

Egg Industry

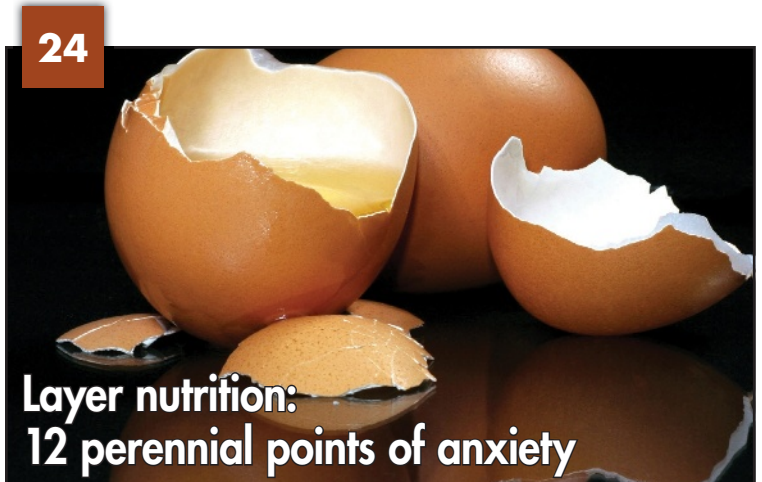
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volume 122 number 1

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EDITORIAL

BY TERRENCE O'KEEFE

tokeefe@wattglobal.com



Are smaller farms really better for animal welfare?

On a recent trip to Europe, I had the opportunity to visit a cage-free layer operation in the Netherlands. The farm has 73,000 hens, which is a relatively large farm for Holland. There are cage-free farms under construction in the U.S. are designed to house 3 million or more hens.

The Dutch farm was very nice and very well managed, but I have seen very large farms in the U.S. that are also very well managed with healthy, good-looking flocks of cage-free hens. According to activist groups, when it comes to animal welfare, environmental impact and just about everything else someone can agitate about, size matters. Big is bad, and small is good.

But, in the case of animal welfare, a group of University of British Columbia researchers have concluded that farm size doesn't matter. The article, "Farm size and animal welfare," was the result of a review of more than 150 publications that "examined the relationship between farm size and at least one animal welfare indicator."

The authors concluded:

"We found little evidence of any simple relationship, positive or negative, between farm size and animal welfare. Instead, the evidence suggests that larger farms provide some opportunities to improve animal welfare but may also create welfare risks."

Based on the review of published research, the authors of course suggest that more research be conducted, but they also provided some advice for animal welfare activists that I heartily agree with.

"We also suggest that policy and advocacy efforts aimed at reversing increases in farm size would be better directed toward improving welfare on farms of all sizes."

The notion that large farms are inherently bad, whether for welfare, the environment or society at large, has always been incorrect. When it comes to farms, size only matters in terms of economies of scale. ■



Read the full article, "Farm size and animal welfare," at goo.gl/QkJnS0.

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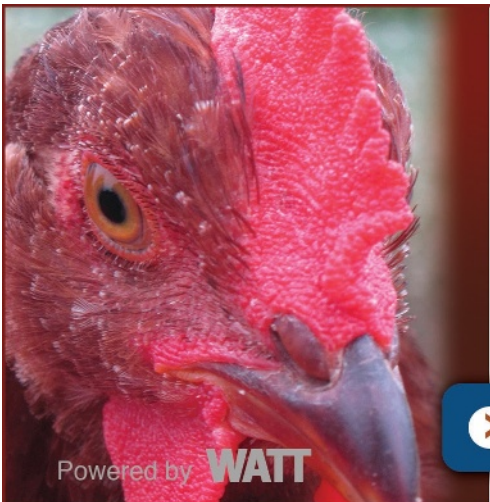
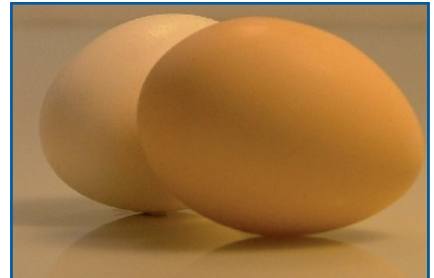
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Egg producers serving the German market have kept the beaks of their hens intact to meet the beak trimming ban that went into effect for pullets placed after January 1, 2017.

Raising hens with intact beaks to produce cage-free eggs

A Dutch egg producer with 25 years of cage-free experience has successfully transitioned to cage-free egg production from hens with intact beaks.

BY TERRENCE O'KEEFE

The practice of trimming the beaks of laying hens, broiler and turkey breeders, and turkey meat birds goes back decades. Beak trimming was instituted as a management tool to prevent injury resulting from aggressive pecking and feather pecking. In spite of advancements such as infrared beak treatment, animal welfare activists have continued to push for an end to beak trimming.

