Mitigating Eimeria resistance in broiler production with phytogenic solutions

By Dr. Ajay Bhoyar, Global Technical Manager, EW Nutrition

In modern, intensive poultry production, the imminent threat of resistant Eimeria looms large, posing a significant challenge to the sustainability of broiler operations. Eimeria spp., capable of developing resistance to our traditional interventions, has emerged as a pressing global issue for poultry operators. The resistance of Eimeria to conventional drugs, coupled with concerns over drug residue, has necessitated a shift towards natural, safe, and effective alternatives.

Several phytogenic compounds, including saponins, tannins, essential oils, flavonoids, alkaloids, and lectins, have been the subject of rigorous study for their anticoccidial properties. Among these, saponins and tannins in specific plants have emerged as powerful tools in the fight against these resilient protozoa. In the following, we delve into innovative strategies that leverage the potential of these compounds, particularly saponins and tannins, to prevent losses by mitigating the risk of resistant Eimeria in poultry production.

Understanding resistant Eimeria in broiler

production

The World Health Organization Scientific Group (World Health Organization, 1965) developed the definition of resistance in broad terms as 'the ability of a parasite strain to survive and/or to multiply despite the administration and absorption of a drug given in doses equal to or higher than those usually recommended but within the limits of tolerance of the subject'.

The high reproduction rate of *Eimeria spp.* allows them to evolve quickly and develop resistance to drugs used for their control. Moreover, the resistant strains of Eimeria can persist in the environment due to their ability to form resistant oocysts, leading to the re-infection of animals and further spread of resistant strains.

Resistant Eimeria strains present many challenges in modern poultry farming, significantly impacting overall productivity and economic sustainability. However, one of the primary challenges is the reduced efficacy of traditional anti-coccidial drugs.

Eimeria resistance occurs in different types

There are different possibilities as to why Eimeria are resistant to specific drugs.

Acquired resistance results from heritable decreases in the sensitivity of specific strains and species of Eimeria to drugs over time. There are two types of acquired resistance: partial and complete. These types depend upon the extent of sensitivity lost. There is a direct relationship between the concentration of the drug and the degree of resistance. A strain controlled by one drug dose may show resistance when a lower concentration of the same drug is administered.

Cross-resistance is the sharing of resistance among different compounds with similar modes of action (Abbas et al., 2011). This, however, may not always occur (Chapman, 1997).

Multiple resistance is resistance to more than one drug, even though they have different modes of action (Chapman, 1993).

Natural substances can bring back the efficacy of anticoccidial measures

It was found that if a drug to which the parasite has developed resistance is withdrawn from use for some time or combined with another effective drug, the sensitivity to that drug may return (Chapman, 1997).

Botanicals and natural identical compounds are well renowned for their antimicrobial and antiparasitic activity, so they can represent a valuable tool against Eimeria (Cobaxin-Cardenas, 2018). The mechanisms of action of these molecules include degradation of the cell wall, cytoplasm damage, ion loss with reduction of proton motive force, and induction of oxidative stress, which leads to inhibition of invasion and impairment of Eimeria spp. development (Abbas et al., 2012; Nazzaro et al., 2013). Natural anticoccidial products may provide a novel approach to controlling coccidiosis while meeting the urgent need for control due to the increasing emergence of drug-resistant parasite strains in commercial poultry production (Allen and Fetterer, 2002).

Saponins and Tannins: Nature's Defense against

Eimeria Challenge

Phytogenic solutions, specifically those based on saponins and tannins, have recently surfaced as promising alternatives to mitigate the Eimeria challenge in poultry production. By harnessing the power of these natural compounds, poultry producers can boost the resilience of their flocks against the Eimeria challenge, promoting both the birds' welfare and the industry's sustainability.

Saponins are glycosides found in many plants with distinctive soapy characteristics due to their ability to foam in water. In the context of Eimeria, saponins can disrupt the integrity of the parasites' cell membranes. When consumed, saponins can interfere with the protective outer layer of Eimeria, weakening the parasite and rendering it vulnerable to the host's immune responses. This disruption impedes the ability of Eimeria to attach to the intestinal lining and reproduce, effectively curtailing the infection.

Tannins are polyphenolic compounds with astringent properties, occurring in various plant parts, such as leaves, bark, and fruits. Choosing the proper tannin at the right level and time is crucial to realize the benefits of tannin-based feed additives.

In the context of Eimeria, tannins exhibit several mechanisms of action. Firstly, they bind to proteins within the parasites, disrupting their enzymatic activities and metabolic processes. This interference weakens Eimeria, hindering its ability to cause extensive damage to the intestinal lining. Secondly, tannins are anti-inflammatory, reducing the inflammation caused by Eimeria infections. Additionally, tannins act as antioxidants, protecting the intestinal cells from oxidative stress induced by the parasite.

When incorporated into broilers' diets, saponins and tannins create an unfavorable environment for Eimeria, inhibiting their growth and propagation within the host. Moreover, these compounds fortify the broiler's natural defenses, enhancing its ability to resist Eimeria infections. By leveraging the innate properties of saponins and tannins, the impact of resistant Eimeria strains can effectively be managed and mitigated, fostering healthier flocks and sustainable poultry production.

What is Pretect D?

Pretect D is a unique proprietary blend of phytomolecules, including saponins and tannins, that supports the control of coccidiosis challenges in poultry production. It can be used alone or in combination with coccidiosis vaccines, ionophores, and chemicals as part of a shuttle or rotation program.

