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WATT Egg Industry
News for the Egg Industry Worldwide

Preventing immunosuppressive infections

Part 1 of a two-part series: Controlling diseases that impact egg production and egg safety through effective immunization.

By Kalen Cookson, DVM, MAM, ACPV,
Fort Dodge Animal Health, Overland Park, Kansas

The old adage, "An ounce of prevention is worth a pound of cure," captures the value of flock immunization which is directed at efficient production of eggs of optimal quality. A properly designed vaccination program averts economic losses due to infections that may cause immune suppression, mortality, drops in egg production or compromised egg quality and safety.

Kalen Cookson

In addition, control of prevalent diseases by vaccination reduces the need to use antibiotics as therapy for secondary infections including *E.coli*.

The process of administering vaccines does not necessarily assure the desired level of protective immunity. A successful vaccination program requires following accepted standard techniques that result in uniform vaccine coverage. Instituting a monitoring system provides necessary feedback and accountability for the entire process of maintaining health.

Protecting the immune system

For any vaccination program to be successful, one must first ensure that each flock is capable of responding appropriately to the vaccines given, which requires an intact and functional immune system.

Vaccines stimulate humoral immunity (circulating antibodies) and local cellular immunity (activation of macrophages and T–lymphocytes). While resistance to some infections such as Newcastle disease and avian influenza rely mostly on antibody production, others including infectious bronchitis and laryngotracheitis rely on cellular immune function. The two most important diseases negatively affecting the immune system are Marek's disease (compromising cellular immunity) and infectious bursal disease (depressing antibody production).

Marek's Disease

The Disease—Marek's disease, caused by a herpesvirus, is known for its ability to cause variable to high mortality in pullets over eight weeks of age due to tumors affecting nerves and internal organs. Marek's disease virus also causes significant immune suppression. The "silent" effect on the immune system is frequently more significant than the impact of mortality.

A sound vaccination program is essential for a productive layer flock and a safe egg supply.

Vaccination—Chicks should receive a full dose of a combination serotype 2 and 3 Marek's vaccine, usually comprising SB-1 and HVT strains. In areas of high challenge, a serotype 1 Rispens vaccine, with or without HVT, is highly recommended. The choice of Rispens vaccine is critical in high challenge areas as low-passaged (less attenuated)

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products have been proven to offer significantly more protection than higher-passaged (milder) vaccines.

Monitoring—Marek's disease vaccines are applied to each bird at hatch and do not spread efficiently within the flock so that accurate vaccination is critical for protection. Monitoring of vaccine administration at the hatchery should reveal over 99.5% of chicks with vaccine dye under their skin and none on the feathers.

Currently polymerase chain reaction (PCR) technology is available to quantify the take level of the vaccine virus in feather pulp which is correlated with a proper immune response. **Figure 1** shows the contrast in bird-to-bird replication of Rispens vaccines of different passage levels.

Infectious Bursal Disease (IBD)

The Disease—Depending on the strain of IBD virus to which flocks are exposed, unprotected birds can become mildly to severely depressed accompanied by acute mortality. Partially immunized flocks sometimes show no obvious clinical signs although feed consumption, body weight gain and uniformity may be reduced.

If adequate protection is not accomplished through vaccination, field challenge will cause some level of immune suppression. Infection with IBD virus before three weeks of age can result in permanent and serious compromise of the immune system. Infections after three weeks can often lead to temporary yet significant immune suppression. Damage to the immune system reduces the effectiveness of subsequent vaccinations against respiratory infections and bacterial pathogens.

Vaccination—A typical vaccination program includes administration of at least three live intermediate IBD vaccines between two and five weeks-of-age. The vaccines should be spaced seven days apart to maximize the immunization of susceptible birds. Varying levels of maternal antibody result in different time points when birds will respond to vaccination. A history of successive flocks experiencing field challenge by or before four weeks-of-age indicates the need to administer the first vaccination by two weeks-of-age. It is important to remember that there is a wide range of attenuation levels among intermediate IBD vaccines.

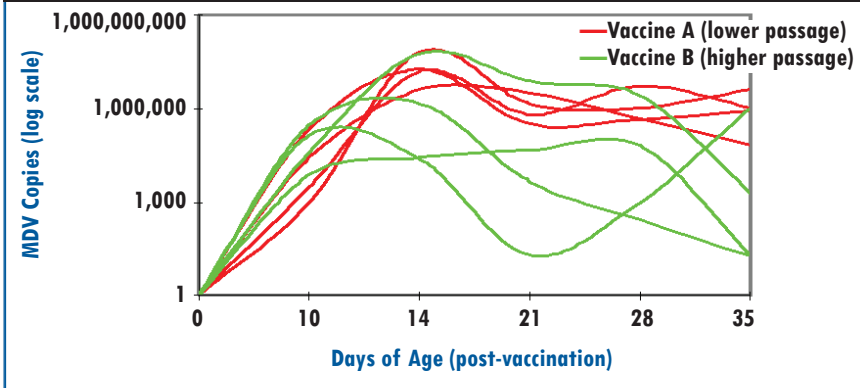
Milder vaccines will not immunize as many birds during each application, resulting in suboptimal protection. Without a solid vaccine take in the bursa of Fabricius, the source of B-lymphocytes, protection against a strong field challenge is difficult to achieve.

