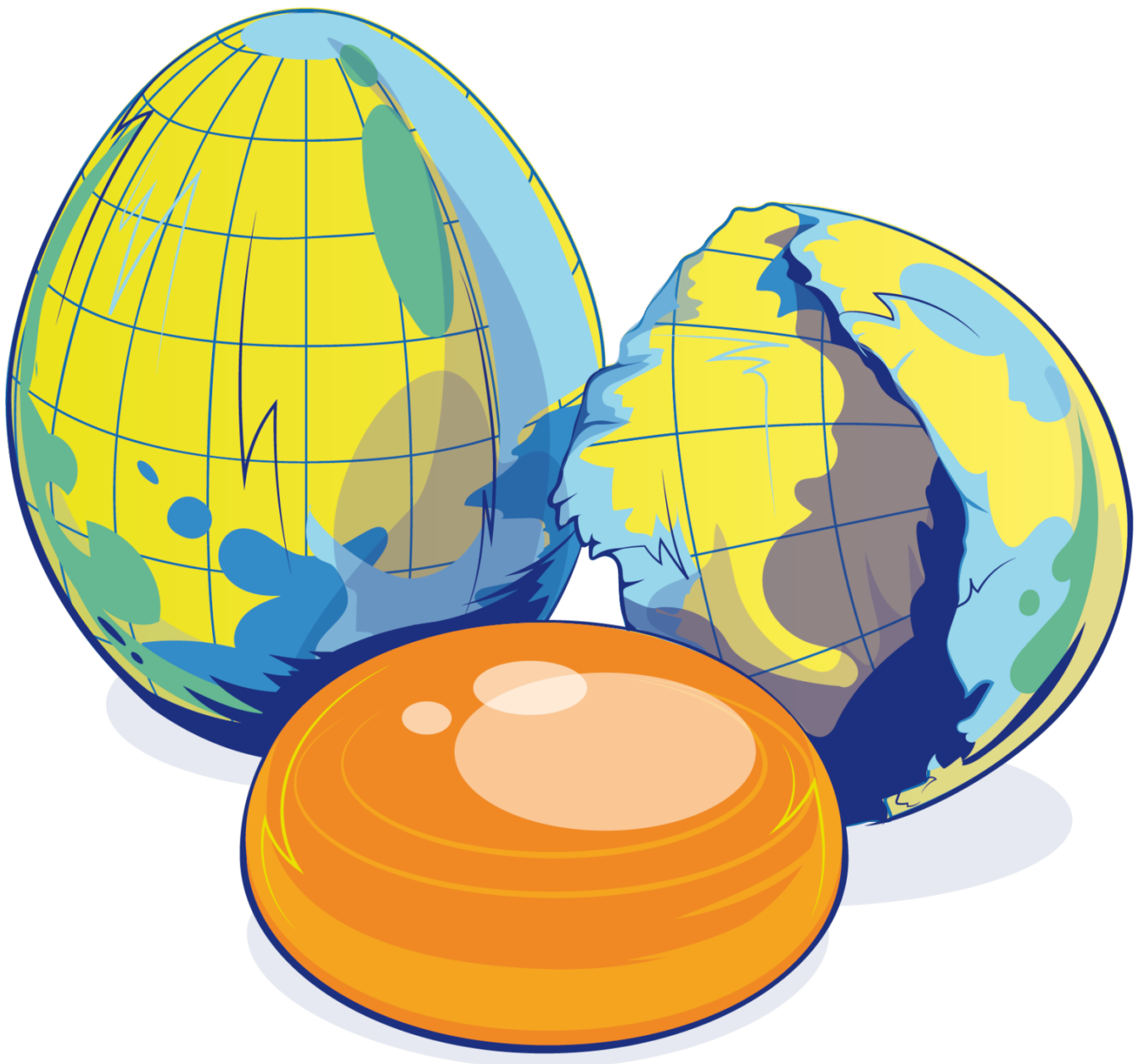


Reducing apo-esters: What are the alternatives?



By *Technical Team*, EW Nutrition

A year ago, the European Commission announced regulation [\(EU\) 2020/1400](#) - restricting the use of ethyl ester of β -apo-8'-carotenoic acid (generally known as 'apo-ester'). Starting on 26 October 2021, this legislation restricts the use of apo-ester in poultry feed to 5 mg/kg for laying hens and 15 mg/kg for broilers.

As apo-esters is a synthetic pigment - not naturally occurring in nature - this measure was taken because the authorities could not guarantee safety upon exposure to the user. Limiting the concentration in feed would reduce this risk to acceptable levels, according to the legislators' decision.

Why use apo-esters in the first place?

Apo-ester is a synthetic yellow colorant, with good stability in premixtures and complete feed. It also has a high deposition rate in the yolk, making it an effective egg yolk colorant.

Its ability to be applied through premix facilitates the proper dispersion in the final feed, which is relevant if micro-dosing systems are lacking in the feed mill.

Why was the legislative change necessary?

The legislative change which limits the use of synthetic apo-ester is based on the precautionary principle and in line with a broader market trend: away from synthetic (non-natural) components, towards the use of naturally occurring alternatives.

The alternative to apo-ester

Natural yellow pigments, typically based on lutein and zeaxanthin produced from marigold oleoresin, are available in the market and can be used to reach the egg yolk pigmentation desired by the consumer. In contrast to apo-ester, these natural solutions are functional antioxidants, further contributing to the egg's nutritious composition.

Challenges for natural alternatives

However, stability in premixtures and complete feed can be a challenge, with inconsistent yolk coloration as a risk. Safety can also be an issue, so it is important to ask for Quality Control measures routinely applied to avoid contamination with undesired substances (e.g., dioxins). To limit the risk of producing eggs with insufficient yolk coloration, it is important to select natural pigments with excellent stability and deposition efficiency.

What is the best natural alternative to apo-ester?

EW Nutrition's natural pigment [Colortek® Yellow B](#), produced with a proprietary technology, withstands the harsh conditions in premixtures, while the unique saponification process provides unparalleled deposition rates.

Moreover, Colortek® Yellow B is the most concentrated natural pigment on the market, making it the perfect premix-delivered colorant in the egg industry. If you want to produce all-natural eggs without worrying about the stability of the product or the reliability of your egg coloration, please contact your local EW Nutrition person.

EW Nutrition launches Ventar D, the next-generation gut health optimizer



VISBEK, 18 October - EW Nutrition announces the launch of a best-in-class next generation gut health modifier. Ventar D is an innovative proprietary blend of phytomolecules with a novel delivery mechanism.

[Ventar D](#) addresses key requirements of the animal nutrition industry. The product has been formulated to support gut health and improve performance, resulting in an increase in profitability for the customer.

Ventar D has been the result of an integrated joint effort of EW Nutrition's research, development, production, sales and services teams.

Michael Gerrits, Managing Director EW Nutrition, emphasizes the success of the company's in-house holistic research and development processes: "EW Nutrition is committed to delivering top-notch gut health solutions to reduce the dependency of the animal nutrition industry on antibiotics. Starting from the in-depth understanding of customer needs, a 100% backward integrated approach allows for seamless support by EW Nutrition throughout the customer's journey."

