplasma synoviae* in broiler chickens.

Turkeys
For maintaining weight gain and feed efficiency in the presence of infectious sinusitis associated with *Mycoplasma gallisepticum*.

Pharmacokinetics and dynamics
Tylosin is a weak organic base (pKa = 7.73) and will slightly to moderately bind to plasma proteins. This creates a high degree of lipid solubility allowing tylosin to be widely distributed in body fluids and tissues.

Absorption
In poultry, Tylovet Soluble is quickly absorbed from the alimentary tract. Tylosin reaches maximum blood levels between 1 and 3 hours after oral administration.

Elimination
Tylovet Soluble is extensively metabolized and most of the residues are excreted in feces, consisting predominantly of tylosin A, tylosin factor D, and dihydrodesmycosin.

Special warnings
Under-dosing and/or treating for an insufficient length of time are causes for the development of resistance in bacteria and should be avoided at all times. Do not use in laying chickens producing eggs for human consumption.

Dose and administration
Chickens (Broilers and Replacement Chickens)
For the treatment of chronic respiratory disease: Ensure that chickens consume enough medicated drinking water to provide 50 mg tylosin per pound BW per day for 3 days. Only medicated water should be available to the birds.

Turkeys
For maintaining weight gain and feed efficiency in the presence of infectious sinusitis:
Ensure that turkeys consume enough medicated drinking water to provide 60 mg tylosin per pound BW per day for 3 days (2 to 5 days depending on severity of infection). Only medicated water should be available to the birds.

Practical administration
For the preparation of the medicated water, the body weight of the animals to be treated and their actual daily water consumption should be taken into account. Water consumption depends on age, state of health, breed and husbandry practices.

After the end of the medication period, the water supply system should be cleaned appropriately to avoid intake of sub-therapeutic amounts of the active substance which might support development of resistance.

Withdrawal period
Chickens must not be slaughtered for food within 24 hours after treatment

Turkeys must not be slaughtered for food within 5 days after treatment
EVALUATION OF HOSTAZYM® X ON PERFORMANCE OF BROILERS

Objective: To evaluate the effects of Hostazym® X on gain and feed conversion of broilers raised to 42 days of age.

Materials and Methods: The trials were performed at Allen’s Dobson Research Farm in Maryland from May 31st to July 7th. Two thousand four hundred and ninety six Cobb chicks were sexed into two groups: one male and one female and then randomly selected to be fed of three dietary treatments for a total of 52 birds (26 male, 26 female) per pen. Each to the three dietary treatments was replicated 16 times for a total of 48 pens. At the same time as the placement of the pen trial, 120,000 chicks were placed on a research farm containing 6 identical commercial houses. Two commercial houses were fed one of the three dietary treatments as those used in the research pen trial. The chicks were placed in an environmentally controlled, solid side wall house that contained 4 side wall fans with timer and thermostat controls, static controlled ventilation, along with black air ventilation boxes, and 6 fans for tunnel ventilation. The house provides 12cfm per bird at maximum ventilation. Light intensity was over 2 foot candles through day 6. On day 7, the light intensity was reduced to one foot candle and gradually reduced to ½ foot candle at day 14. Chicks were housed on 23 hours of light for 7 days at which time they were placed on 20 hours of light and 4 hours of darkness. This program continued until 28 days of age at which time birds were placed back on 23 hours of light until movement.