Germany's ban on beak trimming

The German ban on placing beak-trimmed pullets went into effect January 1, 2017. Johan Bouwhuis' farm, Bouwhuis Agro, houses 73,000 laying hens, all

of which are cage free with beaks intact. Bouwhuis has had hens for 25 years and has always housed his birds cage free. This farm is considered a relatively large layer operation in the Netherlands.

Today, the farm houses 46,000 layers in "barn systems," houses with cage-free aviaries. The other 27,000 hens are "free range." In this market, free-range rearing means the hens have a house with cage-free aviaries or floor and nest system and have outdoor access to a "winter garden" and to pasture land with shade trees. The winter garden has a roof and wire screening for walls, but it is not climate controlled. It is

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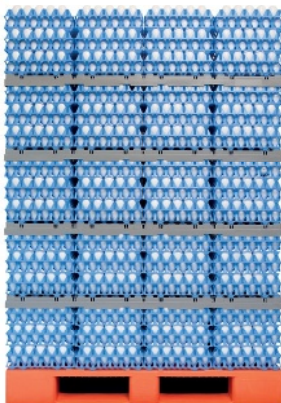
AVIARIES OFFER MORE PLACES than floor and nest systems for lower-ranking hens to move away from more dominant flock mates.

similar to the “porches” used in the U.S. by some organic egg producers. Access to the pasture area is through doors in the winter garden.

Hens not beak trimmed

Egg Industry visited Bouwhuis Agro in early November 2016. At that time, all the hens on the farm were DeKalb White, and they were not beak-trimmed. Bouwhuis said all the farm’s eggs are sold to a customer in Germany unwashed and ungraded. About 70 percent of

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the eggs produced in the Netherlands are sold in Germany. Table eggs in Europe are not washed or refrigerated.

Bouwhuis said they have implemented some management changes along with the elimination of beak trimming, but that the change has gone smoothly. He said that when a flock is first introduced from the pullet farm to the layer house, they use a product called PICKStein (peck stone), which is a mineral block containing calcium, magnesium, sodium and trace minerals at which the hens can peck.

As the mineral block wears down, so might the sharp point of the hens' beaks. He said that once the mineral blocks are worn down, they place some concrete blocks in the scratch areas of the houses for the hens to peck. By the end of the lay cycle, the concrete blocks have been pulverized by the hens. Alfalfa bales are also placed in a holder that rotates as the birds peck at and eat the alfalfa. The idea is to keep the hens occupied exploring and pecking something other than their flock mates.

 Fewer stressors, more stimuli aid untrimmed layer behavior: www.WATTAGNet.com/articles/28923

Aviary better than floor systems

When Bouwhuis built his first layer house, a floor and nest system was installed. Later, Jansen aviary systems were installed and aviaries are in all of the houses now. Bouwhuis said the birds perform better in the aviaries.

The aviaries have three levels, with feed provided on the first and third levels, and nests and water on the second level. The aisles between the aviaries are almost 8 feet wide (2.4 meters), which provides plenty of scratch area for the hens. Ample scratch area and lots of perch space are thought to contribute to reduced bird-to-bird pecking.

The housing system used to raise the pullets must be matched to how the hens will be housed in the layer

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house. The pullets need to learn how to jump and fly in the pullet house, otherwise they will tend to stay on the floor in the layer house and excessive floor eggs will result. The pullets raised for Bouwhuis Agro are reared in Jansen Nivo Varia systems.

Good free-range performance

Bouwhuis is raising just its second free-range flock, and on Egg Industry's recent visit, the hens were 30 weeks

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old. The first free-range flock outperformed the breed standard from week 24 through week 88 in terms of rate of lay. Production peaked

at 98.3 percent in week 29 and remained at more than 90 percent through week 74.

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Alfalfa bales can be placed in a holder to give hens a distraction for pecking. It also rotates to make it harder for hens to camp out on top of it and quickly devour the bale.

rearing for hens, Bouwhuis said, “It is a nice sight to see the birds outside, but it isn’t better for the bird.” He said the free-range flocks have 2 to 3 percent more mortality than cage-free flocks. Bouwhuis receives EUR0.025 (US\$0.027) more for free-range eggs than for cage free, so while more challenging from a management standpoint and less safe for the hens, so far, it has been more profitable.

Bouwhuis offered one tip for caring for free-range hens: He said it is best if the birds are a little heavier coming from the pullet grower because it takes a little time for the bird to get acclimated to going outside. He said some birds will go out every day, but that more will go out in cloudy weather. The big concern for outdoor access, besides potential exposure to wild birds carrying disease, is predators like foxes and birds of prey. Predators can cause the hens to panic and pile up, which can kill more birds than the predators themselves. ■



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US poultry industry recalibrates for **Trump** presidency

The U.S. poultry industry's political, regulatory and economic calculus is radically different with the election of Donald Trump as U.S. president.

BY GARY THORNTON



A key factor in the business outlook for the U.S. poultry industry changed with the election of Donald Trump as the 45th president of the United States.