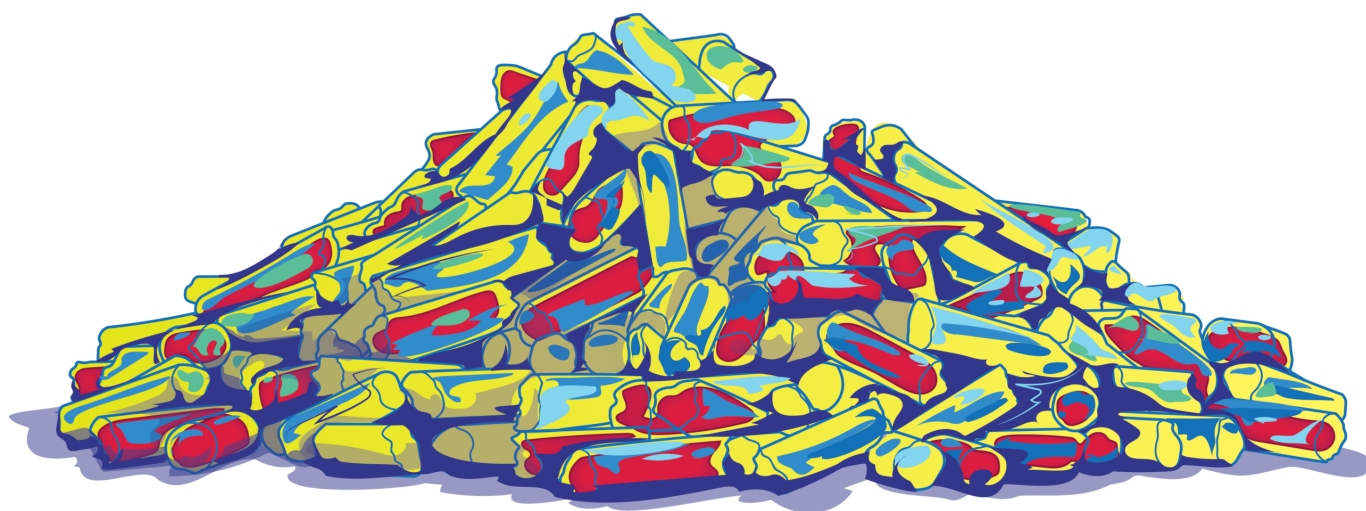
Ruturaj Patil, EW Nutrition's Product Manager Ventar D, speaks of the benefits that Ventar D brings to its customers: "The efficacy of any effective gut health solution lies in its formulation, stability and delivery in the [gastro-intestinal tract](#). Ventar D offers a proprietary formulation, best in class pelleting stability and an innovative delivery system. We are excited to bring this novel solution to our customers and be part of their journey to make animal production more sustainable, while increasing profitability."

For more information, please visit <https://ew-nutrition.com/animal-nutrition/products/ventar-d/>.

About EW Nutrition

EW Nutrition offers animal nutrition solutions to the feed industry. The company's focus is on gut health, supported by other product lines. EW Nutrition researches, develops, produces, sells and services most of the products it commercializes. In 50 countries, key accounts are served directly by EW Nutrition's own personnel.

Encapsulation: How a modern phytogenic feed additive makes all the difference



By Technical Team, EW Nutrition

Secondary plant extracts have been shown to improve digestion, have positive effects on intestinal health, and offer protection against oxidative stress in various scientific studies in

recent years. Their use as a feed additive has become established and various mixtures, adapted to the various objectives, are widely available.

However, their use in pelleted feed has been criticized for some time. In particular, an unsatisfactory reproducibility of the positive influences on performance parameters is the focus of criticism. The causes invoked for the loss of quantifiable benefits are inadequately standardized raw materials, as well as uncontrollable and uneven losses of the valuable phytochemicals contained during compound feed production.



Delivery mechanisms influence product benefits

The animal production industry has long attempted to [reduce its need for antibiotic drugs](#) to an indispensable minimum. As a result, more natural and nature-identical feed additives have been used for preventive health maintenance. These categories include numerous substances that are known in human nutrition in the field of aromatic plants and herbs, or in traditional medicine as medicinal herbs.

The first available products of these phytochemical additives were simply added to compound feed. The desired parts of the plant were, like spices and herbs in human nutrition, crushed or ground into the premix. Alternatively, liquid plant extracts were placed on a suitable carrier (e.g. diatomaceous earth) beforehand in order to then incorporate them into the premix. These procedures are usually less than precise and may be responsible for the difficult reproducibility of positive results mentioned at the beginning.

Another negative factor that should not be underestimated is the varying concentration and composition of the active substances in the plant. This composition is essentially dependent on the site conditions, such as weather, soil, community and harvest time [Ehrlinger, 2007]. In an oil obtained from thyme, the content of the relevant phenol thymol can therefore vary between 30% and 70% [Lindner, 1987]. These extreme fluctuations are avoided with modern phytochemical additives through the use of nature-identical ingredients.

Effective encapsulation is key to stability

The loss of valuable phytomolecules under discussion can also be traced back to the natural origin of the raw materials. Some phytomolecules (e.g. cineole) are volatile even at low temperatures. In regular medicinal use, this effect is mainly employed with cold products. Thus essential oils, such as of mint and eucalyptus, can be added to hot water and inhaled via the resultant steam.

In the process of pelleting in compound feed production, temperatures between 60°C and 90°C are common, depending on the type of production. The process can last for several minutes until the cooling process is over. Sensitive additives can be easily inactivated or volatilized during this step.

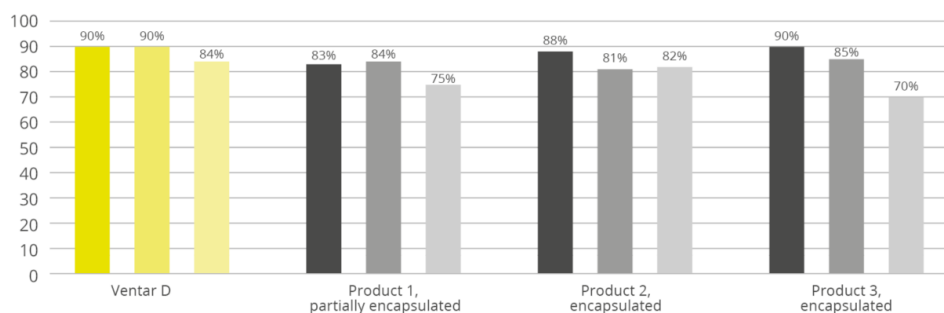
A technical solution for the preservation of temperature-sensitive additives is using a protective cover. This is, for instance, an already established practice for enzymes. Such so-called encapsulation is already used successfully in high-quality products with phytogenic additives. The volatile substances should be protected by a coating with fat or starch so that the majority (>70%) of the ingredients can also be found after pelleting.

Unfortunately, complete protection is not possible with this capsule, as this simple protective cover can be broken open by mechanical pressure during grinding and pelletizing. New types of microencapsulation further reduce losses. In a sponge-like type of microencapsulation, if a capsule is destroyed, only a small proportion of the chambers filled with volatile phytomolecules are damaged.

High protection and recovery with Ventar D

A new type of encapsulation, developed by EW Nutrition for use in feed, delivers further optimization. Results show that the technology implemented in [Ventar D](#) ensures very high recovery rates of the sensitive phytochemicals even under demanding pelleting conditions.

In a comparative study with encapsulated products established on the market, Ventar D was able to achieve the highest recovery rates in all three tested scenarios (70°C, 45 sec; 80°C, 90 sec; 90°C, 180 sec). In the stress test at a temperature of 90°C for 180 seconds, at least 84% of the valuable phytochemicals were recovered, while the comparison products varied between 70% and 82%. A constant recovery rate of 90% was achieved for [Ventar D](#) under simpler conditions.