Monitoring—The extent of microscopically detectable changes in the bursa of Fabricius indicates vaccine response or field exposure to IBD virus. Various procedures have been developed to measure either the gross size or histological integrity of the bursa.

In addition, PCR analysis can reveal whether the bursa has been infected with either vaccine or field virus. Vaccination induces less atrophy of the bursa compared to field viruses and can be assessed by microscopic examination. Regeneration of the bursa is an excellent indication of protection.

B-lymphocyte depletion at the time of pullet transfer indicates the bursa

FIGURE 1. VACCINE RESPONSE OF BIRDS MEASURED BY RISPENS REPLICATION IN FEATHER FOLLICLES USING REAL-TIME PCR ANALYSIS



Polymerase chain reaction technology is available to quantify the take level of the vaccine virus in feather pulp which is correlated with a proper immune system.

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was severely challenged weeks earlier and that the pullet is not fully immunocompetent. **Table 1** shows data from two flocks experiencing a normal vaccine take followed by solid bursal regeneration.

The bottom line

Developing a sound vaccination program for pullets is essential for a productive layer flock and a safe egg supply. Proper administration of vaccine in a structured, appropriate program will help ensure that flocks are well immunized. This requires periodic monitoring of vaccination techniques and confirmation of the expected immune response.

Marek's disease and infectious bursal disease are the two greatest threats to the immune system. Proper immunization against these infections will make it possible for vaccinations against other diseases to stimulate immunity as intended.

The second part of this article in December's *Egg Industry*, will focus on vaccination against infectious bronchitis, mycoplasmosis and *E.coli*, all of which impact the return from flocks. EI

TABLE 1. BURSAL LYMPHOCYTE SCORES IN PULLETS MEASURED BY COMPUTER IMAGING ANALYSIS

Flock	Age (Days)	Average % Lymphocytes	Bird 1	Bird 2	Bird 3	Bird 4	Bird 5
A	25	40	41	40	39	40	42
	35	40	40	41	41	41	41
	44	22	25	24	23	23	22
	56	22	23	19	23	25	24
	119	38	37	39	38	39	NT
B	28	43	42	43	43	44	43
	37	40	43	41	39	40	41
	42	26	28	25	29	29	22
	49	23	22	24	22	24	24
	56	25	22	24	23	24	32
	112	40	36	41	41	42	NT

Blue scores indicate intact bursas prior to take and fully regenerated bursas after 'take'. Black scores indicate bursas just starting to either 'take' (42 days) or regenerate (56 days). NT = not taken

EDITORIAL
WITH DR. SIMON SHANE

Our industry will become stronger

By the time this edition is published we will know the result of California Proposition 2. A report on the implications for the state and the U.S. industry will appear in both the December print edition and in the electronic version.

Irrespective of the outcome, our industry will adapt to the reality and become stronger. What is evident is the tremendous effort by individuals, producer companies and organizations in channeling resources to the defense of our production systems. We can take satisfaction in knowing that cage housing according to the United Egg Producers' program is based on sound scientific principles and not emotion.

Simon Shane

I firmly believe that through our efforts we have succeeded in establishing a greater understanding among consumers of our contribution to the dietary needs of the nation. We offer a choice of eggs derived from caged flocks and those held under alternative systems.

Articles in this edition include practical aspects of rodent control and enhancing production by controlling immunosuppressive diseases which are often overlooked in pullet rearing. A comprehensive review of industry topics and news items complements the articles in consistency with the WATT mission to inform and educate.

Please feel free to provide feedback on content and to request articles and topics of interest to your company.

Thank you for your support,

Simon

sshane@nc.rr.com

Mus musculus, the house mouse, has a small head.
Photo provied by Motomco Ltd.

Controlling rodents in the poultry house

By Simon Shane, Editor

Like the poor, rodents will always be with us. Poultry farms provide feed, warmth and breeding habitats for the three species which infest our operations: the house mouse (Mus musculus), the roof rat (Rattus rattus) and the Norway rat (Rattus norvegicus). All three rodent species arrived in the United States during the early colonial period on sailing vessels. They can occur on the same farm given their specific preferences for feed, ranging and breeding.