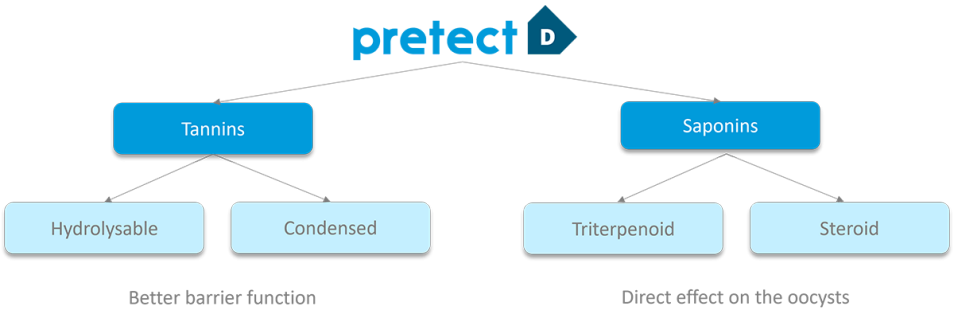


Fig.1. Key active ingredients of Pretect D

Modes of action of Pretect D

Pretect D exhibits multiple modes of action to optimize gut health during challenging times. Due to its anti-protozoal, anti-inflammatory, immunomodulatory, and antioxidant properties, it

a. effectively decreases oocyst excretion and disease spread
b. promotes restoring the mucosal barrier function and improves intestinal morphology
c. protects the intestinal epithelium from inflammatory and oxidative damage.

The beneficial effects of Pretect D

The beneficial effects of Pretect D's inclusion in the coccidiosis control program include improving overall gut health and broiler production performance.

In a challenge study with Cobb 500 broiler chicks under a mixed Eimeria inoculum challenge, it was evident that the group receiving Pretect D (@500g/ton) in the feed throughout the 35-day rearing period had less coccidia-caused lesions (D27) than the broilers challenged and fed control diets.

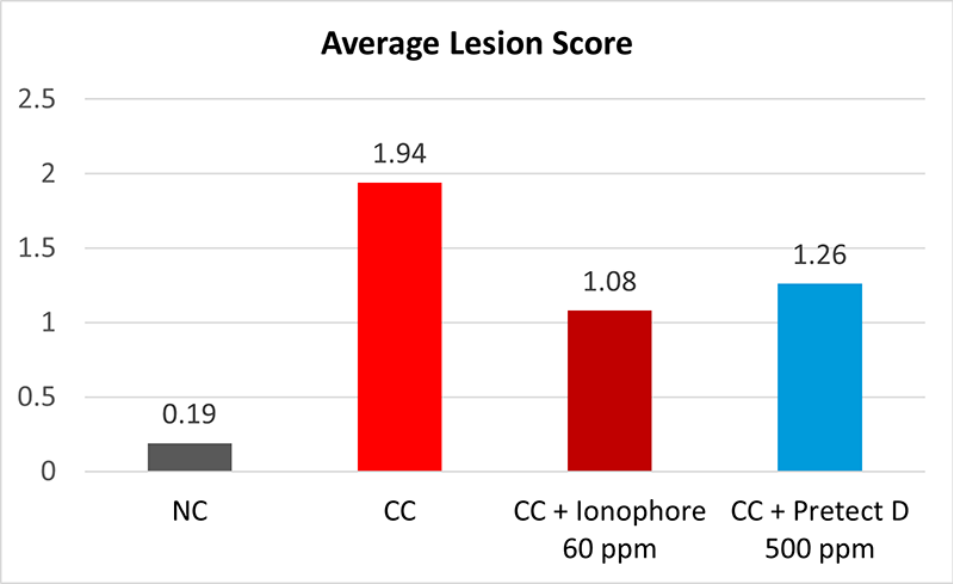
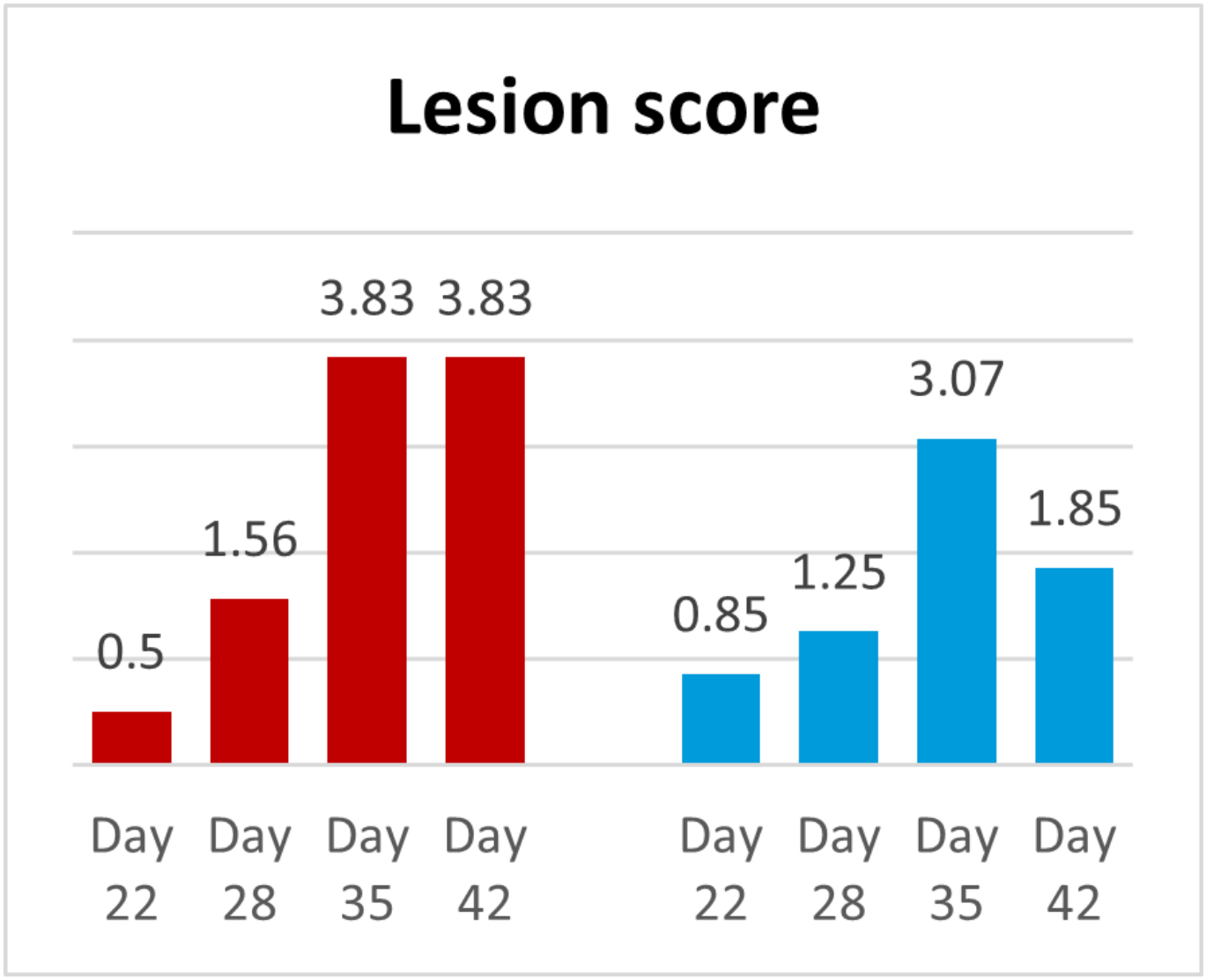