Phytomolecule recovery rates under processing conditions, relative to mash baseline (100%)

Site-specific release of active ingredients

The major gastrointestinal pathogens (like *Clostridia* spp., *Salmonella* spp., *E. coli*, etc.) are present across the [gastrointestinal tract](#) after the proventriculus. This leads to infection or lesions at different sites of preference, reaching up to ceca. Any feed-based solution should have a profound antimicrobial effect. It is, however, also crucial that active ingredients are released across the [gastrointestinal tract](#), for a better contribution to intestinal health.

The unique, innovative delivery system used for Ventar D specifically addresses this point, which many traditional coating technologies do not. Other encapsulation technologies tend to release the active ingredient either too early or too late (depending on the coating composition). The active ingredients in

Ventar D reach across sites in the gastrointestinal tract and exert antimicrobial effects, supporting optimal gut health and improving performance.

Economically and ecologically sustainable

In the past, the losses mentioned in compound feed production and especially in pelleting were described as largely unavoidable. To obtain the desired effect of the valuable phytomolecules in the finished product, higher use of products was recommended and thus increased costs to the end-users and the associated CO₂ footprint, lowering sustainability overall.

The modern encapsulation technology used in Ventar D now offers significantly better protection for the valuable phytomolecules and, in addition to the economic advantage, also offers more efficient use of the resources required for production.

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Water Hygiene: The missing ingredient for successful ABF poultry



By *T.J. Gaydos*

Water quality is a frequently overlooked part of animal production and it becomes even more important when producing animals in an antibiotic-free (ABF) system. Chickens drink almost twice as much water as they consume feed, and water hygiene is often a second-level priority. Microbes present in water can be primary or secondary pathogens or non-pathogenic. Consuming impure water can add a challenge to the immune system, negatively impacting performance.



Water hygiene is essential for achieving antibiotic-free poultry production

Significant resources are spent on the correct nutrients in the diet and the correct additives for bird health. Water quality should be a priority, and a water quality monitoring program is essential for success in an ABF program. All things being equal, animals will perform better if they have access to high-quality water.

The variability of water quality in the grow-out region should determine how many water quality samples are taken. In highly variable areas, water quality should be measured at every season change on enough farms in every region to know if the solutes are changing. If the water quality is good and consistent, monitoring may be reduced significantly. Water quality should be a part of a “problem farm” work up or related to otherwise unexplained poor performance.

Water-soluble additives: Prevent biofilm

The use of water-soluble products is common in ABF production systems and their frequent use may provide a carbon source for bacteria. This, along with warm temperatures and slow water flow in enclosed water systems, makes the perfect environment for biofilm development.

It is important to frequently flush lines, give birds access to fresh water between additives, and sanitize

water lines after using a product that can provide nutrients to bacteria in the line. The biofilm is a perfect location to harbor and protect pathogens from acids and mild or under-dosed disinfectants.

Designing a water quality program

Sample collection

The first step to building a water quality program is to understand the challenge on every farm. [Correct sample collection](#) is critical to achieving good results. Take a water sample from as close to the well as possible and submit for water quality analysis: pH, hardness, and minerals. This sample should also be submitted for bacterial load: total aerobic plate count (CFU) per mL and total coliforms per mL.

Monitor bacterial load

A drip sample should be collected from the end of the line for bacterial load analysis as well. This will help determine if the bacterial challenge begins at the source or is limited to the house. Additionally, a swab from the inside of the end of the water line should be taken to determine the level of biofilm. The total bacterial count should be less than 1,000 CFU/mL without fecal coliforms in a free-flowing sample, and total bacteria should be less than 10,000 CFU/mL on a biofilm swab.

Monitor water pH

Water should have a pH between 5 and 8. Water with a pH consistently lower than 5 can be damaging to equipment, while a pH over 8 reduces the efficacy of many disinfectants and can have a bitter taste to birds. Hard water can increase scaling of lines and equipment, leading to leaking seals. Scale also provides a matrix for biofilm formation, making cleaning and disinfection more difficult.

Clean and disinfect water lines

Cleaning water lines between flocks is the minimum program for ABF production. Stabilized hydrogen peroxide products are excellent for disinfecting water lines between flocks. The levels needed for proper disinfection of lines are generally too strong for birds, and the lines must be flushed prior to bird placement.

Water lines are often only cleaned in the house; it is important to periodically clean the lines that transport water from the well or water source to the poultry house as this may be a significant reservoir for bacteria. If the well is identified as a source of contamination, it is essential to seek the help of a qualified technician before adding any sanitizing product to a wellhead.



Continuous disinfection

Ideally, water should be continuously disinfected with a product that is approved for poultry consumption. One of the best products for continuous disinfection is chlorine dioxide, which is effective at reducing bacteria and also reducing the concentrations of some mineral components. High levels of iron in the water can create a favorable environment for *E. coli* and other bacteria such as *C. perfringens*.

In addition to disinfection, chlorine dioxide is an effective treatment to reduce soluble iron levels. High sodium and chloride levels can lead to flushing and promote the growth of some bacteria. If high levels of sodium and chloride are consistent across a grow-out region, it may be possible to decrease the levels in the feed to reduce flushing. If the levels of sodium and chloride are considerably high, reverse osmosis should be considered to improve water quality.

Bottom line: invest in high-quality water

Another effective product is stabilized hydrogen peroxide at an appropriate residual level for bird consumption. There are other options for water line sanitation that can be explored on a case-by-case basis.

There are excellent [online resources](#) [link] for poultry water quality. The important message remains, in any case, that investment in high-quality water is a critical step for success in ABF [poultry production](#).

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Why ABF poultry producers need to invest in pullet rearing



By *T.J. Gaydos*

There is no more efficient place to invest than in pullets. Pullets are the future of an integrated company. Successful pullet rearing is simply attention to detail, management, serology, biosecurity, vaccination, and worming. Decisions, both good and bad, made during rearing will follow that company for a year. This is especially true related to the introduction of pathogens such as mycoplasmas, *Salmonella*, and reoviruses, which are persistent and can be vertically transmitted. The importance of [biosecurity](#) in any pullet program cannot be overstated, but it is even more critical in an antibiotic-free (ABF) program.

The 4 pillars of rearing pullets without antibiotics

1. Effective management

It is imperative to properly manage flock uniformity, weight, and frame size. For details on how to manage and feed pullets, it is always advised to use the technical support of the primary breeder company because no one knows their bird better than them. Pullet uniformity is critical to the success of the flock in the breeder house. Uniform and healthy pullets are easier to manage to peak and easier to feed for persistency of lay.

Uniform and consistent feed distribution is crucial to managing pullets: people must monitor feeding on a regular and consistent basis. Simply because the feed disappears before the next feeding does not mean it was distributed in an effective way to all birds. Non-uniform feed distribution is not only bad for uniformity but may train other undesirable behaviors such as race tracking, foraging, and roosting on lines to feed. These behaviors increase the risk for trauma and picking up pathogens in the litter.



There are multiple stressful transition periods in the life of a pullet. It is advised to spread the stressors apart as much as possible. Do not make major management changes, such as turning birds out, changing their lighting or feed program, all at the same time. The more gradual the transitions are, the easier it will be on the birds, and the more likely they will perform as desired.