Speaking at the National Chicken Council Annual Conference just days before the 2016 election, political analyst Charlie Cook said Donald Trump had no chance of being elected president of the United States and Hillary Clinton was the presumptive president elect. The political, regulatory and economic calculus is now radically different.



NCC Chairman Mike Popowycz is hopeful that meaningful immigration reform will occur in 2017.

From the same podium, Ambassador William J. Burns, former deputy secretary of state in the Obama administration, expounded on America's enshrined doctrines of multilateral global diplomacy and trade. If Trump has his way, it would shatter much of the globalist dogma ushered in by the Reagan administration and continued in succeeding ones.

On the economy, the dean and professor of International Business at the Tuck School at Dartmouth College and former member of the Council of Economic

Advisers in the Executive Office of the president surveyed projections for slow growth in 2017 for the U.S. (2.2 percent) and the world's advanced economies (1.8 percent). Trump confidently says 4 percent U.S. economic growth can be achieved.

Trump's vision complicated for poultry

The question is: Just how have the political, regulatory and economic outlooks changed for the U.S. poultry industry? It remains to be seen how Trump's pro-business policies would impact the U.S. poultry industry.



While a lightening of the regulatory burden would be favorable for all businesses, Trump's campaign pledges, if implemented in policy, could impact the poultry industry in unpredictable ways on trade, the availability of labor, government regulations and the economic growth that spurs consumer spending on food. For one thing, U.S. poultry and red meats have historically been the sacrificial lamb when trade upsets occur.

In early December 2016, as Trump conducted his "Thank You" tour of the electoral swing states that gave him the presidency — promising to fulfill promises to rectify unfair trade practices, secure borders, strike down arbitrary regulations, foster job creation and eco-



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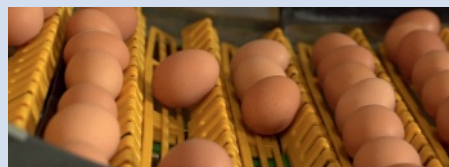
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TRUMP PRESIDENCY



Outgoing NCC chairman Todd Simmons pointed to the opening of South Africa to U.S. chicken as a major win for the industry in 2016.

conomic growth — sitting President Obama lectured the American people that Trump would not be able to make good on those promises.

Trump, however, told a crowd in Fayetteville, North Carolina: “I’m asking you to dream big again as Americans. I’m asking you to believe in yourself. I’m asking you to believe in your country and to believe in your future.”

Too little confidence in America

Citing global attitude surveys, Tuck business school professor Matthew Slaughter told NCC members that in advanced economies

there is little optimism for the next generation. Sixty-five percent say their children will be worse off financially than the present generation, while only 28 percent say their children will be better off. The numbers are even worse in the U.S., where only 21 percent believe the next generation of children will be better off. A survey in September 2016 indicated that 69 percent of people in the U.S. believed the country was on the wrong track, while only 27 percent thought the country was on the right track.

“What both Bernie Sanders and Donald Trump tapped into in their presidential campaigns is that the slowly rising economic tide has been lifting very few boats,” Slaughter said.

“U.S. real median household income in 2015 was \$56,516. This was barely above the level first reached in 1989, and it was 2.4 percent below the level reached in 1999,” he said.

In fact, only the highest educational groups (Ph.D., M.D., J.D., MBA) representing 4 percent of the U.S. population experienced rises in real total earnings from 2000 to 2014.

Growth is slow in advanced economies

Slaughter presented world economic outlook projections for slow growth in output in the advanced economies. In the U.S., it dropped from 2.6 percent in 2015 to a projected 1.6 percent in 2016. The projection for the U.S. in 2017 is a tepid 2.2 percent.



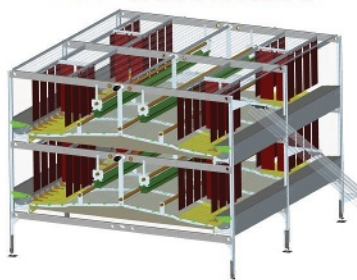
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Why is growth so slow? “Mainly because productivity growth is slowing,” he said. “U.S. average annual labor productivity growth for 2011-2015 averaged just 0.6 percent. At this rate, average standard of living takes 116 years to double.”

Will Trump’s policies drive economic growth?

How do countries grow their economies and raise earnings? “Mainly through productivity growth,” Slaughter said. “Productivity booms — the kind that create entire industries, unleash productivity, slash costs, create jobs, boost incomes and generate billions in profits — tend to be driven by companies that are some combination of young, nimble and global.