Fig. 2: Pretect D reduced coccidia-caused lesions in broilers

In another field study, a traditional anticoccidial program (Starter and Grower I feeds: Narasin + Nicarbazin, Grower II feed: Salinomycin, Finisher/ withdrawal feeds: No anticoccidial) was compared with a program combining anticoccidials with Pretect D (Starter and Grower I feeds: Narasin + Nicarbazin, Grower II and Finisher feeds: Pretect D). The addition of Pretect D significantly reduced OPG count and lowered the coccidiosis lesion score compared to the control (Fig. 3).


Lesion score
3.83
3.83
3.07
1.85
1.56
1.25
0.85
0.5
Day 22
Day 28
Day 35
Day 42
Day 22
Day 28
Day 35
Day 42

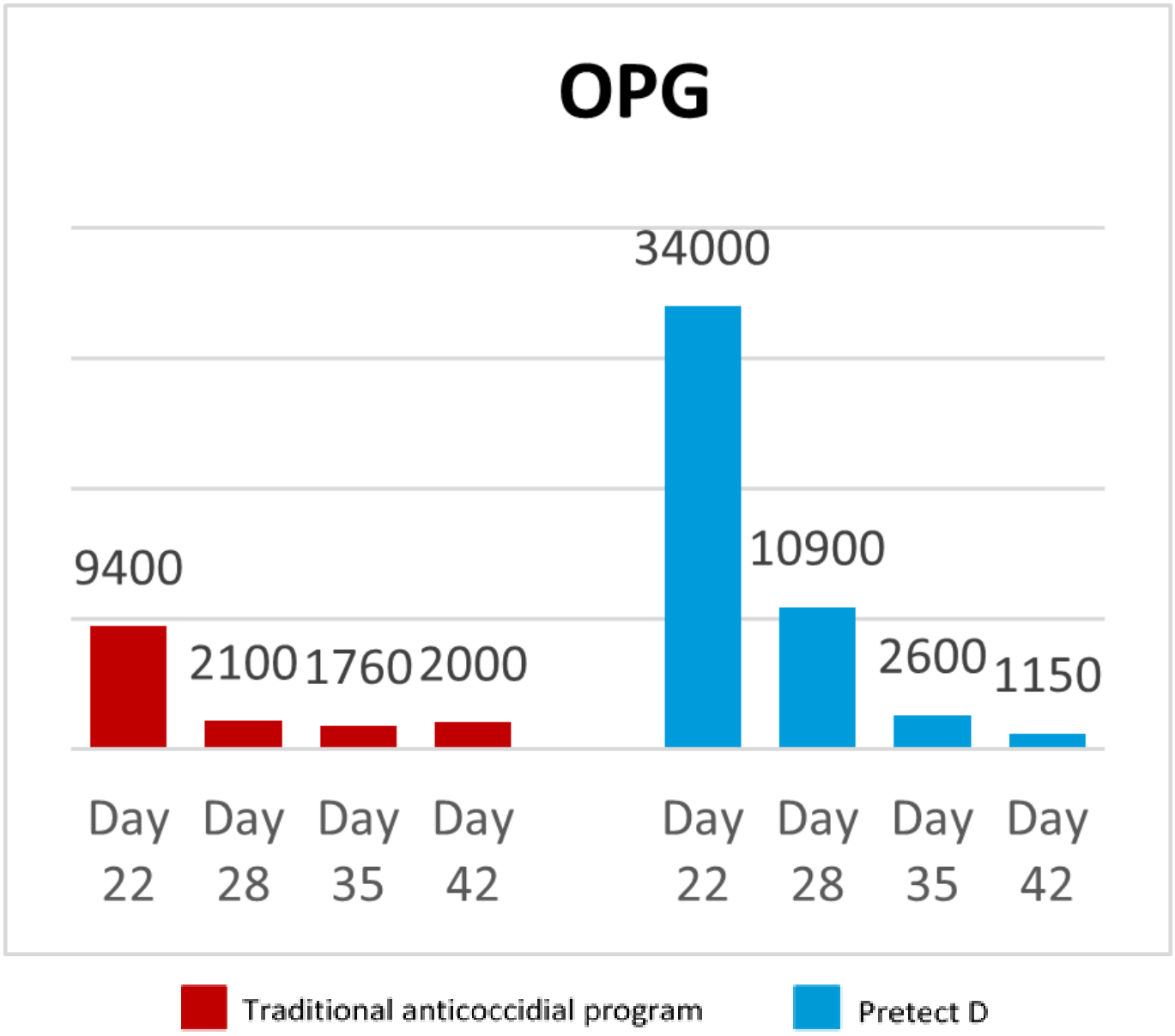
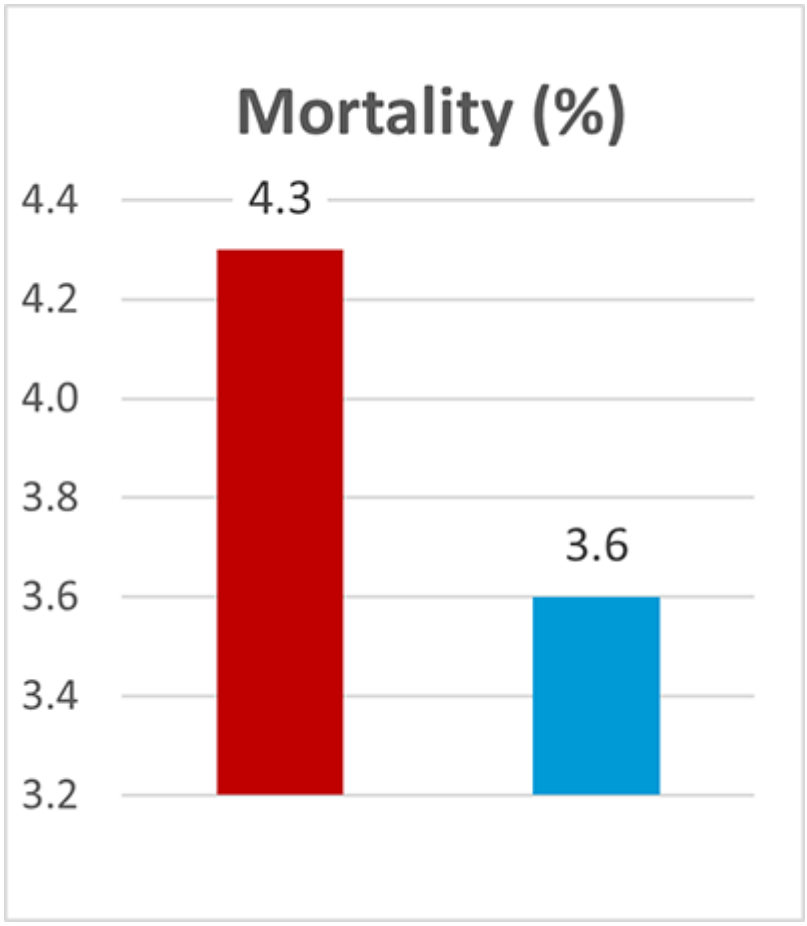
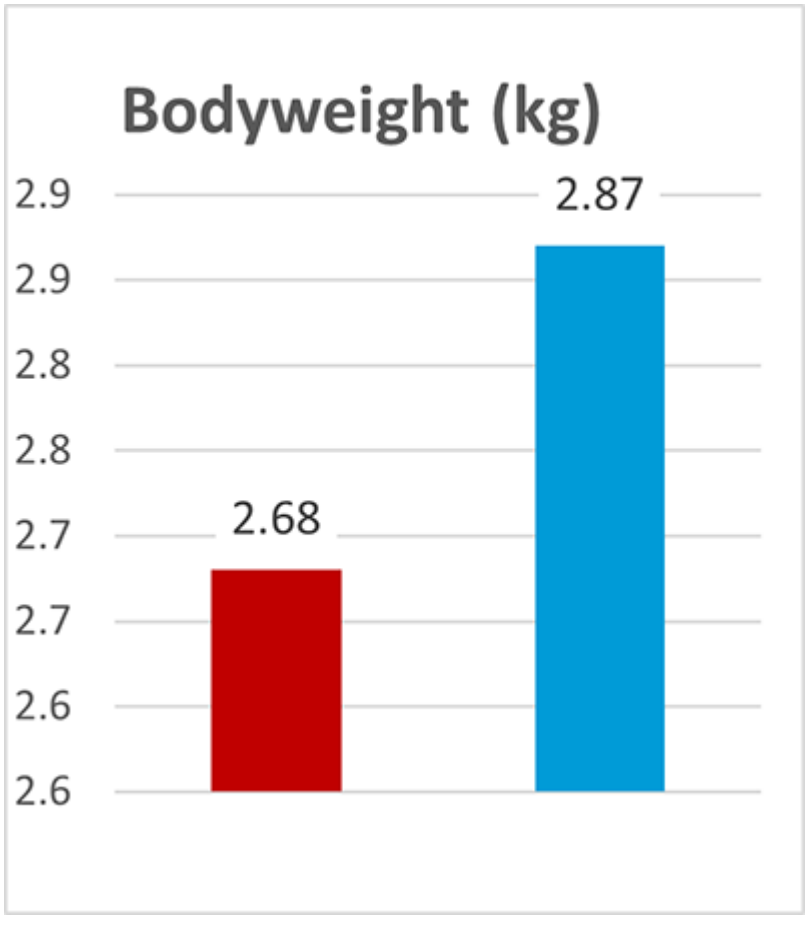


Fig.3. Pretect D reduced broilers' coccidiosis lesion score and OPG count

Consequently, broilers receiving Pretect D showed better overall production performance.