<table>
<thead>
<tr>
<th>Treatments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diet 1 – Positive Control</td>
</tr>
<tr>
<td>Diet 2 – As 1 – 30 kcal/lb</td>
</tr>
<tr>
<td>Diet 3 – As 2 + Hostazym X</td>
</tr>
</tbody>
</table>

The three corn, soybean meal and canola meal (2.5 to 5%) diets were formulated to meet the Cobb management guide dietary recommendations. In order to decrease the energy value of the diets by 30 kcal/lb some fat was removed and the corn and canola meal levels were slightly adjusted. However, it is important to note that all diets had at least 1% poultry fat inclusion. All the diets contained BMD (50g/ton) and 3-nitro (0.4 lbs/ton). The diets were fed as crumbles during the starter period until 19 days of age, and then as pellets for the grower (20 to 35 days of age) and withdrawal (36 to 49 days of age) periods. The feed for the test was made in 20 ton runs at the Seafood, DE feed mill. Each run consisted of 4 batches of 5 tons each. After the first ten tons of feed were manufactured the feed was tested by NIR to make sure the energy and protein
levels were within specification. The remaining feed was shipped to the company farm that was running the concurrent commercial field experiment. To ensure that the data is correct, all feed deliveries to the commercial farm were made by the same truck driver during the period of 9am to 4pm and verified by the farm manager that the feed was delivered to the correct house and bin.

<table>
<thead>
<tr>
<th></th>
<th>Diet ME (kcal/lb.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Starter</td>
</tr>
<tr>
<td>Treatment 1 (Positive Control)</td>
<td>1399.5</td>
</tr>
<tr>
<td>Treatments 2 and 3</td>
<td>1370.9</td>
</tr>
</tbody>
</table>

The starter feed was fed until 14 days of age (1.45 pounds per bird), grower was fed until 28 days of age (3.0 pounds per bird) and the withdrawal feed was fed until the termination of the experiment or approximately 3.5 pounds per bird. The field trial birds received the same ratio of feed. Three feed samples were collected: one each from the beginning, middle, and end of the batch of treatment diet and mixed to form a composite sample. One composite sample was taken from the composite for each treatment and proximate analysis as well as enzyme analysis was performed.

**Performance Results at 14 days of age**

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Weight Gain, lb/chick</th>
<th>Feed Conversion (adjusted)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>0.955(^b)</td>
<td>1.059(^a)</td>
</tr>
<tr>
<td>-30 kcal/lb</td>
<td>0.950(^b)</td>
<td>1.072(^b)</td>
</tr>
<tr>
<td>-30 kcal/lb. + Hostazym X</td>
<td>0.963(^a)</td>
<td>1.055(^a)</td>
</tr>
<tr>
<td>Pooled SEM</td>
<td>0.968</td>
<td>0.0030</td>
</tr>
</tbody>
</table>

\(^{a,b,c}\) P <0.05

**Performance Results at 42 days of age**

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Weight Gain, lb./chick</th>
<th>Feed Conversion (adjusted)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>4.48</td>
<td>1.447(^b)</td>
</tr>
<tr>
<td>-30 kcal/lb.</td>
<td>4.45</td>
<td>1.462(^c)</td>
</tr>
<tr>
<td>-30 kcal/lb. + Hostazym X</td>
<td>4.50</td>
<td>1.435(^a)</td>
</tr>
<tr>
<td>Pooled SEM (P value)</td>
<td>9.528</td>
<td>0.0037</td>
</tr>
</tbody>
</table>

\(^{a,b,c}\) P <0.05
### Pen Trial Economic Analysis

<table>
<thead>
<tr>
<th></th>
<th>Positive Control (PC)</th>
<th>Negative Control (NC)</th>
<th>NC + Hostazym X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed cost per lb.</td>
<td>0.1821</td>
<td>0.1764</td>
<td>0.1770</td>
</tr>
<tr>
<td>Average weight, lb.</td>
<td>4.48</td>
<td>4.45</td>
<td>4.50</td>
</tr>
<tr>
<td>Feed Conversion</td>
<td>1.727</td>
<td>1.746</td>
<td>1.725</td>
</tr>
<tr>
<td>Chick cost @0.28</td>
<td>0.0625</td>
<td>0.0629</td>
<td>0.0622</td>
</tr>
<tr>
<td>Grower pay @$180</td>
<td>0.0408</td>
<td>0.0414</td>
<td>0.0407</td>
</tr>
<tr>
<td>Feed cost</td>
<td>0.3145</td>
<td>0.3080</td>
<td>0.3053</td>
</tr>
<tr>
<td>Total Cost</td>
<td>0.4178</td>
<td>0.4123</td>
<td>0.4082</td>
</tr>
</tbody>
</table>