Rodents incur costs associated with purchase and placement of rodenticides, damage to structural components including insulation, deterioration of equipment including fiber egg-conveyor belts and electrical insulation which is gnawed. They serve as reservoirs of bacterial infections such as salmonellosis and pasteurellosis and they may function as mechanical vectors of viruses which can be entrained in dust.

House mice are susceptible to *Salmonella enteritidis* (SE) and survivors remain permanent carriers of the infection. Since a single mouse voids 35,000 droppings in its lifespan of 15 months, with each dropping containing up to one million Salmonella, there is a significant potential for contamination of flocks.

An infestation of 10,000 roof rats in a one-million hen in-line operation will consume feed to the value of $20,000 a year. In the case of organic operations, the cost will be proportionately greater based on a threefold differential in the price of feed and limitations on the use of baits for control.

Quantifying rodent populations

Since rodents are nocturnal, large populations of house mice and roof rats can exist without management being aware of the extent of infestation. The presence of mice and rats can be determined by physical observation. Bag stores and feed mills will show the presence of droppings and damage due to gnawing bags will result in spillage of grains.

Burrows associated with Norway rats may be found adjacent to houses and within dried manure cones in high-rise houses.

Damage to the bottom of wooden doors from gnawing indicates points of entry and activity. Equipment failure due to damaged insulation and water leaks from gnawed piping confirms the presence of rodents and suggests a relatively high population. Nocturnal inspection of attics, aisles, the pits of high rise houses, especially at the feed and egg collection end, and around dumpsters should indicate the extent of the problem. It is advisable to examine egg belts in the morning before activation to detect the presence of droppings.

Quantitative measures may include the use of video cameras, trapping using multiple capture mouse traps (Tin Cat or Ketch-All) or snap traps arranged with the triggers adjacent to a wall. Tracking powder can be used to detect mice and rats when placed along walls or on beams which reveal movement over a 24-hour period. Tail and foot prints are usually characteristic and can differentiate between mice and rats. Smudge-marks are left by mice and rub-marks by rats on rafters, walls and other structures along frequently traveled routes.

Structural exclusion

It is generally accepted that control of rodents requires exclusion exemplified by a comment from a producer who claims to successfully "build 'em out." Structural defects such as gaps beneath doors larger than a quarter inch will allow entry of mice. Overhead or underground pipes or feed augers passing through walls, and poorly fitting roll-up doors allow entry of rodents. Roof rats may gain access to a house through defective flashing or electrical cables which pass through roof components, eaves or walls. Norway rats burrow beneath foundations and can enter unprotected earth-floored houses with ease.

It is essential that houses should be surrounded with a concrete or crushed stone perimeter barrier 3-feet wide to prevent

TABLE 1. CHARACTERISTICS OF RODENTS INFESTING EGG PRODUCTION OPERATIONS

CHARACTERISTIC	ROOF RAT	NORWAY RAT	HOUSE MOUSE
Length (nose to tail tip)	13" – 17"	12" – 18"	5" – 7"
Weight	5 – 10 oz	7 – 9 oz	1 oz
Body Shape	Thin pointed nose, Tail as long as body, Ears can be folded over eyes	Husky, blunt nose Tail shorter than body Small ears	Small head
Offspring per female/year	30	30	40
Maturity	3 Months	3 months	1 month
Lifespan	18 Months	15 months	15 months
Annual food intake	20 lbs	25 lbs	2 lbs
Water intake/day	1 oz	1 oz	1/20 oz
Droppings	½" long, pointed ends 25,000/year	¾" long, blunt ends 25,000/year	¼" long, pointed ends 35,000/year
Range from food source	100' – 300'	100' – 300'	30'
Breeding sites	Attics, trees	Burrows in soil	Corners & structural elements, manure pits

All three rodent species can occur on the same farm given their specific preferences for feed, ranging and breeding.

A Well-Executed Rodenticide Rotation Program Eliminates Rodent Infestations, Keeps Birds Healthy

It is well known that rodent control is a key element of any successful biosecurity program. A well-orchestrated rodenticide rotation strategy helps rid facilities of these pests.

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Roof Rat

Norway Rat

A recommended practice

Rodents are a problem in the poultry and egg industries as they take up residence in breeder and layer houses: transmitting disease, causing building damage, and contaminating and consuming feed and water.

Bait rotation is a recommended biosecurity practice to avoid resistance based on rodent behavioral traits, or the rodents' potential dislike for any combination of flavor, texture, or shape of bait formulations.