Mortality (%)
4.4
4.2
4.0
3.8
3.6
3.4
3.2
4.3
3.6


Bodyweight (kg)
2.9
2.9
2.8
2.8
2.7
2.7
2.6
2.6
2.68
2.87

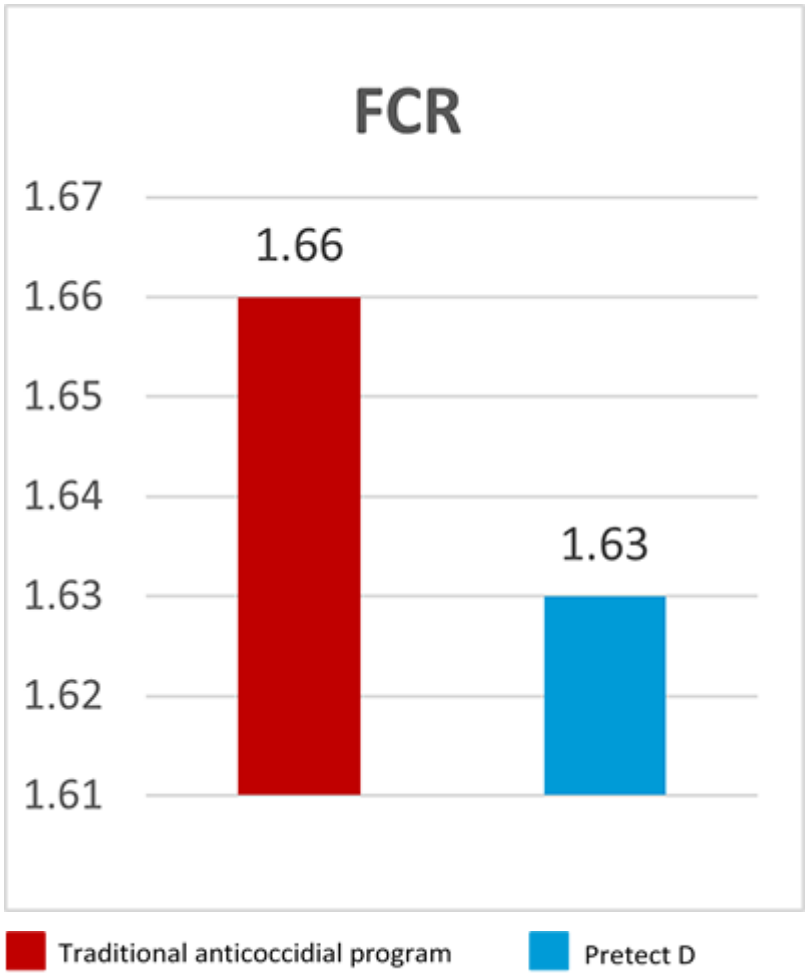


Fig. 4. Overall improved production performance by Pretect D

Pretect D: Application Strategies

The introduction of an effective phytogenic combination in the coccidiosis control program can help mitigate the drug resistance issue. Such a natural anticoccidial solution can be used as a standalone, preferably in less challenging months, as well as in combination with chemicals (shuttle/ rotation) or a coccidiosis vaccine (bio-shuttle), reducing the need for frequent drug use.

Shuttle programs are commonly employed for managing coccidiosis, and they yield a satisfactory level of success. Within these programs, multiple drugs from distinct classes of anticoccidials are administered throughout a single flock. For instance, one class of drug is utilized in the starter feed, another in the grower stage, reverting to the initial class for the finisher diet and concluding with a withdrawal period.

In rotation programs, anticoccidial drugs are alternated between batches rather than within a single batch.

Conclusions

Coccidiosis is considered one of the most economically significant diseases of poultry and the development of anticoccidial resistance has threatened the profitability of the broiler industry. Therefore, regularly monitoring Eimeria species to develop resistance against different anticoccidial groups is crucial to managing resistance and choosing an anticoccidial. It would be rewarding to use an effective phytogenic solution in the coccidiosis control program as a strategic and tactical measure and to focus on such integrated programs for drug resistance management in the future.

References:

Abbas, R.Z., D.D. Colwell, and J. Gilleard. “Botanicals: An Alternative Approach for the Control of Avian Coccidiosis.” *World’s Poultry Science Journal* 68, no. 2 (June 1, 2012): 203–15. https://doi.org/10.1017/s0043933912000268.

Abbas, R.Z., Z. Iqbal, D. Blake, M.N. Khan, and M.K. Saleemi. “Anticoccidial Drug Resistance in Fowl Coccidia: The State of Play Revisited.” *World’s Poultry Science Journal* 67, no. 2 (June 1, 2011): 337–50. https://doi.org/10.1017/s004393391100033x.

Allen, P. C., and R. H. Fetterer. “Recent Advances in Biology and Immunobiology of*Eimeria*Species and in Diagnosis and Control of Infection with These Coccidian Parasites of Poultry.” *Clinical Microbiology Reviews* 15, no. 1 (January 2002): 58–65. https://doi.org/10.1128/cmr.15.1.58-65.2002.

Chapman, H. D. “Biochemical, Genetic and Applied Aspects of Drug Resistance in*Eimeria*Parasites of the Fowl.” *Avian Pathology* 26, no. 2 (June 1997): 221–44. https://doi.org/10.1080/03079459708419208.

Chapman, H.D. “Resistance to Anticoccidial Drugs in Fowl.” *Parasitology Today* 9, no. 5 (May 1993): 159–62. https://doi.org/10.1016/0169-4758(93)90137-5.

Cobaxin-Cárdenas, Mayra E. “Natural Compounds as an Alternative to Control Farm Diseases: Avian Coccidiosis.” *Farm Animals Diseases, Recent Omic Trends and New Strategies of Treatment*, March 21, 2018. https://doi.org/10.5772/intechopen.72638.

Nazzaro, Filomena, Florinda Fratianni, Laura De Martino, Raffaele Coppola, and Vincenzo De Feo. “Effect of Essential Oils on Pathogenic Bacteria.” *Pharmaceuticals* 6, no. 12 (November 25, 2013): 1451–74. https://doi.org/10.3390/ph6121451.

Pop, Loredana Maria, Erzsébet Varga, Mircea Coroian, Maria E. Nedișan, Viorica Mircean, Mirabela Oana Dumitrache, Lénárd Farczádi, et al. “Efficacy of a Commercial Herbal Formula in Chicken Experimental Coccidiosis.” *Parasites & Vectors* 12, no. 1 (July 12, 2019). https://doi.org/10.1186/s13071-019-3595-4.

World Health Organization Technical Report Series No. 296, (1965) pp:. 29.

The future of coccidiosis control

*By **Madalina Diaconu**, Product Manager Pretect D, EW Nutrition and*
***Twan van Gerwe**, Ph.D., Technical Director, EW Nutrition*

With costs of over 14 billion USD per year (Blake, 2020), coccidiosis is one of the most devastating enteric challenges in the poultry industry. With regard to costs, subclinical forms of coccidiosis account for the majority of production losses, as damage to intestinal cells results in lower body weight, higher feed conversion rates, lack of flock uniformity, and failures in skin pigmentation. This challenge can only be tackled, if we understand the basics of coccidiosis control in poultry and what options producers have to manage coccidiosis risks.

Current strategies show weak points

Good farm management, litter management, and coccidiosis control programs such as shuttle and rotation programs form the basis for preventing clinical coccidiosis. More successful strategies include disease monitoring, strategic use of coccidiostats, and increasingly coccidiosis vaccines. However, the intrinsic properties of coccidia make these parasites often frustrating to control. Acquired resistance to available coccidiostats is the most difficult and challenging factor to overcome.