“Governments can boost probability of private-sector productivity growth through wise policies on tax, trade, immigration, research and infrastructure. The fundamental question is will governments have

Growth projections for world economies

Percent change

	2015	Projections	
		2016	2017
World Output	3.2	3.1	3.4
Advanced Economies	2.1	1.6	1.8
United States	2.6	1.6	2.2
European area	2.0	1.7	1.5
Germany	1.5	1.7	1.4
France	1.3	1.3	1.3
Italy	0.8	0.8	0.9
Spain	3.2	3.1	2.2
Japan	0.5	0.5	0.6
United Kingdom	2.2	1.8	1.1
Canada	1.1	1.2	1.9
Other advanced economies	2.0	2.0	2.3
Emerging market and developing economies	4.0	4.2	4.6

Source: Matthew Slaughter, 2016 National Chicken Council Annual Conference; IMF WEO, October 2016

Growth in economic output is slow because productivity growth is slowing.

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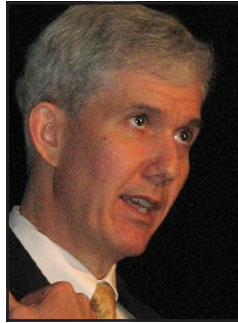
TRUMP PRESIDENCY

the courage and will to pursue these policies?"

He pointed to immigration policy — a policy area in which many U.S. poultry industry leaders have advocated reform — as a potential booster for

economic growth. "Will government leaders bring on [positive conditions for growth] via high-skilled immigration liberalization?" he asked.

Again, the policy outlook for poultry is complicated. While poultry producers would benefit from immigration reforms that bring skilled people into the workforce,



"I, FOR ONE, AM hopeful [about the economic outlook]. It beats the alternative, and it often is surprisingly correct."

**— Matthew Slaughter,
Dean of the Tuck School of business**

their biggest need is for lower-skilled workers.

Questions about trade, immigration policy

It remains to be seen how the policies of the Trump administration will impact the U.S. poultry industry. While a lessening of the regula-

tory burden on U.S. business would benefit poultry producers, the impact of Trump's policies — especially on trade and immigration — are impossible to predict. The U.S. poultry industry faces new and unpredictable challenges and opportunities in 2017 with Donald Trump in the White House. ■

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3987_Watt_Egg Industry_April

Future of poultry breeding, balanced genetic selection

Geneticists say economically important traits will improve as balanced selection efforts result in broilers and layers that perform well and have high welfare under a variety of management and nutritional regimens.

BY TERRENCE O'KEEFE

In the developed world, the broiler and layer industries find themselves in an unusual situation. Performance measures for livability, growth rate, feed conversion, and carcass and slaughter yield have never been better for broilers, and the same is true for persistency of lay, livability and feed conversion for layers. However, activist group activities and consumers in the developed world have a heightened interest in animal welfare and transparency, so poultry producers are being challenged to manage their flocks so they are productive and presentable for a photo shoot throughout their lives.

Selecting layers in varied environments

Fortunately, poultry breeding companies recognized these consumer and activist trends years ago and began adapting their selection programs to produce genetic stock that is adaptable to multiple housing situations, has improved performance on bird welfare measures and continues to be more productive with each generation. The movement out of cages for laying hens started in Europe, but it is spreading rapidly to North America. Laying hen strains have proven adaptable to cage-free environments because breeders began adding cage-free environments for their selection lines more than 20 years ago.

Frans van Sambeek, research and development director, ISA, said selection for the important cage-free behavioral traits like nesting behavior and lower aggressiveness won't really slow progress on economically important

Broilers will likely continue to have the potential to be raised to higher weights as balanced selection continues to improve welfare and meat quality traits, rate of weight gain and feed conversion rates.

Photo courtesy of Cobb-Vantress



traits like persistency of lay or egg size and quality, because this balanced approach to selecting breeder candidates is being helped by genomic techniques.

Santiago Avendano, senior geneticist, Aviagen, explained: “Genomics is especially important for attributes for which there is a limited amount of individual records at the time of selection, like sex-limited traits. For instance, in the past we have been able to make a prediction of the genetic potential for egg production or hatchability of a male selection candidate based on the qualities of its family, but with genomics we can now see exactly the genetic configuration of each selection candidate and use it for predicting its genetic potential more accurately.”

Feather coverage

Feather coverage on laying hens provides an example of where what might be thought of as a welfare trait has actually proven to be a trait that is of increasing economic performance.

“Selecting for feathering is an important trait from a feed efficiency point of view so that hens are not overeating (to maintain body temperature), but it is also important from a consumer and society point of view because in free range or in aviaries, consumers want to see the welfare of the birds,” said van Sambeek.

Cage-free houses provide more space per hen and this makes temperature control in the layer house more of an issue in the winter months, so better feather coverage can save on feed and fuel costs.

Preparing for beak trimming bans

Dr. Neil O’Sullivan, research director, Hy-Line International, said the company discontinued beak trimming selection candidates more than 20 years ago. He said they didn’t document beak shape when they first started selecting nonbeak-trimmed birds, but he said that their perception is that beak shape might have changed slightly. However, the big change has been in the bird’s behavior.