2. Heightened biosecurity

It is recommended to have dedicated inside and outside boots for all growers, service technicians, and regular visitors. A divided entrance (i.e., Danish entry) is ideal to further limit the risk of bringing pathogens in from the outside. Rodent and insect control is another important facet of pullet biosecurity and must be closely monitored. Vehicles entering the farm must be consistently cleaned and disinfected.

Managing the risk of pathogen introduction via feed is important and feed hygiene should not be ignored. Visitors are almost always the cause of biosecurity breaks and pullets receive a lot of visitors including vaccination crews that travel between farms with equipment. Ensure that vaccination equipment is properly sanitized between farms and crews always use appropriate personal protective equipment.

3. Focus on intestinal health

One of the most difficult challenges to raising pullets is conferring early and uniform [immunity to coccidia](#). These parasites can be managed successfully with chemicals, ionophores, or vaccine programs, although every program has pros and cons. A fundamental problem with an ionophore program is accidentally feeding ionophores (technically considered antibiotics) to ABF flocks due to logistic errors at the feed mill.

Chemical programs can be very effective at managing *Eimeria spp.* cycling. Most of the time they work a little too well and birds do not develop adequate immunity; consequently, putting flocks at risk of breaking with *Eimeria necatrix* after chemicals are removed from the diets. A coccidiosis vaccine program is the most sustainable for rearing pullets.

The relative low density of birds, compared to broilers, and the lower feed consumption and thus lower consumption of water can result in dry litter early. The reduced density can also make it difficult for birds to pick up oocysts early in the coccidiosis cycle. Several techniques may be used to increase the chance of success. Birds can be spray-vaccinated at the hatchery and again when placed in the house. Brooding the birds in a portion (e.g., $\frac{1}{4}$) of the house for the first 7 to 8 days before turning them out to half house, and then to full house can improve early cycling.



Carefully using built-up litter may improve exposure to beneficial microflora; thereby, improving gut health. Managing intestinal health with the correct non-antibiotic feed additives such as saponins, essential oils, and pre and probiotics can significantly improve pullet health.

A well-designed deworming program is important for bird health and uniformity. It is also essential to help reduce the risk of Blackhead disease, which is caused by *Histomonas meleagridis*, while its intermediate host is *Heterakis gallinarum* (cecal worms).

4. Tailored vaccination program

Building a vaccination program for pullets has two critical functions: protect the health of the pullets/breeders and protect the health of the offspring by conferring maternal immunity. The exact constituents of the program depend heavily on regional disease challenges. Matching the program to disease pressure is best accomplished with a combination of a rigorous serology program for hens as well as periodically checking the blood of processing-age broilers.

Serology combined with open communication between the breeder and broiler departments about disease challenges can greatly improve the antigen choices of the vaccination program. Pullet rearing is attention to detail – managing the small details will help the long-term success of the poultry company.

Necrotic Enteritis control for ABF poultry production



By *T.J. Gaydos*

Control of Necrotic Enteritis (NE) can be one of the most difficult challenges in a system without the availability of antibiotics. In addition, NE is a costly disease because of mortality and loss of performance. Necrotic enteritis is a multifactorial disease that requires damage to the intestinal mucosa, disruption of the intestinal microflora, and a toxin-producing strain of

***Clostridium perfringens*.** If any one of these three items is removed or lessened, the severity or incidence of NE will be reduced.

The 3 must-haves for antibiotic-free necrotic enteritis control in poultry

1. Prevent mucosal damage



The most common cause of damage to intestinal mucosa in broilers is excessive cycling of *Eimeria maxima*. The ubiquitous nature of this parasite in [poultry production](#) makes it one of the most important contributors to NE. This species of coccidia is most relevant with respect to NE because its life cycle invades deeper into tissues than other species leading to more damage to the intestinal mucosa.

The life cycle of coccidiosis lasts roughly seven days, with each cycle producing exponentially higher numbers of the parasite. Three consecutive replication cycles are needed to produce immunity. The biology of *E. maxima* is a significant reason why NE commonly occurs around 18-21 days. However, many other things may damage the intestinal mucosa, including mycotoxins, worms, and rancid fat. Managing all sources of mucosal disruption are critical to preventing and controlling NE.

2. Support the microflora

The importance of the microbiome on health is well known; the ability to modify the microbiome to a more appropriate or healthy status is a more difficult challenge. There is a tremendous volume of research in all species about the impact and importance of intestinal microflora on immunity, health, and disease. The microflora is not static but rather a dynamic community of microorganisms that change with bird age, time of day, composition of the diet, and treatment with antibiotics or other additives. Management of intestinal microflora is a very difficult process because its development and manipulation are not fully understood.

Any significant feed formulation or feed form change is a stress event for intestinal microflora. Feed changes are thus high-risk periods for the development of NE. It is a best practice to avoid feed changes when birds are in the NE risk window. It is important to support the intestinal microflora with either in-feed or in-water products to improve intestinal health during feed changes.



It is important to avoid feed outages. After a feed outage, the disruption to the microflora and the increase in mucus production increases the likelihood of an NE outbreak in the following days. Preemptively adding a water additive to improve intestinal health directly after a feed outage can reduce the risk of NE in the flock.

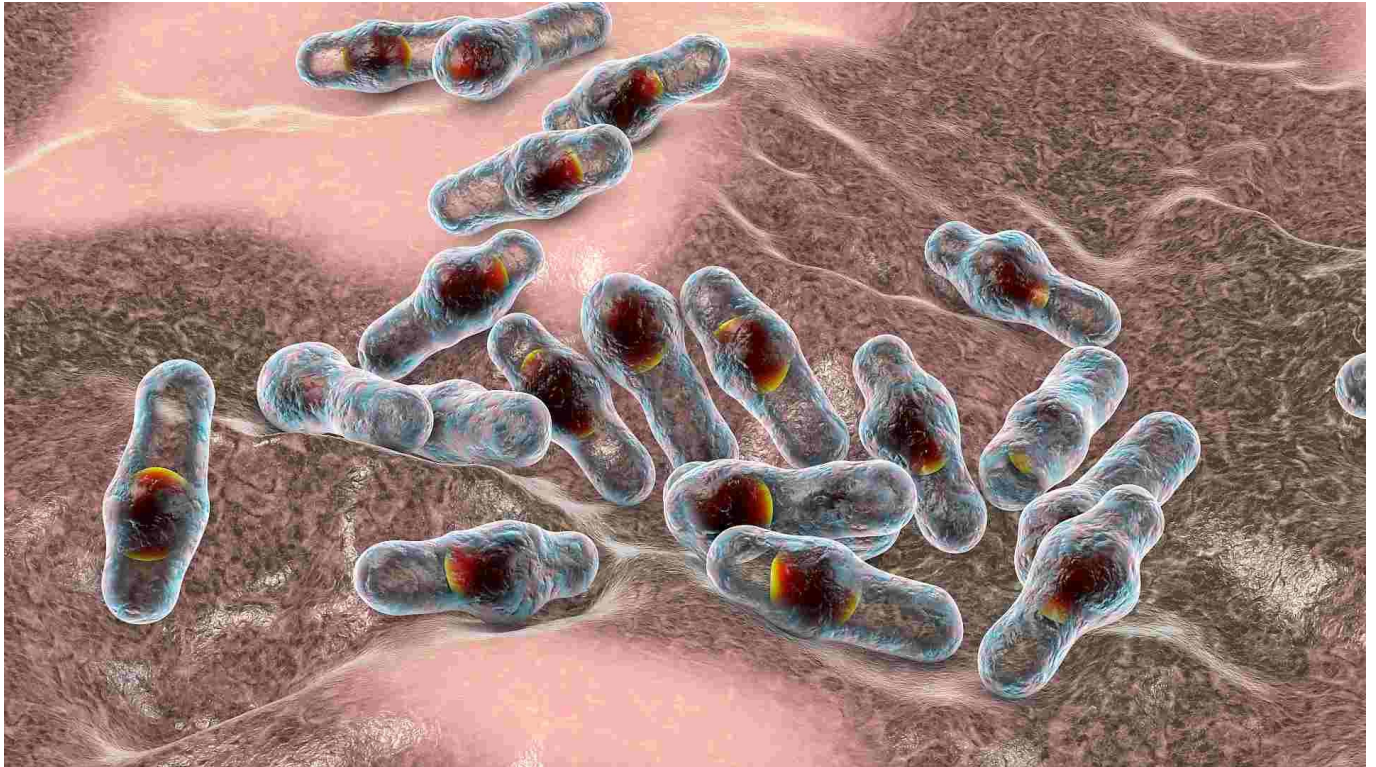
When managing intestinal microflora: probiotics, prebiotics, plant extracts, enzymes, and organic acids are the most commonly used tools. Each of these product classes interacts with the bird and its flora in a different way and selecting additives with complimentary modes of action is critical to the success of the program. Direct colonizing organisms like *Lactobacillus* spp. can help to directly change the microflora, providing a more mature and healthier microbiome.

