

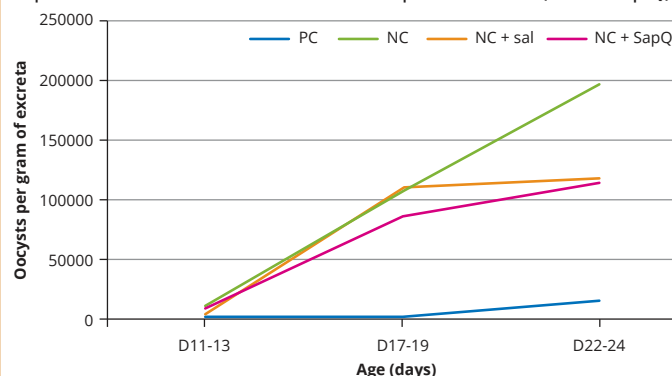
# Saponin-aluminosilicate promotes resilience to coccidiosis

Coccidiosis is the most frequently occurring health problem in intensive poultry production. This disease is caused by protozoan parasites of the genus *Eimeria*. One feed strategy which has proved to be a promising complementary coccidiosis control strategy in broilers is the inclusion of saponins derived from *Quillaja saponaria*.

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**V**arious *Eimeria* species invade different parts of the intestinal tract and replicate within the epithelial cells, causing severe damage to the intestinal wall. Intestinal lesions impair nutrient digestion and absorption which, consequently, compromises broiler health and performance by reducing feed efficiency and growth. Coccidiosis is also a predisposing factor to necrotic enteritis. High levels of undigested nutrients allow the growth and proliferation of *Clostridium perfringens*. Subsequent production of toxins by *C. perfringens* leads to necrotic lesions which are mainly restricted to the small intestine.

Figure 1 – Oocyst shedding curve (number of oocysts shed per gram of collected excreta) of broilers reared on clean litter (PC), used litter (NC), used litter with the addition of salinomycin to the diet (NC + sal), and used litter with the addition of the saponin-aluminosilicate blend on top of the diet (NC + SapQ).



## Current control strategies

Conventional strategies to prevent and control coccidiosis in commercial broiler production are mainly based on chemoprophylaxis, such as the administration of synthetic compounds and ionophores in the feed, or the use of live vaccines (attenuated or non-attenuated). These interventions are relatively costly and, combined with the productivity losses and secondary challenges associated with coccidiosis, are estimated to cost the global chicken industry in excess of US\$ 2 billion every year. The prolonged use of anticoccidials has further led to the development of resistant *Eimeria* strains. Increasing concerns about antimicrobial resistance and the potential impact of anticoccidials on public and animal health may lead to new restrictive regulations on the use of anticoccidials. Vaccines often do not result in a timely build-up of immunity in broilers and are often associated with performance losses. The shortcomings of current coccidiosis control strategies, coupled with the fact that the development of new anticoccidial medications and live vaccines is expensive, only serve to increase the need for the development and implementation of alternative coccidiosis management strategies. The use of feed additives to control *Eimeria* infection and improve gut health has now become a part of coccidiosis management. One feed strategy which has proved to be a promising complementary coccidiosis control strategy in broilers is the inclusion of saponins derived from *Quillaja saponaria*.

## Source of saponins

Saponins are secondary metabolites of plants and are generally considered to play a role in a plant's natural defence system due to their antimicrobial, fungicidal and insecticidal properties. Owing to their biological activities, saponins have a wide range of applications in various industries. These include their use as food additives, cosmetic ingredients and vaccine adjuvants. *Quillaja* saponins are derived from an endemic, evergreen tree found in Chile, Peru and Bolivia. The soapbark tree (*Quillaja saponaria*, Molina) contains high concentrations of triterpenoid saponins which consist of a triterpene aglycone linked to saccharide side chains. Triterpenoid saponins are well known for their antiprotozoal effects. Strict local regulations ensure that these trees can provide a



constant, reliable and sustainable raw material for producing *Quillaja saponaria* extract.

The antiprotozoal effect of saponins is related to their amphiphilic properties, meaning that they possess both hydrophilic (saccharide side chains) and lipophilic (aglycone) parts. Their amphiphilic properties enable saponins to interfere with the integrity of biological membranes which prevents micro-organisms such as *Eimeria sp.* from infecting cells.

### Optimal saponin-aluminosilicate blend

A unique product is obtained (Excential Sapphire Q, Orffa Additives BV) by combining *Quillaja saponaria* extract with an activated aluminosilicate. This optimal saponin-aluminosilicate blend will not only support resilience against coccidiosis but will also provide excellent binding of bacterial toxins. The activated aluminosilicate has been shown to bind to alpha and NetB exotoxins, important virulence factors produced by the *Clostridium perfringens* pathogen. Therefore, the functional activity of this unique blend has a broader spectrum towards necrotic enteritis.

### Reduced oocyst shedding

A recent trial carried out at Virginia Tech (USA) showed that the combination of *Quillaja* saponins and an aluminosilicate reduced the adverse effects of a coccidiosis challenge on the performance in broiler chickens. The challenge consisted of used litter containing oocysts shed by seeder birds (natural infection model). In total, 1152 one-day-old Ross 708 male broilers were allocated to 12 replicate pens of 24 broilers. The trial consisted of four treatments: a positive control reared on clean litter, with no additive or coccidiostats added to the feed (PC); a negative control reared on used litter, with no additive or coccidiostats added to the feed (NC); a negative control reared on used litter, with a coccidiostat (salinomycin) added to the feed (NC + sal); a negative control reared on used litter, with the addition of Excential Sapphire Q, Orffa Additives BV (*Quillaja saponaria* extract on an aluminosilicate carrier) on top of the diet during the whole rearing period

(NC + SapQ). The number of *Eimeria* oocysts shed by broilers challenged with coccidiosis was similar for the broilers that received salinomycin, an anticoccidial, and the broilers that received the saponin-aluminosilicate blend (Figure 1). Furthermore, the addition of the saponin-aluminosilicate blend improved final body weight (BW) at 42 days of age and the feed conversion ratio (FCR) between 0 and 42 days of age of coccidiosis infected broilers (used litter) to a similar level as broilers reared on clean litter (PC) (Figure 2). Improved feed efficiency and reduced severity of *Eimeria* infection in broilers will directly translate into higher farm income.

### Promote resilience

The distinctive combination of a highly concentrated and standardised *Quillaja saponaria* extract (with a high concentration of triterpenoid saponins) and activated aluminosilicate results in a suitable blend to complement present coccidiosis control strategies and further promote resilience to infection in broilers.

**Conventional strategies to prevent and control coccidiosis in commercial broiler production are mainly based on chemoprophylaxis.**