Optimally, coccidiosis control programs are developed based on the farm history and the severity of infection. The coccidiostats traditionally used were chemicals and ionophores, with ionophores being polyether antibiotics. To prevent the development of resistance, the coccidiostats were used in shuttle or rotation programs, at which in the rotation program, the anticoccidial changes from flock to flock, and in the shuttle program within one production cycle (Chapman, 1997).

The control strategies, however, are not 100% effective. The reason for that is a lack of diversity in available drug molecules and the overuse of some molecules within programs. An additional lack of sufficient coccidiosis monitoring and rigorous financial optimization often leads to cost-saving but only marginally effective solutions. At first glance, they seem effective, but in reality, they promote resistance, the development of subclinical coccidiosis, expressed in a worsened feed conversion rate, and possibly also clinical coccidiosis.

Market requests and regulations drive coccidiosis control strategies

Changing coccidiosis control strategies has two main drivers: the global interest in mitigating antimicrobial resistance and the consumer's demand for antibiotic-free meat production.

Authorities have left ionophores untouched

Already in the late 1990s, due to the fear of growing antimicrobial resistance, the EU withdrew the authorization for Avoparcin, Bacitracin zinc, Spiramycin, Virginiamycin, and Tylosin phosphate, typical growth promoters, to "help decrease resistance to antibiotics used in medical therapy". However, ionophores, being also antibiotics, were left untouched: The regulation (EC) No 1831/2003 [13]of the European Parliament and the Council of 22 September 2003 clearly distinguished between coccidiostats and antibiotic growth promoters. Unlike the antibiotic growth promoters, whose primary action site is the gut microflora, coccidiostats only have a secondary and residual activity against the gut microflora. Furthermore, the Commission declared in 2022 that the use of coccidiostats would not presently be ruled out "even if of antibiotic origin" (MEMO/02/66, 2022) as "hygienic precautions and adaptive husbandry measures are not sufficient to keep poultry free of coccidiosis" and that "modern poultry husbandry is currently only practicable if coccidiosis can be prevented by inhibiting or killing parasites during their development". In other words, the Commission acknowledged that ionophores were only still authorized because it believed there were no other means of controlling coccidiosis in profitable poultry production.

Consumer trends drove research on natural solutions

Due to consumers' demand for antibiotic-reduced or, even better, antibiotic-free meat production, intensified industrial research to fight coccidiosis with natural solutions has shown success. Knowledge, research, and technological developments are now at the stage of offering solutions that can be an effective part of the coccidia control program and open up opportunities to make poultry production even more sustainable by reducing drug dependency.

Producers from other countries have already reacted. Different from the handling of ionophores regime in the EU, where they are allowed as feed additives, in the United States, coccidiostats belonging to the polyether-ionophore class are not permitted in NAE (No Antibiotics Ever) and RWE (Raised Without Antibiotics) programs. Instead of using ionophores, coccidiosis is controlled with a veterinary-led combination of live vaccines, synthetic compounds, phytomolecules, and farm management. This approach can be successful, as demonstrated by the fact that over 50% of broiler meat production in the US is NAE. Another example is Australia, where the two leading retail store chains also exclude chemical coccidiostats from broiler production. In certain European countries, e.g., Norway, the focus is increasingly on banning ionophores.

The transition to natural solutions needs knowledge and finesse

In the beginning, the transition from conventional to NAE production can be difficult. There is the possibility to leave out the ionophores and manage the control program only with chemicals of different modes of action. More effective, however, is a combination of vaccination and chemicals (bio-shuttle program) or the combination of phytomolecules with vaccination and/or chemicals (Gaydos, 2022).

Coccidiosis vaccination essentials

When it is decided that natural solutions shall be used to control coccidiosis, some things about vaccination must be known:

1. There are different strains of vaccines, natural ones selected from the field and attenuated strains. The formers show medium pathogenicity and enable a controlled infection of the flock. The latter, being early mature lower pathogenicity strains, usually cause only low or no post-vaccinal reactions.
2. A coccidiosis program that includes vaccination should cover the period from the hatchery till the end of the production cycle. Perfect application of the vaccines and effective recirculation of vaccine strains amongst the broilers are only two examples of preconditions that must be fulfilled for striking success and, therefore, early and homogenous immunity of the flock.
3. Perfect handling of the vaccines is of vital importance. For that purpose, the personnel conducting the vaccinations in the hatchery or on the farms must be trained. In some situations, consistent high-quality application at the farm has shown to be challenging. As a result**,** interest in vaccine application at the hatchery is growing.

Phytochemicals are a perfect tool to complement coccidiosis control programs

As the availability of vaccines is limited and the application costs are relatively high, the industry has been researching supportive measures or products and discovered phytochemicals as the best choice. Effective phytochemical substances have antimicrobial and antiparasitic properties and enhance protective immunity in poultry infected by coccidiosis. They can be used in rotation with vaccination, to curtail vaccination reactions of (non-attenuated) wild strain vaccines, or in combination with chemical coccidiostats in a shuttle program.

In a recent review paper (El-Shall et al., 2022), natural herbal products and their extracts have been described to effectively reduce oocyst output by inhibiting Eimeria species' invasion, replication, and development in chicken gut tissues. Phenolic compounds in herbal extracts cause coccidia cell death and lower oocyst counts. Additionally, herbal additives offer benefits such as reducing intestinal lipid peroxidation, facilitating epithelial repair, and decreasing Eimeria-induced intestinal permeability.

Various phytochemical remedies are shown in this simplified adaptation of a table from El-Shall et al. (2022), indicating the effects exerted on poultry in connection to coccidia infection.