Prebiotics such as mannan- and fructo-oligosaccharides provide a food source for beneficial microorganisms and can interact directly with the immune system of the bird. Plant extracts can have antimicrobial or anti-inflammatory properties that can also modulate the microflora by impacting the growth and metabolism of different species of microorganisms in the intestine.

3. Limit *Clostridium perfringens* growth

It is not possible to eliminate toxin-producing *C. perfringens* from the environment. Clostridia are spore-forming microorganisms that are very resistant to disinfectants. However, it is possible to manage the abundance of these microorganisms in a system through proper litter management, sanitation, and disposal of mortality.

A house that has a history of NE should have the litter completely removed and the environment cleaned and disinfected as much as the facility will allow. New clean shavings should be brought into the house at a sufficient depth to limit access to the floor. Several non-antimicrobial feed and water additives have shown promise in reducing numbers of *C. perfringens* in feces of infected birds. Feed and water additives are an essential tool to reduce the impact of NE.



Conclusion: the more you prevent, the less you have to treat

Even with the best management practices, outbreaks of NE will happen. In order to successfully treat a flock with NE, it is critical to catch the mortality early. Once a flock is experiencing high mortality from NE, it is very difficult to treat because the sickest birds will not be drinking enough water to receive a significant amount of water additives. Treating or managing an outbreak is as much art as science, but it is a combination of reducing the inciting causes.

Manage microflora and clostridial growth with organic acids, copper sulfate, phytogenics, or probiotics. Reduce coccidiosis cycling with amprolium, saponins, or other phytogenics. With excellent husbandry, the impact of NE can be reduced drastically even without using antibiotics. Managing NE incidence in poultry is a mixture of animal husbandry, managing coccidiosis cycling, feed and water additive selection, and high-quality nutrition.

Nutrition and feeding in ABF poultry production



By *T.J. Gaydos*

Management practices and feed additive selection are often discussed when working in antibiotic-free (ABF) poultry production. Nutrition is another critical component of any agricultural animal system. Working with a qualified nutritionist will help ensure that the diet is correctly formulated with high-quality ingredients.



5 nutrition tips for antibiotic-free poultry production

1. Consider feed form and delivery

Feed form and delivery are nearly as important as the nutrient content of the formulation. If feed form or handling is improper and feed separates, is improperly mixed, or oxidized, the birds will not appreciate the effort that went to develop a balanced diet. A durable pellet or crumble is important to allow all birds to have equal access to a nutritionally complete diet with every bite.

Additionally, if the finished feed or individual ingredients are not stored properly, they may not have the same value that is attributed to them in the formulation process. Other than correct nutrient formulation, three parts of the diet that should be considered are feed additives, mycotoxin contamination, and lipid oxidation.

2. Prevent oxidative stress

The impact of oxidative stress on the intestinal mucosa, immune system, and performance is well-documented across species. Oxidized fat sources reduce the available energy, but equally significant to bird health is the reduction in vitamin availability, resulting in increased oxidative stress for the animal. Protecting the sources of fat and the finished feed is important to spare fat-soluble vitamins, specifically vitamin E.

Oxidized fat can also irritate the intestinal mucosa leading to decreased absorption of nutrients. The process of breaking down macromolecules during digestion and converting them to forms useful for further metabolism is a significant contributor to oxidative stress. The immune system is also a great contributor to oxidative stress. Immune cells use reactive oxygen species to kill pathogens that are phagocytosed.

A large portion of the immune system is located in the GI tract in order to protect the animal from pathogens crossing from the gut into the animal. In addition to being a contributor to oxidative stress, the immune system can be negatively impacted by oxidized feed ([Liang et al., 2015](#)). The combination of metabolic and immune activity in the intestines puts it at a high risk of damage from oxidative stress. It is vital to protect fat sources with synthetic or natural antioxidants; reducing the incoming stress from oxidized fat should be a priority to [improve poultry health](#).



3. Mitigate mycotoxin risks

Another risk to bird health and mucosal integrity is mycotoxins. Diets containing mycotoxins may damage the mucosa of the GI tract directly or may damage other organs leading to significant health challenges and decreases in performance. Some mycotoxins or compounds created by fungi can disrupt the intestinal microflora by acting on bacterial cells, as many fungal metabolites are [antimicrobial](#).

The best approach to managing mycotoxins is eliminating them from the system by purchasing high-quality grain and storing it appropriately. It is impossible to completely eliminate all risks of receiving ingredients contaminated with mycotoxins. An internal program should be developed to test the incoming ingredients and finished feed regularly for mycotoxins.

Knowing the challenging ingredient sources may help reduce the risk to highly susceptible birds like Breeders or chicks through dilution in formulation or the addition of toxin binders and/or enzymes. Several toxins may be found in a feed stuff and many of the mycotoxins are synergistic in their deleterious effects ([Murugesan et al., 2015](#)). Different binders have varying affinity for different mycotoxins; closely examining the product literature can help to choose the correct product to mitigate risk.

4. Choose optimal additives

Choosing the correct feed additive program for intestinal health, food safety, and growth performance depends on the specific challenges in the complex. When selecting a feed additive that is not FDA approved, it is important to base the decision as much as possible on scientific evidence through peer-reviewed research.

In addition to published data, internal testing within the production system is also helpful to ensure the product matches the local challenge. In a market saturated with “natural” products, it is essential to find a supplier that is trustworthy and is engaged in the success of the complex and health of the birds, not only in selling products. A partnership will be much more successful in the long term than only a buy/sell arrangement.

5. Manage expectations

When considering removing antibiotics from a program, the temptation is to expect natural products to completely replace the efficacy of antibiotics. This is an unreasonable expectation. The success of a transition to ABF production relies on modifying management practices as well. The vast majority of program success is related to attention to the details of husbandry, biosecurity, and sanitation. The remaining opportunity to improve health rests on the additive program.