Anticoagulants and acute toxicants (non-anticoagulants) are the baits most often used for a rotation program. Some anti-coagulants are single-feed and effective within several days. Meanwhile, acute toxicants, are all considered single-feed because rodents typically stop feeding after one meal. If a lethal dose is ingested, rodents usually die within 24 hours. However, acute rodenticides may be less palatable due to their higher level of active ingredient.

Selecting rodenticides

Rodenticides need to be formulated for high palatability and acceptance. Single-feed anticoagulants, such as Hombre™ (with the anticoagulant difethialone) or Boothill® (with the anti-coagulant bromadiolone) require a lower amount of active ingredient. They deliver a lethal dose in one feeding to provide a fast kill, but not so fast as to trigger bait shyness.

Multiple-feed anticoagulants often require rodents to feed multiple times in order for a killing dose to be consumed. An acute toxicant in the rotation, however, helps control rodents' resistance to multiple-feed or single-feed anticoagulant rodenticides. Additionally, rodents typically stop eating after a single lethal dose, saving both money and bait. Gunslinger®, for example, contains a high concentration of the neurotoxin bromethalin for a quick knockdown of any infestation.

Whatever the active ingredient, it must be effective against all commensal rodent species, including mice, Norway rats and roof rats. Different rodent species require different baiting techniques. This is the primary reason for a variety of formulations, which typically include blocks, bulk pellets, and pellet place packs.

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A multi-phase process

A disciplined rodent control process is essential to the successful execution of a biosecurity program and bait rotation strategy. It involves effective exclusion and vigilance to keep rodents out of facilities, followed by intensive treatment to reduce invading rodent populations, and ongoing monitoring and routine bait treatments to maintain houses rodent-free.

Proper rotation

Bait rotation means switching between an anticoagulant and a non-anticoagulant. Simply switching products or brands, however, is not considered rotation. Instead, use of one type of anticoagulant, such as one containing difethialone (Hombre), for six months. Then switch to an anticoagulant rodenticide containing bromadiolone (Boothill) for another six months to provide different active ingredients and flavors. An acute toxicant with bromethalin (Gunslinger) can then be used during the cleanout phase. The cycle repeats as part of an ongoing program.

Place rodenticides wherever droppings, tracks or rub-marks are found. Place bait preferably in bait stations, or at least in areas inaccessible to birds and other non-targets.

Bait stations should always contain an ample supply of rodenticide. Running out of bait for even a short time period can allow rodent populations to recover, eroding efforts and increasing overall control costs. Move uneaten bait to areas where bait is being consumed.

The importance of proper bait placement

Bait station placement is critical. Rodents prefer to travel along established paths between their nest and their water/food supply. They will not go out of their way unless they are forced to. Placement of Aegis bait stations at regular intervals will ensure bait is available and not missed, improving the effectiveness of your rodent control program.

burrowing. An area free of vegetation other than mowed grass at least 20-feet wide should surround houses. Disused equipment, surplus building material including roof and wall sheeting and stacked timber should be removed from the vicinity of feed mills, packing plants and poultry housing for a distance of a least 300 feet.

Baiting rodents

Rodenticides must be placed in approved bait stations around the exterior of feed mills, poultry houses and packing plants and along the side walls and aisles of cage houses. Only curiosity traps and sticky traps are allowed within processing plants or units operated according to organic rules.

Rodenticides may be formulated as pellets, small granules in packets, wax blocks or in liquid form. Only approved containers should be used to prevent accidental contamination of the environment and poisoning of non-target species. Rodents will not consume spoiled or fungus-infested baits which require frequent inspection, cleaning of containers and replenishment.

Generally mice are effectively baited using wax and extruded blocks. Pellets, granules and liquid baits are available and multiple types should be used depending on the extent and range of rodent infestation.

Generally bait stations compete with available feed sources in mills and the feeders in houses. Effective control requires placement of baits in areas of high rodent activity and in sufficient numbers to encourage consumption. For severe infestation with mice and Norway rats in high-rise houses, baits must be placed along walkways within the pit area at a distance of approximately 25 feet for rats and 12 feet for mice. It is frequently advisable to concentrate bait containers in areas where rodent activity occurs such as adjacent to doors, along walls and beneath egg conveyors.

Ratus norvegius, the Norway rat, is husky, with a blunt nose, short tail and smaller ears. *Photo provied by Motomco Ltd.*

Ratus ratus, the roof rat, has a thin pointed nose, long tail and larger ears. *Photo provied by Neogen Corp.*

Liquid bait may be placed in one-gallon fonts in attics to kill roof rats. Bait containers are required along walls, aisles and in pits and packets of granules can be positioned on beams.