Bioactive compound	**Effect**
Saponins	*Inhibition of coccidia:* By binding to membrane cholesterol, the saponins disturb the lipids in the parasite cell membrane. The impact on the enzymatic activity and metabolism leads to cell death, which then induces a toxic effect in mature enterocytes in the intestinal mucosa. As a result, sporozoite-infected cells are released before the protozoa reach the merozoite phase.*Support for the chicken:* Saponins enhance non-specific immunity and increase productive performance (higher daily gain and improved FCR, lower mortality rate). They decrease fecal oocyst shedding and reduce ammonia production.
Tannins	*Inhibition of coccidia:* Tannins penetrate the coccidia oocyst wall and inactivate the endogenous enzymes responsible for sporulation.*Support for the chicken:* Additionally, they enhance anticoccidial antibodies' activity by increasing cellular and humoral immunity.

Flavonoids and terpenoids	*Inhibition of coccidia:* They inhibit the invasion and replication of different species of coccidia.*Support for the chicken:* They bind to the mannose receptor on macrophages and stimulate them to produce inflammatory cytokines such as IL-1 through IL-6 and TNF. Higher weight gain and lower fecal oocyst output are an indication of suppression of coccidiosis.
Artemisinin	*Inhibition of coccidia:* Its impact on calcium homeostasis compromises the oocyst wall formation and leads to a defective cell wall and, in the end, to the death of the oocyst. Enhancing the production of ROS directly inhibits sporulation and also wall formation and, therefore, affects the Eimeria life cycle.*Support for the chicken:* Reduction of oocyst shedding
Leaf powder of Artemisia annua	*Support for the chicken:* Protection from pathological symptoms and mortality associated with Eimeria tenella infection. Reduced lesion score and fecal oocyst output. The leaf powder was more efficient than the essential oil, which could be due to a lack of Artemisinin in the oil, and to the greater antioxidant ability of A. annua leaves than the oil.
Phenols	*Inhibition of coccidia:* Phenols change the cytoplasmic membrane's permeability for cations (H+ and K+), impairing essential processes in the cell. The resulting leakage of cellular constituents leads to water unbalance, collapse of the membrane potential, inhibition of ATP synthesis, and, finally, cell death. Due to their toxic effect on the upper layer of mature enterocytes of the intestinal mucosa, they accelerate the natural renewal process, and, therefore, sporozoite-infected cells are shed before the coccidia reaches the merozoite phase.

Table 1: Bioactive compounds and their anticoccidial effect exerted in poultry

Consumers vote for natural – phytochemicals are the solution

Due to still rising antimicrobial resistance, consumers push for meat production without antimicrobial usage. Phytomolecules, as a natural solution, create opportunities to make poultry production more sustainable by reducing dependency on harmful drugs. With their advent, there is hope that antibiotic resistance can be held in check without affecting the profitability of poultry farming.

Coccidiosis management without increasing antimicrobial resistance – it's up to us

*By **Tingting Fan**, Regional Technical Manager Poultry, EW Nutrition*

Chicken coccidiosis is a common and important disease in poultry production, with an incidence of infection as high as 50-70%. The mortality rates are around 20-30% or higher in highly severe cases. In addition to losses due to mortality, producers lose money due to poor growth as well as decreased meat yield and quality. Additionally, the birds get more susceptible to secondary infections, e.g., necrotic enteritis (Moore, 2016).

The costs caused by coccidiosis in poultry are about 13 billion US $ (Blake, 2020). These costs globally divide into 1 billion costs for prophylaxis/treatment and 12 billion due to performance losses. Until now, only 5% of the prophylaxis costs have been created by natural solutions. That means that there is still a high potential to be tapped.

Natural solutions, unfortunately, are only used by a minority

For a long time, ionophores fitting the classical definition of antibiotics and chemicals were used in coccidia-fighting programs – and contributed to the development of antimicrobial resistance (Nesse et al., 2015). Nowadays, the combination with vaccination in rotation or shuttle programs has reduced this danger, but there is still potential. Meanwhile, some natural solutions are available that can be integrated into coccidiosis-fighting programs. However, producers using natural solutions are still a minority.

For thousands of years, plants have been used in human and veterinary medicine. Before the discovery of antibiotics in 1928, diseases were fought with plants. To regain the effectiveness of antibiotics, using natural solutions for prophylaxis should be once more standard, and the use of antibiotics is the treatment only for critical cases.

How does Eimeria damage broilers

The pathogenic mechanism of coccidia or Eimeria spp. is mainly the massive destruction of host intestinal cells when it reproduces, resulting in severe damage to the intestinal mucosa. On the one hand, the damaged gut wall loses its capability for effective digestion and absorption of nutrients, leading to worse feed conversion and lower weight gain.

On the other hand, this damage reduces the chicken’s immunity and paves the way for other infections, such as necrotic enteritis, and raises mortality.

Table 1:The seven most known Eimeria species in broilers and their main site of occurrence

Eimeria species	Predilection site
E. tenella	Ceca
E. acervulina	Duodenum and prox. jejunum
E. maxima	Central jejunum
E. mitis	Distal jejunum and ileum
E. necatrix	Central jejunum and ceca
E. brunetti	Ileum, entrance of the ceca and rectum
E. praecox	Duodenum and prox. jejunum

Concerning their pathogenicity, for poultry, the Eimeria species must be ordered in the following way: E. necatrix> E. tenella > E. brunetti > E. maxima > E. acervulina > Eimeria mitis, and Eimeria praecox.

Prevention is better than treatment

Thanks to its bi-layered wall with a robust structure, the oocysts of coccidia are extremely resilient. They can survive 4 to 9 months in the litter or soil and are resistant to common disinfectants. Farm personnel and visitors are also important vectors, so good biosecurity practices can reduce the number of oocysts contaminating the premises and help prevent clinical out-brakes. Coccidiosis control in poultry should focus on “prevention” rather than “treatment”, combining biosecurity practices, feed additives, and/or vaccination.

Effective hygiene on the farm is crucial

To prevent coccidia infections, one of the most critical points is hygiene. Biosecurity practices are crucial and include cleaning and disinfection of the poultry houses and their surroundings, pest control and prevention, restriction, control, and management of the entry of personnel, visitors, vehicles, and equipment, among others.