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EW Nutrition launches Pretect D to support poultry gut health during challenging periods



VISBEK, 28 September - EW Nutrition announces the launch of a novel gut health solution for poultry. Pretect D, a proprietary blend of phytomolecules, helps maintain bird performance and farm profitability.

Trials indicate that [Prectect D](#) offers natural support even during *Eimeria*-related challenges, making it an effective addition to programs focused on gut health issues.

“EW Nutrition is a front runner when it comes to innovations driving lower use of antibiotics and harmful chemicals in the animal production industry,” says Michael Gerrits, Managing Director. “The introduction of Prectect D signifies our commitment to helping customers make livestock production more sustainable through best-in-class natural solutions.”

Research with Prectect D conducted around the globe, in research institutes and under commercial conditions, evidenced improved body weight and lower feed conversion rate. EW Nutrition is also following up on initial results indicating significant oocyst count reduction.

“Poultry producers are affected by reduced animal performance and high costs for preventive and therapeutic control,” says Madalina Diaconu, Product Manager for Prectect D. “What our product brings to the market is an ability to support the natural defenses of birds. We’re also investigating our product’s ability to impair the growth cycle of the *Eimeria* population.” Prectect D is developed to be used in combination with vaccines, ionophores and chemicals, as part of the shuttle or rotation program.

About EW Nutrition

For the global animal production and feed industries, EW Nutrition offers innovative, comprehensive solutions for gut health, feed quality, pigmentation, digestibility, on-farm performance and more.

Headquartered in Germany, with R&D and manufacturing facilities around the world, EW Nutrition owns the entire value chain, from development and scale-up to production, distribution, and support in 90+ markets.

What poultry producers need to know about coccidiosis control



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Coccidiosis is one of the most devastating enteric challenge in the poultry industry costing over over 14 billion US\$ per year ([Blake et al., 2020](#)). In the early days of intensive poultry production, outbreaks of *Eimeria tenella*, were most destructive. *Eimeria tenella* is a coccidia species that causes severe haemorrhages and hypovolemic shock, leading to a fatal outcome for the affected bird.



Poultry producers need to control the performance and welfare issues caused by subclinical coccidiosis

Understanding and managing coccidiosis in poultry

However, today, subclinical coccidiosis accounts for even more of production losses due to intestinal cells injuries: lower body weights, higher feed conversion rates, lack of flock uniformity, failures on skin pigmentation and, at the end mortality. Variation in the supply and quality of animal feed exacerbates the issue and compromises farm profitability even more. To tackle this challenge, we need to understand the basics of coccidiosis control in poultry and what options producers have to manage coccidiosis risks.

From *Eimeria* infection to disease

Coccidiosis is a disease caused by protozoan parasites, mainly of the genus *Eimeria*, that are located in the small and large intestines. Being very resistant and highly contagious, these protozoa are easily transmitted by various routes (via feed, litter, water, soil, material, insects, and wild animals).

Coccidia are present in all livestock species. However, the infection is particularly severe in poultry. The health consequences can be significant: loss of appetite, reduction in feed intake, increased FCR, enteritis, hemorrhagic diarrhea, and mortality. The most common species of *Eimeria* in broilers are: *E. acervulina*, *E. mitis*, *E. maxima*, *E. brunetti*, *E. necatrix*, *E. praecox*, and *E. tenella*. They are widely found in broiler productions across the globe (McDougall & Reid, 1991).



Figure 1: Sporulated oocyst of *Eimeria maxima* and *E. Acervulina* (40 x)

The pathogenesis of infection varies from mild to severe and is largely dependent on the magnitude of infection. Coccidiosis outbreaks are related to multiple factors that, together, promote a severe infestation in the farm.

Within poultry, the highest economic impact is in broilers, where the most common species of *Eimeria* are *E. acervulina*, *E. maxima*, *E. tenella* and *E. necatrix*, which all show high virulence. However, pathogenicity is influenced by host genetics, nutritional factors, concurrent diseases, age of the host and the particular species of the *Eimeria* (Conway & McKenzie, 2007).

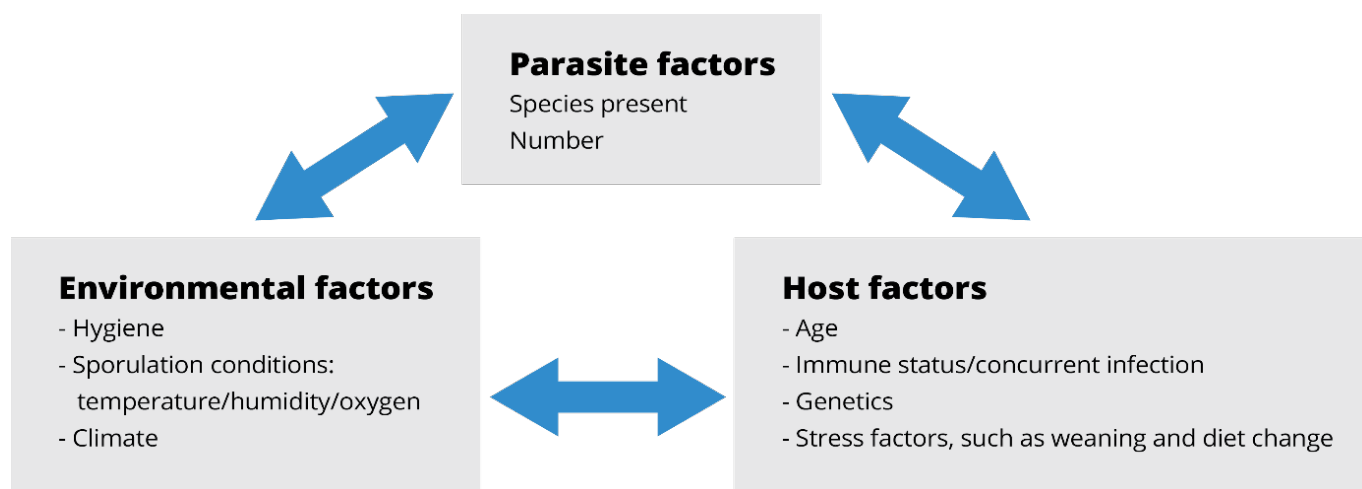


Figure 2: Interaction of factors that promote coccidia outbreaks

The *Eimeria* infection starts with the ingestion of protozoa that are at a sporulated stage. Once inside the

gut, the protozoa liberate the sporozoites. This infective form can get into enterocytes and then begin a massive reproduction, killing thousands of intestinal cells. (Olabode et al., 2020; Shivaramaiah et al., 2014)