“Now it is the decision of the farm management to beak treat,” O’Sullivan said. “If birds are in open-sided houses, they probably need to be beak trimmed, but you don’t have to otherwise.”



Poultry breeders see paradigm shift with genomic selection:

www.WATTAgNet.com/articles/9697

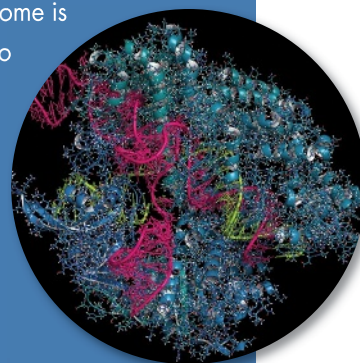
Finding solutions to breast meat myopathies

Breeders have been quite successful in increasing the breast meat yield of broilers. In some markets, particularly in the U.S., birds raised for deboning are routinely processed at 9 pounds (4.1 kilograms) live

Will genome editing be accepted in poultry?

Genome editing is the process where the native genome of an organism is precisely corrected or adjusted. This technique is beginning to be used in human medicine where the patient’s genome is precisely manipulated to achieve a therapeutic effect. In contrast, genetically modified organisms (GMOs) have had transgenic introduction of foreign DNA sequences, which is different from genome editing where no foreign DNA is introduced into the organism’s genome.

The poultry geneticists interviewed for this article all cited genome editing as a technology with potential to affect genetic selection and breeding in the future, but they stressed that it is uncertain whether consumers and society will make a distinction between genome editing and genetically modified organisms when it comes to food-producing animals. Genome editing has not been employed in poultry at this time.

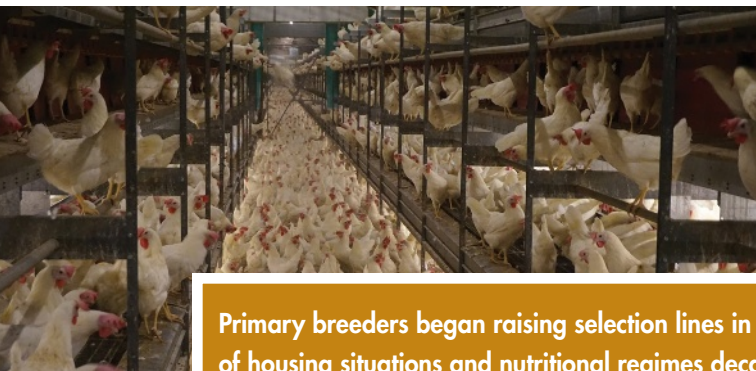


FUTURE OF POULTRY BREEDING, BALANCED GENETIC SELECTION

weight or more. Along with these larger birds, processors are seeing increases in white striping and woody breast muscle myopathies.

All breeders report gathering information on several meat quality traits in birds at processing to gather information about individual birds and families.

According to Dr. Derek Emmerson, vice president of research and development at Aviagen, “These are combined with indirect measures on selection candidates to identify birds with the condition while they are still alive and provide a very accurate way to identify



Primary breeders began raising selection lines in a variety of housing situations and nutritional regimes decades ago so that the industry would be prepared for changes in how birds might be housed and fed in the future.

which individuals are developing wooden breast. We have also increased our emphasis on traits such as cardiopulmonary function to provide a better physiological foundation to support improved meat quality and reduce the impact of one of the important risk factors for meat quality, namely, hypoxia or tissue ischemia.”

The root causes of these muscle myopathies is not fully understood, but researchers are actively looking for solutions.

Dr. Mitch Abrahamsen, senior vice president of research and development, Cobb-Vantress, said: “Cobb currently works with researchers on three different continents to find solutions, both short term and long term, to meat quality issues that are seen in the industry.”

Selecting the broiler of tomorrow

Given all the considerations of selecting for welfare traits and efficiency, breeders were asked if birds raised for deboning would continue to get larger in the future.

“There might be a physiological limit or at least a physiological optimum, which most likely has not been reached yet,” said Yves Jego, director of research and development at Hubbard. “It is not just a matter of what the physiological limit will be, as these kind of extremely heavy broilers need to be grown under completely different management (growth profile, feed, lighting, housing, density, etc.) to get the maximum saleable final product.”

“Short term — yes. Long term — it depends,” Abrahamsen said. “There are metabolic limits that have been reached at some of the heavier weights, but we had similar issues with ascites in the past. The integrations learned how to manage or limit the issues, while the breeding companies worked on identifying families that were healthier. These same principles apply to metabolic challenges that are faced today at heavier weights or faster growth rates.”

“Selection for welfare traits including leg strength, gait, foot pad integrity and cardiopulmonary health provides a better physiological foundation to support field livability and bird welfare,” Emmerson said. “In addition,

pedigree lines are selected across a range of different environments including drug-free production with exposure to common enteric challenges. This has allowed us to develop breeds which are adapted to processing at higher weights and under antibiotic-free conditions.”