### Feed Conversion at 14 Days of age

**Feed Conversion at 42 Days of age**

(adjusted for mortality)

---

### Field Trial Results

<table>
<thead>
<tr>
<th></th>
<th>Positive Control (PC)</th>
<th>Negative Control (NC)</th>
<th>NC + Hostazym X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Birds</td>
<td>40,600</td>
<td>40,600</td>
<td>40,600</td>
</tr>
<tr>
<td>% Mortality</td>
<td>2.40</td>
<td>2.98</td>
<td>3.23</td>
</tr>
<tr>
<td>Birds Sold</td>
<td>39,626</td>
<td>39,463</td>
<td>39,658</td>
</tr>
<tr>
<td>Weight, lb.</td>
<td>4.45</td>
<td>4.32</td>
<td>4.47</td>
</tr>
<tr>
<td>Feed Conversion</td>
<td>1.751</td>
<td>1.763</td>
<td>1.745</td>
</tr>
<tr>
<td>Days of Age</td>
<td>37</td>
<td>37</td>
<td>37</td>
</tr>
<tr>
<td>Rate of Gain</td>
<td>0.1203</td>
<td>0.1168</td>
<td>0.1208</td>
</tr>
</tbody>
</table>
Conclusions: Pen Study

Decreasing the energy value of the diets by 30 kcal/lb. negatively affected weight gain and feed conversion of broilers at all periods measured. At 14 and 42 days of age broilers fed the negative control (30 kcal/lb. lower in energy) diets with the addition of Hostazym X had feed conversions that were numerically better however not significantly different than the birds fed the positive control diets. Although there was no significant difference, mortality was the highest for the birds fed the negative control diet. It was consistently higher from day 10 until day 22 at which point no difference in mortality was noted between the treatment groups.

Feeding broilers the negative control diet resulted in the lowest cost on either a per ton or per pound basis but the birds performed the worst on this diet. Feeding the negative control diet plus Hostazym X to broilers resulted in the lowest production cost, $.0041/lb. better than the negative control and $.0096/lb. better than the positive control diets. The addition of Hostazym X more than paid for itself compared to the other two treatments. The additional weight of the broilers fed the negative control plus Hostazym X resulted in lower fixed costs as compared to the other two groups.

Conclusions: Commercial Field Study

A field trial was run concurrent to the pen trial following the same format as the pen trial. The results of the field trial are very similar to the results of the pen trial. The group fed the negative control diet had the lowest body weight, highest mortality and feed conversion versus the other groups. As in the pen trial, the broilers fed the negative control diet plus Hostazym X numerically had the highest body weight, lowest feed conversion and best livability. Overall there was little difference in body weight of the broilers in the pen and field trials for the negative control diet plus Hostazym X and the positive control diet. The broilers in the field trial that were fed the negative control diet were 0.0013 pounds lighter than the broilers fed the negative control diet in the pen trial. An economic analysis of production costs for the field trial was conducted. The results followed the same pattern as the pen trial with the negative control diet plus Hostazym X had the lowest cost per pound of all the three dietary treatments. The spread in cost of the treatments in the field trial was greater due to the lighter weight of the broilers fed the negative control diets. The production cost of the broilers fed the negative control diet plus Hostazym X was $.0054 better than the cost of the broilers fed the negative control diet and $.0100 better than the broilers fed the positive control diet.

The use of Hostazym® X enables the reduction in energy levels in broiler diets by at least 30 kcal/lb. while optimizing performance and savings.
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As a producer, you know that coccidiosis is endemic in your flock; birds are being challenged and that has a cost—lower feed efficiencies. Expensive medications lose effectiveness as coccidia strains become more resistant, and may not be the answer.

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