Wax blocks can be placed on nails along walkways beneath the collecting belts on the lowest tier. Rotational baiting can be followed; this involves moving bait stations around the perimeter of houses in 8-foot increments at three day intervals.

Rodent suppression should be intensified at the time of flock depletion and continue during the interflock interval. With no feed in troughs, rodents will avidly access both granular and liquid bait. Unfortunately, in high-rise houses migration occurs after flock depletion which creates the potential for dissemination of SE from infected flocks to susceptible hens in adjacent houses.

Generally, egg-production companies employ a professional exterminator to place and service bait stations. Although this approach may be more expensive than in-company control, bonded professionals maintain records, assume legal responsibility and follow procedures which may be required in terms of qualification as a supplier or to comply with state regulations.

If an in-company program is followed, the procedures must be committed to writing. Clear responsibility for placing and servicing bait stations and monitoring rodent populations must be assigned and the cost of a program should be monitored against predetermined budgetary values and industry benchmarks.

Classifications of rodenticides

Approved rodenticides are classified according to first-generation anticoagulants, second-generation anticoagulants and non-anticoagulants. It is possible that some rodent populations have developed resistance against first-generation anticoagulants since they have been widely used since the early 1950s. The first-generation anticoagulants require multiple feedings over several days to produce death, requiring constant access to bait.

TABLE 2. AVAILABLE RODENTICIDES FOR USE IN POULTRY OPERATIONS

CHEMICAL COMPOUND	CLASSIFICATION	TRADE NAME(S)	BAIT PRESENTATION
Warfarin	1st Generation Anticoagulant	Final	Water, Food
Pindone	1st Generation Anticoagulant	Pival Pivalyn	Water, Food
Chlorophacinone	1st Generation Anticoagulant	Rozol	Food
Diphacinone	1st Generation Anticoagulant	Ramik Tomcat	Water, Food, Wax block
Brodifacoum	2nd Generation Anticoagulant	Talon Havoc Jaguar	Food Wax block
Bromadiolone	2nd Generation Anticoagulant	Contrac Maki Hawk	Food Wax block
Difethialone	2nd Generation Anticoagulant	Boot Hill Hombre	Food
Bromethalin	Non-anticoagulant CNS-agent, single dose	Assult Trounce Vengance Rampage	Food
Cholecalciferol	Non-anticoagulant Produces hypercalcemia	Quintox	Food
Zinc Phosphide	Non-anticoagulant Liberates phosphine in GIT	Eraze	Food

Approved rodenticides are classified according to first-generation anticoagulants, second-generation anticoagulants and non-anticoagulants.

The slow action of first-generation anticoagulants precludes the development of "bait shyness."

Second-generation anticoagulants may produce death after a single feeding although a cumulative effect occurs with consumption of small quantities over successive days. Brodifacoum is the most potent of the anticoagulants and will produce death within four days of a single feeding.

Each of the three non-anticoagulant rodenticides has a specific action. Bromethalin affects the central nervous system and is a single-dose compound which is not associated with bait shyness. Cholecalciferol (Vitamin D3), mobilizes calcium from the skeleton and results in death from hypercalcemia three to four days after ingestion of a lethal dose. Zinc phosphide releases phosphine in the stomach after ingestion, resulting in death. Bait shyness has been associated with this compound.

Occasionally placement of anticoagulant baits is only partially effective. Although resistance is frequently implicated, it is relatively rare and is usually associated with Warfarin the original first-generation anticoagulant. Most failures result from insufficient bait stations placed too far apart with infrequent replenishment of bait or lack of rotation of rodenticides.

Three-prong prevention

Control and suppression of rodents requires a coordinated approach involving exclusion, structural modifications and housekeeping. Selection and placement of baits according to accepted and approved practices should be carried out by a licensed professional exterminator or a designated trained employee in strict accordance with statutory label instructions. Rodent control requires planning, implementation and control both of procedures and costs.

Effective rodent control is a necessary component through the entire chain of egg production. EI

Experience, science guide UEP president

Gene Gregory is a selfless worker for the U.S. egg industry. As an egg producer in Illinois in the 1960s and 1970s, he gained first-hand experience of the problems, risks and opportunities facing farmers.

Gene Gregory

In 1982 he began working for the Midwest United Egg Producers' (UEP) Regional Cooperative, then transferred to the National UEP office in Atlanta in 1992. In 2007 he became president of UEP upon the retirement of Al Pope.

Egg Industry is fortunate to have been able to discuss current issues with Gene at a time when he is involved in serious issues including the emerging lawsuits and Proposition 2 in California, instigated by the Humane Society of the United States (HSUS). He consented to this interview on Sept. 30.