Coccidia oocysts are ubiquitous and survive for a long time, and even effective cleaning and disinfection cannot completely remove them. After a severe outbreak, it is recommended to take drastic biosecurity measures such as flame or caustic soda disinfection to prevent further spread of the disease.

When there are birds in the house, it must be paid attention that the litter is not excessively humid. Litter moisture should be maintained around 25%; turning and replacing moist litter are the best practices to follow. For keeping the litter dry, adequate ventilation and appropriate stocking density are beneficial.

To avoid unnecessary stress and gut health issues, the birds must be fed according to their requirements with high-quality feed so that the animals build up good immunity and resilience.

Coccidiosis can be controlled with effective programs

Anticoccidial drugs were the first means of preventing and controlling coccidiosis in chickens and once achieved very good results. Since Sulfaquinoxaline was found to be effective in the 1850s, about fifty other drugs have been developed for the prevention and control of coccidiosis. Generally, the anticoccidials used for years to prevent the disease can be divided into ionophores and chemicals.

Ionophores, produced as by-products of bacterial fermentation, are technically antibiotics. The great benefits of ionophores are that they kill the parasite before it can infect the bird and thus prevent damage to the host cells. Eimeria species also take a long time to develop resistance to ionophores (Chapman, 2015). Well-established ionophores are products that contain monensin, lasalocid, salinomycin, narasin, or maduramycin; the trade names are Coban/Monensin, Avatec, Coxisstac, Monteban, and Cygro.

Chemicals, these molecules, are produced by chemical synthesis. They differ from each other and ionophores as each one has a unique mode of action against coccidia. In general, they act by interfering with one or more stages of the life cycle of Eimeria, e.g., supplying fake nutrients (Amprolium, Vit. B1) to the parasite, starving them out. The active components here are nicarbazin, amprolium, zoalene, decoquinate, clopidol, robenidine and diclazuril, and the respective trade names Nicarb, Amprol, Zoamix, Deccox, Coyden, Robenz and Clinacox. Eimeria species develop resistance to these chemical molecules; therefore, they must be used carefully and with strict planning. However, cross-resistance does not develop, making them highly valuable in rotation programs.

Vaccination against coccidiosis is accepted by many farmers as a good solution to control coccidiosis in chickens. Vaccination aims to replace resistant field strains with vaccine strains, which are sensitive to anticoccidials. Currently, commercial chicken vaccines are available in natural and attenuated strains; research to obtain safer and more efficient vaccines is also ongoing.

Non-attenuated vaccines are less expensive and make for good immunity, but as they may mildly damage the intestinal epithelium, the risk of necrotic enteritis can increase. On the contrary, attenuated strains – usually “precocious” strains with shorter reproduction cycles, cause less intestinal damage and thus have a lower risk of provoking bacterial or necrotic enteritis. The immunity is like after normal infections; however, you have a controlled epidemiology, fewer coccidiosis outbreaks, and an improved uniformity of the flock.

Phytomolecules-based natural anticoccidials saponins and tannins are natural components that can also help control coccidiosis (e.g., Pretect D, EW Nutrition GmbH). These ingredients act in different ways: the tannins improve the intestinal barrier function locally and systemically. The saponins directly impact the oocysts by preventing their growth, interacting with the cholesterol in the cell membrane (triterpenoid saponin), or hindering further sporulation and causing cell death by causing pores in the cell membrane of the parasite. Altogether, Pretect D promotes the beneficial microbial population and reduces the harmful one, improves the gut barrier function, reduces mucosal inflammation, inhibits growth and replication of Eimeria, preventing their lesions, and fosters birds’ immune response against Eimeria spp.

To prove Pretect D’s effectiveness in the reduction of coccidiosis, several trials were conducted. One of the trials was carried out in Poland with 360.000 broilers in commercial conditions. The animals were divided into ten houses, and two cycles were tested. Half of the birds served as control and received Narasin and Nicarbazin in the starter and grower I diet and salinomycin in the grower II diet. The other half also were fed Narasin and Nicarbazin in the starter and grower I diet, but Pretect D @1kg/t in grower II and 0.5kg/t in the finisher diet. The results are shown in figure 1: The application of Pretect D in the grower II and finisher diet decreased the number of oocysts in the droppings more than the application of salinomycin and, therefore, reduced the spreading of coccidiosis. In addition, the performance of the broilers receiving Pretect D was nothing short of the control’s performance showing Pretect as an optimal completion in shuttle or rotation programs (see more HERE).

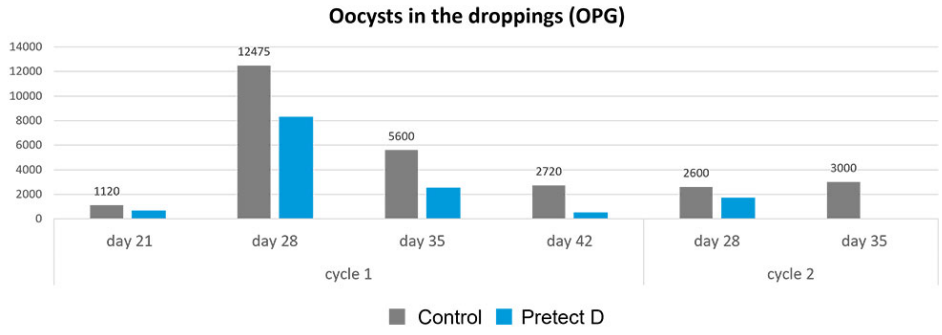


Figure 1: Reduction of oocysts in the droppings by Pretect D

Managing coccidiosis without promoting

antimicrobial resistance is not easy, but feasible

Coccidiosis is a challenge aggravated by our current high level of production. Tools such as ionophores, chemicals, but also vaccines, and natural products are available to fight coccidiosis. However, due to the high probability of resistance development, these tools must be used carefully and in structured programs. The phytomolecules-based product Pretect D gives the possibility to reduce antimicrobial resistance as part of programs against coccidiosis.

References upon request

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 Pretect 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 Pretect D signifies our commitment to helping customers make livestock production more sustainable through best-in-class natural solutions.”

Research with Pretect 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 Pretect 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.” Pretect 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.