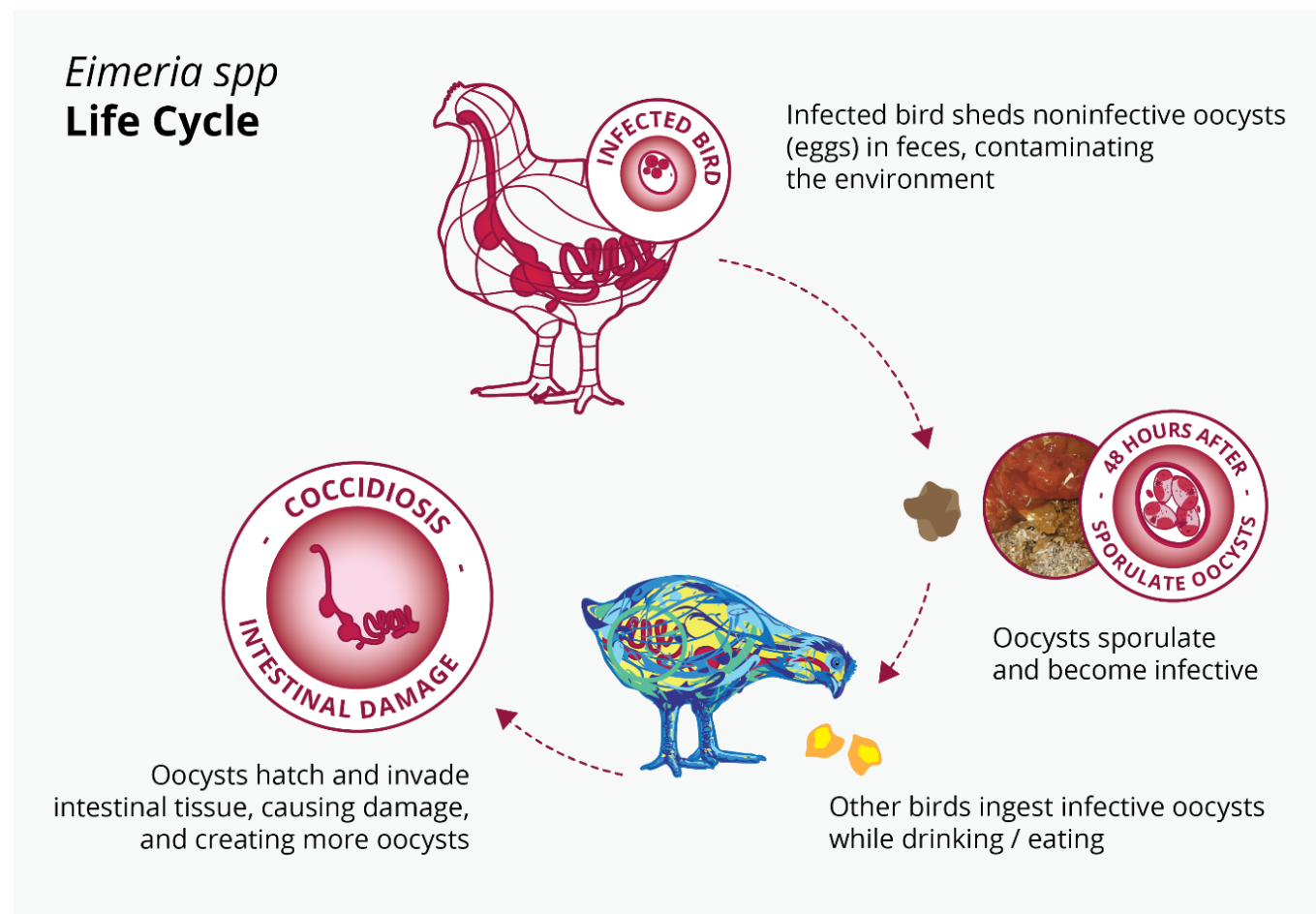


Figure 3: *Eimeria* spp. life cycle

The reproduction potential depends on the coccidia species. *E. acervulina*, *E. mitis* and *E. praecox* have the highest reproduction rate. This characteristic is closely related to their short life cycle.

In broilers, coccidiosis usually occurs after 21 days of age. The infection spreads gradually from day 1 already, depending on species of *Eimeria* and their virulence. A typical progression of coccidiosis in broilers is shown in Figure 4.

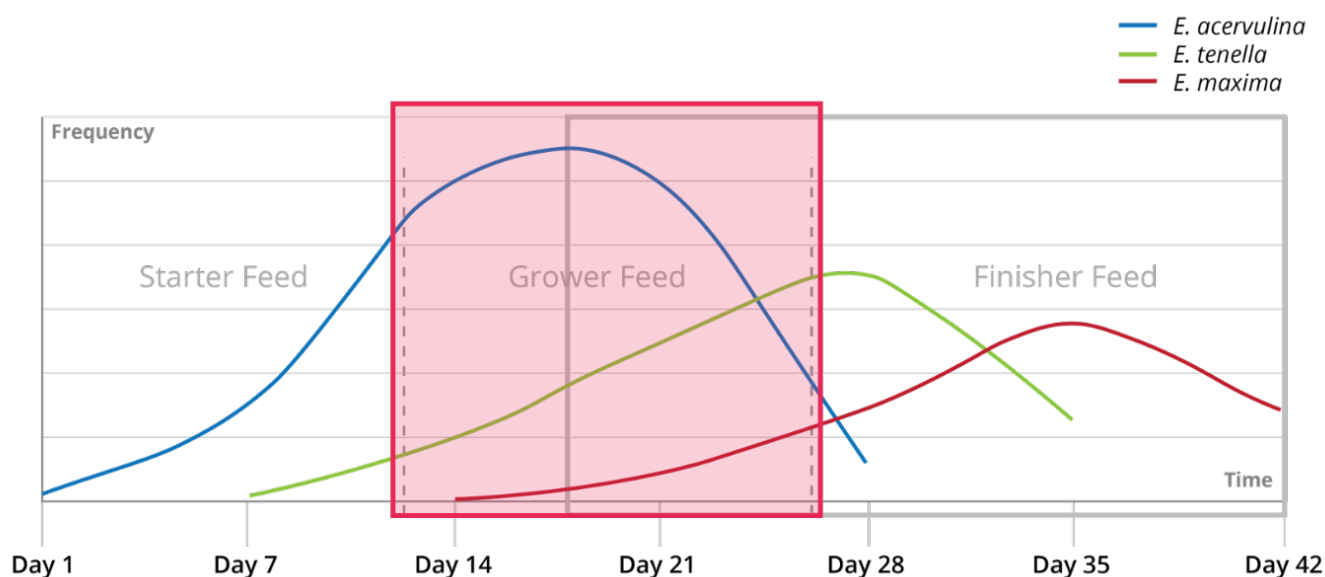


Figure 4: Typical development of a coccidia infection in relation to broiler feed phases

Coccidiosis control in poultry: Strategy guidelines

The intrinsic characteristics of coccidiosis makes this parasite unique and many times frustrating to control. Resistance to available coccidiostats makes this task even harder. Good farm management, litter hygiene, and the use of control coccidiosis programs such as shuttle and rotation are functional measures to prevent clinical coccidiosis. Successful control strategies specifically recognize the importance of monitoring, use anticoccidial drugs wisely, and include vaccines where applicable.

Monitoring

The first step is to establish a strict monitoring program in all stages of production, including the feed mill. It is important to verify that therapeutics are included in the feed in an adequate form and quantity, and that the follow-up in the field takes place.

Field monitoring should be frequent and in line with the operation's coccidiosis management program. Field monitoring is a complementary work that collates clinical, necropsy, and faeces findings to closely track the disease situation.



Coccidiosis control in poultry operations needs to include rigorous monitoring

Anticoccidial drugs

Since the middle of the 20th century, chemotherapeutic agents have offered the best way to control coccidia. However, unbridled use of anti-coccidial drugs and the emergence of the new resistant field strains of coccidia have made it increasingly challenging to control coccidiosis with commonly available coccidiostat drugs.