Egg Industry: What lead to the formation of United Egg Producers as a national organization for the U.S. industry?

Gene Gregory: Prior to 1998 there were five regional cooperatives which were effectively serving their constituencies. Consolidation and maturity occurring within the industry involving the emergence of large integrations operating across many states, and all of us facing similar problems, required concentration of resources and coordination in a central office.

> ***'The UEP welfare program is based on science ... the results of controlled experiments subjected to peer review by competent scientists.' Gene Gregory***

EI: What have been the major achievements of UEP over the past twenty years?

GG: One was probably the introduction of the UEP Five-Star Program to prevent SE (*Salmonella enteritidis*). It came at a time when the industry needed to quickly implement quality assurance food safety programs to address consumers' concerns. Although there were a number of successful state programs such as the Pennsylvania EQAP (Egg Quality Assurance Programs), it was felt that the industry required a single standard for producers in states that had yet to develop their own programs.

The UEP was instrumental in working with the American Egg Board (AEB) which was responsible for education of both consumers and the institutional market. The AEB also worked with U.S. Department of Agriculture which developed and promoted the "Fight Bac" program which was also beneficial in promoting safe storage, handling and preparation of eggs.

Working with the Food and Drug Administration (FDA) we were able to establish refrigeration requirements from the point of processing through transportation which also contributed to safety. The UEP is still actively involved with the FDA in developing the Salmonella Reduction Initiative.

EI: What has been the contribution of UEP to welfare of flocks?

GG: Following trends in Europe, the UEP recognized the

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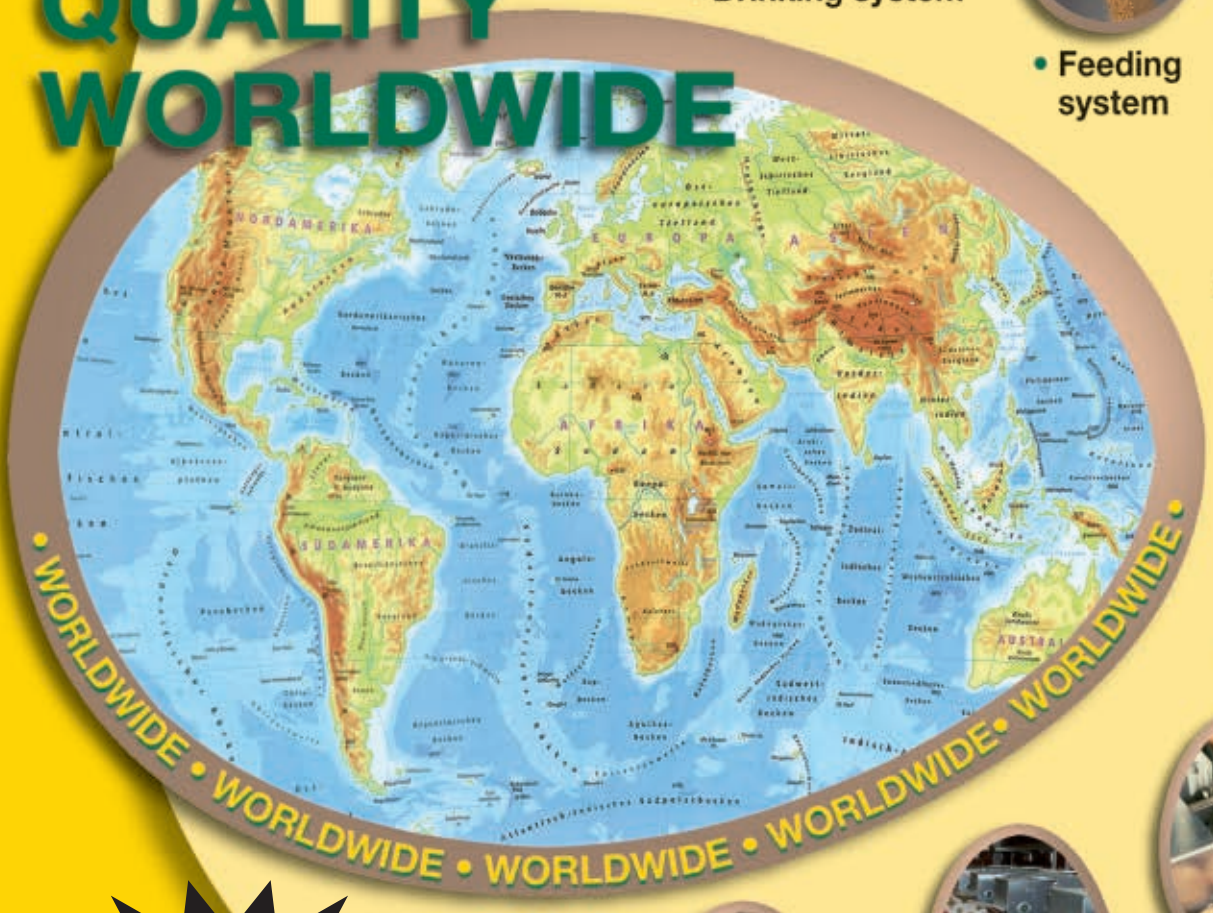

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need for proactive action on welfare. We were concerned that European Union mandates were based on emotion and ethical principles but there was little scientific evidence to support the regulations which were being framed.