“The real question of the upper limit for deboning birds is a broader one and will be determined by a number of different factors e.g., market factors, product use and consumer acceptance.” ■

This is the first article in WATT Global Media's 100-year anniversary series, which looks at key drivers that will shape the future of the worldwide poultry industry. The next article in the series will explore how innovations in seed technology will benefit the poultry industry.

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Layer nutrition: 12 perennial points of anxiety

If we were to mention the main nutritional issues faced by the egg industry, we could focus on twelve points that are the focus of nutritionists, genetic companies, feed mills, veterinarians and, of course, farmers.

BY IOANNIS MAVROMICHALIS

Every nutritionist involved in layer nutrition has come across a number of problems that we can summarize in the following brief list.

Not only do these problems keep showing up constantly, but for most of them we do not have a satisfactory solution.

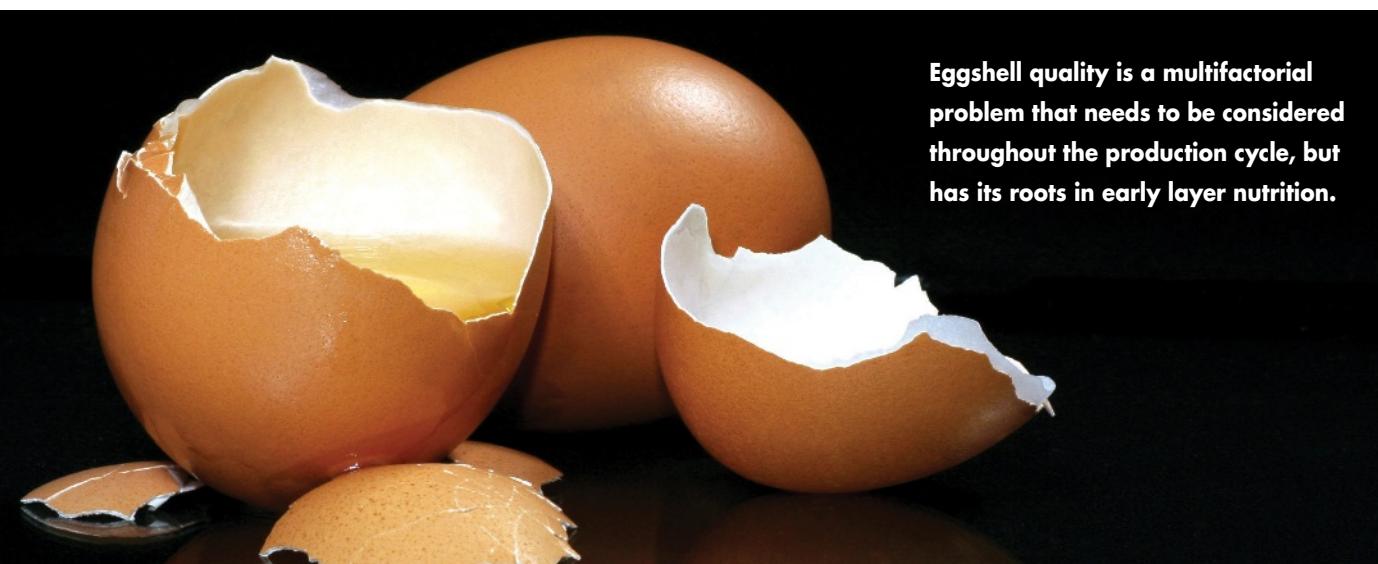
1 Eggshell quality remains the major issue

This is a multifactorial problem that has deep roots in early layer nutrition. The major issue is that as the hen ages and tends to produce a large egg, she cannot spare extra calcium, ending up producing an ever-thinning eggshell. To make matters worse, the efficiency by which she absorbs calcium from feed drops considerably. It is only by means of

controlling egg size, preserving and even boosting calcium absorption capacity and monitoring actual calcium levels in the feed that this problem can be addressed.

2 Egg size is a double-edged problem

Fresh-egg markets prefer a larger egg, but this comes with a thinner eggshell, and it might drain the hen from body reserves of energy and protein if her nutrition is inadequate. Most producers prefer to limit the upper egg size to ensure a longer egg cycle, but others invest in less but heavier eggs. The main means towards both goals is protein and especially methionine nutrition.



Eggshell quality is a multifactorial problem that needs to be considered throughout the production cycle, but has its roots in early layer nutrition.

3 Summer heat distress has not been resolved

During heat waves, hens will eat less and produce fewer and smaller eggs. This issue is best addressed by proper facilities and management, but nutrition can also play a role. Primary attention should be paid to feed electrolyte balance, but certain additives, especially through the water, can be administered to alleviate the problem. Feeding during cooler hours (night) is not an easy proposition since it interferes with the egg formation cycle.

4 The dilemma of a prelayer diet

Most farms feed a prelayer diet that is high in calcium to ensure early egg production does not deplete hens, but some don't because this might predispose hens to early renal failure from calcium over-dosage. A high calcium prelayer diet also contributes to higher water intake throughout the egg cycle, something important for layers housed on litter.