The coccidiostats have been classified in two groups: ionophores, molecules obtained from microbiological fermentation, and chemicals, synthetic compounds. The mode of action of ionophores is to interfere with the membrane ion exchange, killing the extracellular stages (sporozoites and or merozoites) as they expend energy to maintain the osmotic balance. Chemical compounds can have an anticoccidial effect even on extracellular and intracellular stages (Sumano López & Gutiérrez Olvera, 2005).

However, resistance development is limiting their effectiveness, and certain compounds cannot be used in older birds or in hot environments. Moreover, government regulations often include anti-coccidial drugs in bans on antibiotics use. This does not mean that these drugs are not crucial to controlling this disease, but it is important to use alternative tools: they help make a coccidiosis control program not only less dependent on anticoccidial drugs but also more robust.

Vaccines

There are two commercial kinds of coccidia vaccines; the first one uses natural strains. These *Eimeria* are selected from field outbreaks, show a medium pathogenicity, and allow for a controlled replication of a coccidia infection. The second kind of vaccines include attenuated strains; these are precocious strains and birds usually show low or no post-vaccinal reactions.

The management of coccidia vaccines is the principal challenge for using this tool to control coccidia. Special vaccination training is required at the hatchery, which then needs a follow-up on the farm. In the field, this follow-up and the alignment of all the protocols has proven challenging for many producers.

Managing coccidiosis in poultry: Next steps

The limitations chemotherapy and vaccines have led to a surge in the quest for effective natural solutions. Recent research into plant-derived phytochemicals shows that these compounds have properties that make them an interesting tool against coccidiosis (cf. [Cobaxin-Cárdenas, 2018](#)). Knowledge, research, and technological developments are now ready to offer solutions that can be an effective part of coccidia control programs. These natural solutions create opportunities to [make poultry production more sustainable](#) by reducing dependency on harmful drugs.

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Hatchery management in ABR production



By *T.J. Gaydos*

Producing high-quality chicks is critical to the success of any broiler program, but it is even more important in an antibiotic-free (ABF) program. The hatchery is the perfect environment for the incubation of eggs and, consequently, bacteria and mold. This makes hatchery sanitation a very high priority in ABF production systems because of the inability to use antibiotics in the hatchery or later in production.



Chick quality can be divided into two categories:

- microbiologic
- chick vitality

The reality is many of the processes that impact these two categories are often intertwined but can be generally separated into

- sanitation practices
- setting/hatching practices

It is not helpful to set specific objective benchmarks for an individual hatchery without understanding its specific challenges. The hatchery manager must realize that the end product is a healthy, robust chick; therefore, benchmarks and numerical goals for the individual hatchery, breed, and flock age need to be established.

There are a host of measurements that can be performed and data that can be collected; however, it only makes sense to collect only information that will be used to make decisions. It is easy to over-collect and under-utilize data.

Hatchery sanitation

Bacterial contamination

Hatchery sanitation starts at the breeder farm. Eggs are a significant source of contamination in the hatchery; consequently, floor eggs should not be brought to the hatchery. If they must be hatched for egg flow needs, it is essential to at least segregate them from the regular egg flow throughout the process. It is imperative to send a clean egg pack to the hatchery (transport and store the eggs at proper temperatures and humidity). Once the eggs are at the hatchery, the focus is on proper storage, incubation, and

hatching.

Monitoring sanitation

The risk of multiplying bacteria in the hatchery is high. Hatchery equipment can be difficult to clean, there are sufficient nutrients to support microbial growth, and the environment is perfect for incubation. Developing a program to monitor the cleanliness of the hatchery is a critical step in managing sanitation. The whole hatchery must be regularly cleaned and disinfected, and the most effort should be spent on chick contact surfaces.

Egg flats must be clean and dry before returning to the breeder farm. Hatcher baskets must be clean and dry before eggs are transferred. The tray wash machine should use a detergent and disinfectant to remove and sanitize the trays (the water temperature should be 140°F). A disinfectant with residual efficacy should be used after the tray wash. Too low of a temperature will encourage bacterial growth, and too high a temperature can damage the baskets.



When using an *in ovo* vaccination system, it is essential to clean and disinfect the machine after every use and prepare it for the next transfer. Chick belts, counters, chick baskets, hatcher, and setters are all areas that can harbor pathogens. Wet areas are also at risk for harboring disease: wet bulb thermometers, humidification equipment, and tray washers. All these areas should be regularly checked for cleanliness by traditional microbiology or rapid ATP testing.

It is important to monitor the hatchery air quality on a regular basis to ensure the level of bacteria and fungi is not too high. This is most effectively accomplished by placing air plates in key locations for air movement such as clean hatcher and setters and their respective halls, and plenums. The areas where vaccines are stored, mixed, and prepared should be surgical suite clean.

Hatching practices

Chick vitality

A high-quality, active chick is one of the keys to program success. The actual profile used to hatch that bird is a mixture of breeder flock profile, hatchery equipment, climate, and experience. When evaluating a hatchery and a hatching program, it is best to start at the endpoint and work backward.

Managing chick comfort in the holding room is vital to set the chicks up for success on the farm. The chicks will tell you if they are too hot or too cold and if they have too much or too little airflow. This is determined by experience and monitoring behavior.

Tracking chick rectal temperatures is a useful way to check comfort. Remember that a small animal can change their body temperature from ideal to hyper- or hypothermic extremely quickly. On average, 103.5°F is a good benchmark for chick internal temperature. Moving backward through the process, evaluate the vaccine spray cabinet to ensure chicks are getting the proper vaccines at the proper rate.

The next critical opportunity to monitor chick vitality is when chicks are being separated from hatch debris. The volume of chicks passing through the site allows for rapid evaluation of the flock. In this area, it is important to check for open navels, strings, red hocks, green chicks, dirty chicks, and general appearance and behavior.



Hatch debris

The egg should be pipped and broken almost exactly in half. The debris should have minimal meconium, yolk stains, and should not smell bad. Excess meconium is an indication that the hatch window is prolonged, and the chicks spent too much time in the machine before pull.

When eggshells are crushed in one's hand they should break, but the membrane should remain intact. If the membrane also breaks, it is a sign that the chicks were potentially overheated, incubated too long, or humidity was too low.

Chick yield

One of the most useful measures of the setting process is [chick yield](#), which is the weight of the chick at hatch compared to the weight of the egg set. Chicks with a low yield were set with a high temperature or low humidity or were hatched for a long time before being removed from the hatcher. Chicks with a high chick yield are a result of the opposite: low temperature and high humidity incubation or did not spend enough time in the hatcher post-hatch. The ideal chick yield depends on the breed of chicken and the individual hatchery, but 67-68 % yield is a good benchmark. 

Breakout

Analyzing [hatch debris](#) is a crucial tool for understanding setting and hatching efficiencies. Embryo mortality is variable but tends to follow a consistent pattern. The majority of embryo mortality is early (1-7 days), with little mortality in the middle (8-14 days), and the second increase in embryo mortality occurring from 15-18 days. Results should be recorded, and a standard developed for the hatchery. Deviations from this standard should be investigated.

When aiming to improve the data collection process, focus on building a program that prioritizes the most useful information. Breakouts and chick yields are two of the most meaningful tests to modify the hatching process. Sanitation checks and monitoring of disinfectant levels at critical sanitation steps are valuable to improve hatchery quality. When all the pieces come together, high quality egg pack, sanitation, and excellent hatchery management, the result is a high-quality chick ready to succeed on the farm.