The UEP approached Professor Jeffrey Armstrong of Purdue University in 1998 to establish a scientific committee which he selected independently of UEP. The Committee met with leading primary breeders, equipment manufactures and visited egg farms.

After two years of literature review and deliberations, the Scientific Welfare Panel produced a series of recommendations directly related to caged hens. The Producer Committee of the UEP accepted their guidelines although there were still unresolved questions relating to feeding space and molting. These provisional guidelines were incorporated into a program for certification of producers.

EI: How is the program implemented?

GG: Originally, UEP thought that a limited number of members would adopt the certification program. In the end it turned out that over 80% of egg producers subscribed to the provisions of the program.

In order to avoid market disruptions and to ensure an adequate supply of eggs to satisfy market demand, UEP met with the Food Marketing Institute and the National Council of Chain Restaurants. These industry associations agreed to a phase-in of the program over a six-year period. This allowed producers to either re-cage their facilities or to build new housing to supply the market as density was decreased.

EI: How has the UEP welfare program developed since inception?

GG: The approach to molting was resolved following publication of directed research which showed that alternatives to molting by starvation were both practical and, in fact, beneficial. After the studies were validated and a recommendation obtained from the Scientific Welfare Panel, the Producers Committee acted by amending the program to mandate flock-friendly molting practices which have now been universally adopted by producers certified by the program.

There is still concern over feed trough space allowance and studies are in progress to address this issue. It is emphasized that the UEP welfare program is based on science and that all requirements are derived from the results of controlled experiments subjected to peer review by competent scientists.

EI: The UEP Welfare Program of 2002 and subsequent amendments dealt with caged-hens. What is the situation with regard to floor-housed flocks?

GG: The Scientific Welfare Panel has been working for a number of years on the issue of floor-housed flocks. Again applying scientific principles, the panel developed a series of standards adopted by the Producers Committee and issued them at the beginning of this year.

EI: How do you view the future of egg production?

GG: There will be more consolidation, dictated in part by the need to achieve efficiency and driven by the realities of high feed and fuel costs. I believe that the industry will become more environmentally friendly and that we will have to improve manure handling.

We must obtain greater value from our by-products. This presumes greater use of on-belt manure drying and composting both in-house and in dedicated facilities.

EI: What developments do you envisage in marketing?

GG: I would hope that with maturity of the industry it will be possible to supply markets without the traditional swings between over- and under-production. It is my opinion that we will see growth in non-caged flocks but there are signs that price resistance is affecting the expansion in both cage-free and the organic segments of the industry.

I believe that the U.S. industry will continue to process a little more than 30% of production but I do not concur with some industry leaders who feel that breaking, pasteurization and added-value processing will attain significant growth as a proportion of total eggs produced.

EI: Price discovery, production statistics and trend forecasting are critical to making investment decisions. How is UEP addressing this need?

GG: To date we have been fortunate in relying on the diligence and wisdom of Don Bell of California who has assembled and issued statistics and generated forecasts based on his experience in the application of mathematical models.

The UEP is very interested in the establishment of a research unit at Iowa State University, staffed by an experienced agricultural economist to assume responsibilities for statistical reporting and forecasting following the retirement of Don Bell.

Keep current with UEP activities at www.unitedegg.org

EI: In retrospect is there anything that you would have done differently based on your experience with UEP programs?

GG: I believe we should have concentrated more on education of consumers with our welfare program. We should also have enhanced our messages to consumers regarding how eggs are produced and their value, complimenting the work done by the AEB. We are actively addressing these issues using our website and through our public relations advisors. **EI**

PRODUCTNEWS

Mycotoxin analysis aid

Vicam has introduced the new Myco 6-in-1 purification column which can be used to separate six mycotoxins of significance to animal production. The column is used to prepare samples before analysis using high pressure liquid chromatography-mass spectography. The patented immunoaffinity technology will benefit laboratories with suitable analytical equipment including university, commercial and state pesticide and toxicology laboratories to expedite assays on mycotoxins in corn.