Understanding daily calcium cycle in layer hens:

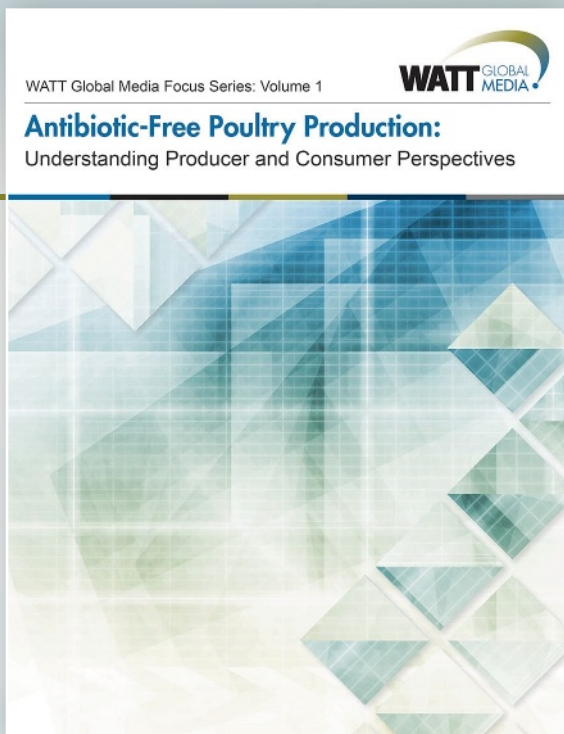
www.WATTAgNet.com/articles/25083

5 Pellets, mash or crumbles?

This is a much-asked question, and it really has no single answer apart from the recommendation to test what works best under the conditions of each farm. Mash is cheaper, but it can separate. Pellets are recommended for low-appetite strains, but they are more expensive. Crumbles seem to work best in most situations, but they are very expensive.

6 Sticky, wet, dirty litter

Water overconsumption combined with viscous cereals in the feed cause sticky droppings that refuse to lose their water through evaporation. This is not such an issue in cage-housed layers, but when they are housed on litter it becomes a major issue that affects hen health



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LAYER NUTRITION

and welfare and gives issue to dirty eggs. Understanding why hens might consume more water than they need (feed electrolyte balance and protein are the major nutrition issues) and addressing feed viscosity seem to resolve this problem, unless it is a major disease problem.

7 Finding the right yolk color

Pale egg-yolk color is undesirable in the fresh-egg market, whereas an overly red one is also suspicious. Finding the right point is an exercise of balance between natural and synthetic pigments. Where synthetic pigments are not preferred, natural intense pigments can be sourced from less conventional ingredients.

WHEN ONE WANTS TO know about layer nutrition, calcium should be the starting point.

8 Feather picking

This remains a problem in caged layers, mostly out of boredom, lack of space or both, but it can also happen in cage-free hens if their diets are low in protein or specific amino acids. Checking the mineral and amino acid profile of a diet will quickly reveal if this is a nutrition problem or something that needs to be addressed through management. Some additives might offer limited relief from this problem.

9 Cage layer fatigue

High-producing strains confined in cages often suffer from this syndrome, especially if their bones are depleted of calcium due to nutritional imbalances. Affected hens become progressively paralyzed and die from hunger as they move to the back of the cage. A prelayer diet with the correct level of calcium seems to be helpful especially if it is targeted along the appearance of sexual maturity.

10 Fatty liver syndrome

When hens overeat their daily allowance, or when there is not enough protein in relation to protein/

amino acids in their feed, the excess energy is deposited as fat. Excess fat in the liver is easily oxidized, leading to hemorrhages and general liver dysfunction and to reduced productivity, health and longevity. Restricting feed intake is not easy because not all birds will overconsume feed. It is by balancing the energy-protein ratio and by adding nutrients and additives that will help “dissolve” the fatty liver that this problem can be addressed by nutritional means.

11 Calcium is the most discussed nutrient

When one wants to know about layer nutrition, calcium should be the starting point. Understanding the daily calcium cycle — from calcium in the feed to calcium in the eggshell — and the recycling of calcium in bones are the cornerstones of calcium nutrition. In addition, deciding on the optimum source of calcium, its form and granular size and, finally, the time of supplemental calcium feeding, all are important aspects of this delicate subject. The role of phosphorus and vitamin D are two further aspects that are often overlooked, but these two nutrients interact with calcium absorption and utilization and must be monitored.

12 Genetics and book dietary specifications

Genetic suppliers always offer sound nutritional background information on how to best feed their layers. In most cases, these are a mix of scientific and empirical evidence, but by nature they are best estimates or averages. Some producers and nutritionists prefer to follow these guidelines to the letter, if only not to be blamed when something goes wrong. Others with more experience prefer to use these recommendations as guidelines and starting points based on which they can customize the nutrition program of each layer farm.

Layer nutrition is not limited to the above twelve points, but these do constitute a good reference list for the most common issues. Each point is worth further analysis and study, and nutritionists, researchers and producers are working hard to find better solutions. ■



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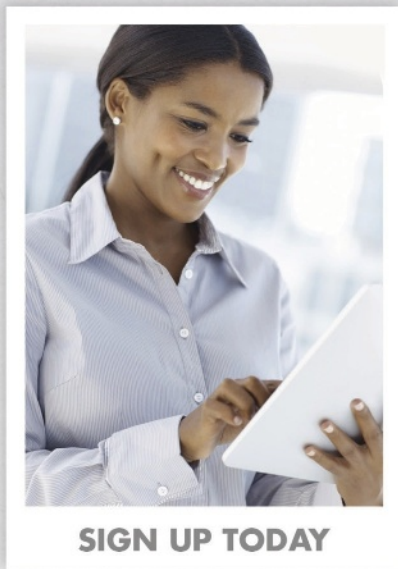
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- Vaccine containers: Store in liquid nitrogen

INDICATIONS

This vaccine is recommended for use in healthy chickens one day of age or older by coarse spray as an aid in the prevention of bronchitis caused by IBV GA08 and aid in the reduction of bronchitis caused by IBV GA13, and gel droplet by oral administration as an aid in prevention of bronchitis caused by IBV GA08 and IBV DMV/1639/11. Good management practices are recommended to reduce exposure to Infectious Bronchitis virus for at least two weeks following vaccination.

PRECAUTIONS

1. Do not over dose or under dose.
2. Vaccinate only healthy birds.
3. Be sure vaccination equipment is clean and ready for vaccination. Avoid residual chemical disinfectants (bleach, quaternary ammonia, etc.) to come in contact with vaccine by thoroughly rinsing the equipment.
4. Do not open and mix vaccine until ready to vaccinate.
5. Be sure the machine is calibrated to deliver the required volume of vaccine per chicken by spraying into a volumetric cylinder.

VACCINE PREPARATION

1. Be familiar with all safety and precautionary measures for handling liquid nitrogen to prevent personal injury.
2. Wear gloves, a plastic face shield and protective goggles before removing vaccine ampoules from the liquid nitrogen.
3. Check the container to confirm a sufficient amount of liquid nitrogen is present to keep the vaccine frozen. If thawed, do not use the vaccine. The containers (Dewars) must be checked regularly for liquid nitrogen level and must be refilled as needed.
4. After inspecting the diluent and completing all preparations, match the dose size of the vaccine with the diluent amount.
5. The vaccine should be quickly removed from the Dewar and placed into a clean 80°F (26.5°C) thaw bath. This step can be repeated until the appropriate dosage has been reached. Gentle agitation during the thawing process promotes rapid, uniform thawing and evenly distributes the vaccine in the ampoule.
6. Immediately after thawing, confirm the vaccine is removed from the ampoule neck and carefully open the ampoule.
7. Gently draw the vaccine from the ampoule with an 18-gauge, 1.5 inch needle and slowly mix with the diluent. Rinse the ampoule one time with the diluted vaccine.

DIRECTIONS FOR USE

Carefully read the directions before use. The instructions must be completely followed. Match the vaccine dose size to the proper distilled water dilution for administration.

For 10,000 doses of Cevac® I Bron by **coarse spray**

1. Transfer contents of the Cevac® I Bron ampoule into 1000mL distilled water at room temperature (68-77°F or 20-25°C).
2. Vaccinate at one day of age or older at a ratio of 10mL for every 100 birds, through a coarse spray machine or device.
3. Use vaccine within 90 minutes of preparation.

For 10,000 doses of Cevac® I Bron by **gel droplet**

1. For 10,000 doses add 70g of CEVAGEL™ to 2.5L of distilled water. Mix well with a blender. No further agitation is required for use on the same day.
2. Mix the vaccine vial well prior to opening.
3. Pour half of the gel into a clean container, add the vaccine, then add the remaining gel to a final volume of 2.5L for 10,000 doses. Mix with a blender.
4. Vaccinate at one day of age or older with a ratio of 25mL for every 100 birds using a gel administration machine.
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NOTICE

This vaccine has been thoroughly tested for safety, purity and potency and is in compliance with all applicable USDA and Biomune Company standards.

CAUTION

1. Do not vaccinate within 21 days before slaughter.
2. The vaccine contains gentamicin and amphotericin B as preservatives.
3. Inactivate any unused product.
4. Keep vaccine in liquid nitrogen until ready for use.
5. Do not open and mix vaccine until ready to vaccinate. Use entire contents when first opened.
6. Do not over dose or over dilute the vaccine.
7. The effect of combining this vaccine with other products is not known and could impact vaccine efficacy.
8. Contact a physician for human exposure.
9. For use in animals only.

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