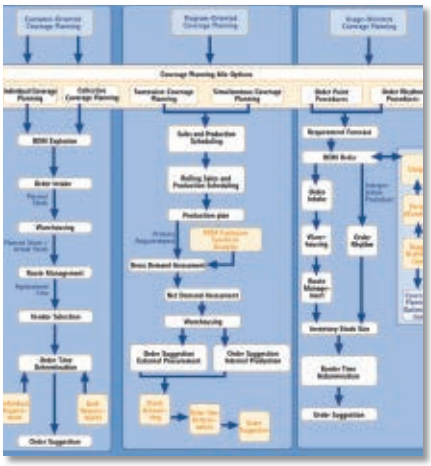
Vicam, www.vicam.com

Rapid Aflatoxin test

Charm Sciences Inc. has introduced the ROSA (Rapid One Step Assay) aflatoxin test system using a single step quantitative assay which is used to determine the amount of aflatoxin present in an extracted sample using the compatible ROSA-M reader.

Charm Sciences, www.charm.com

CSB software



CSB-System International introduced a 4.2 version of their planning and procurement software. The company produces software systems for the food and allied industries which can integrate inventory control, pricing, invoicing and related documentation.

CSB-System International, www.csb-system.com

MARKETPLACE

Ad sizes start at one column by one inch and can be any size up to six column inches. Logos and photographs are acceptable. Add color for an additional $30 per color per insertion. The rate for **EGG INDUSTRY** is $100 per inch per insertion (1-time rate), $90 per inch per insertion (6-time rate), and $80 per inch per insertion (12-time rate). The production charge is included except for ads with excessive make-up demands.

For more information on how to place your ad, contact:
Denise Slager
Tel: 815-966-5575 • Fax: 815-968-0941
E-mail: dslager@wattnet.net

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See us at the IPE-IFE, booth 3822

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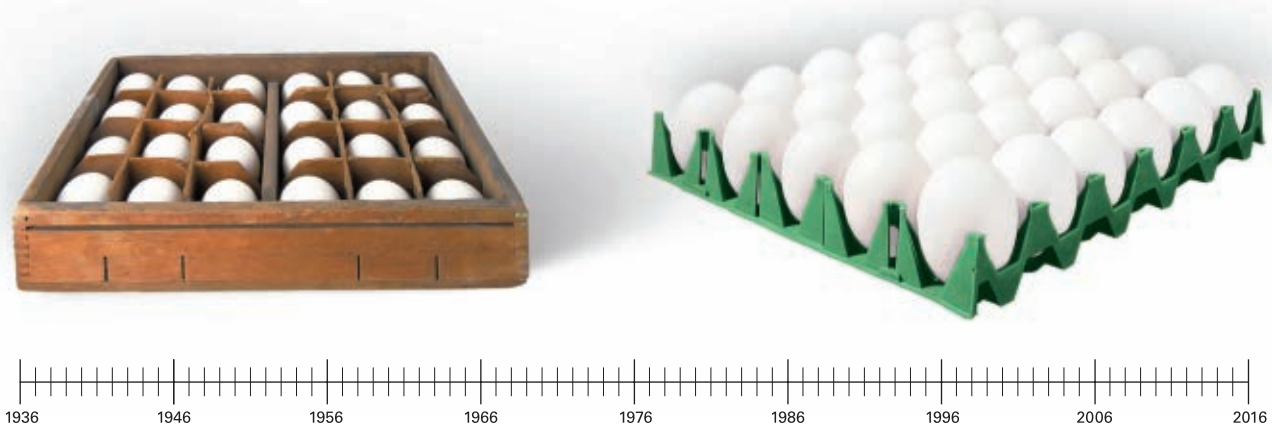
Science suggests that ROVIMIX HY-D provides birds with all the 25-hydroxyvitamin D_3 they need to develop and maintain bones that can withstand the stresses of egg production. In young pullets, stronger bones are necessary for optimal lay persistence which can translate into more eggs. As the hen ages, ROVIMIX HY-D will help promote better egg shell quality.

To learn more about how ROVIMIX HY-D can strengthen your flock, call your DSM Nutritional Products Account Manager or visit our website at **www.nutraaccess.com.**

Rovimix® Hy·D®
Building a better bird.

Unlimited. DSM

Feed conversion has never been more important than today.



That's why we started selecting for it generations ago.

Feed conversion is not a new concept at Hy-Line. Our never-ending research goal has been selecting layers that produce more eggs with higher egg mass on less feed. And since we started that research project in 1936, generations of efficient, high performance layers have been successfully adding to the profitability of egg producers around the world. And will be for generations to come.

***More eggs—less feed*; that's the Hy-Line advantage.**

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