# Can a saponin-aluminosilicate blend promote resilience to coccidiosis in broilers?

COCCIDIOSIS is one of the main disease challenges affecting broiler production worldwide.

This disease has a significant economic impact on the poultry industry, and the global cost of coccidiosis in chickens linked to prevention, treatment and performance losses is estimated at $A19.49 billion or $A0.20 per bird.

Coccidiosis is caused by protozoan parasites of the genus Eimeria.

In order to replicate, these parasites invade the intestinal cells of the host, which results in tissue damage, impaired nutrient digestion and absorption, and compromised well-being and growth in broilers.

Furthermore, coccidiosis is also a predisposing factor to secondary diseases, such as necrotic enteritis, induced by Clostridium perfringens.

Coccidiosis is commonly controlled with prophylactic anticoccidial drugs and the use of vaccines.

However, the extensive prophylactic use of anticoccidials has resulted in resistant Eimeria strains and loss of efficacy.

Vaccines, on the other hand, have a high relative cost and, if managed incorrectly, can predispose the animals to subclinical coccidiosis and secondary necrotic enteritis.

In broilers, vaccines often do not lead to a timely build-up of immunity.

With these drawbacks, broiler producers are looking for new tools to add to their global coccidiosis management strategy.

Natural feed additives – such as saponin-rich plant extracts and specific clay minerals – are among the promising approaches used to control coccidiosis in broilers.

Saponins are found in many plant species and are known to be antimicrobial, to inhibit mould, and to protect plants from insect attack.

As a result, saponin extracts from plants such as the Quillaja saponaria Molina tree have a wide range of applications in livestock production and can be used as antibacterial, antiviral and antiparasitic agents, as well as vaccine adjuvants.

The antiparasitic effect of saponins may be linked to their detergent action – the hydrophobic part of the saponin can integrate into the membrane of protozoa to form complexes with sterols, resulting in pore formation and cell lysis.

Aluminosilicates are clay minerals that are also widely used as feed additives to improve growth performance and health of animals, mainly due to their ability to adsorb heavy metals, ammonia, mycotoxins and toxins, thereby protecting the intestinal tract.

A blend of saponins and aluminosilicate was tested in coccidiosis-challenged broilers.

The objective of the study was to investigate the effect of a blend of Quillaja saponaria extract (a source of triterpenoid saponins) and aluminosilicate on oocyst excretion, intestinal lesions and productive performance in broilers raised on used litter seeded with coccidia oocysts.

A total of 1152 one-day-old Ross 708 male broilers were divided over four treatments, each with 12 replicates.

A positive control with no anticoccidials, reared on clean pine shavings (PC); a negative control with no anticoccidials, reared on used pine shavings (NC); a negative control with 60mg of an anticoccidial (salinomycin) per kilogram of feed, reared on used pine shavings (NC + sal); and a negative control with a saponin-aluminosilicate blend (Excential Sapphire Q by Orffa Additives) providing 30mg of Quillaja saponaria extract per kilogram of feed, reared on used pine shavings (NC + sap-al).

The broilers were fed in three phases – starter (0 to 16 days), grower (16 to 29 days) and finisher (29 to 42 days).

The used litter was generated by housing chicks that received a 10 times dose of Coccivac-B52 via feed for two days and raised until 18 days of age to allow birds to shed oocysts.

Litter was then mixed and redistributed into pens.

Apart from intestinal lesion evaluation, fresh excreta samples were collected to determine the number of oocysts shed per gram of excreta.

At the end of each feeding phase, body weight and average daily feed intake were determined to calculate the body weight gain and feed conversion ratio.

For the overall trial period, the salinomycin treatment had a higher BWG compared to NC, with the PC and NC + sap-al treatments being intermediate but not significantly different from the NC and NC + sal treatments (see Figure 1).

For FCR from 0 to 42 days, the NC + sal and NC + sap-al treatments tended to improve the overall FCR compared to the NC treatment (P = 0.053).

The ADFI did not differ between treatments.

No differences in lesion scores were noted among treatments in the duodenum, jejunum and ileum.

From 11 to 13 days, the lowest oocyst shedding was observed for PC and the highest shedding for NC and NC + sap-al treatments, with the NC + sal treatment being intermediate (P < 0.001) (see Figure 2).

No significant differences in oocyst shedding were found between the treatments from 17 to 19 days (P = 0.209), though the PC group showed numerically the lowest oocyst counts on these days.

From 22 to 24 days, a trend was observed for oocyst counts (P = 0.063).

The NC + sal and NC + sap-al treatments reduced the number of excreted oocysts by 39.7 percent and 41.3 percent, respectively compared to the NC treatment.

The PC treatment showed numerically the lowest oocyst excretion on these days.

The reduction in oocyst excretion when salinomycin or the saponin-aluminosilicate blend was fed suggests a direct anticoccidial effect of these additives.

Saponins are natural detergents because they

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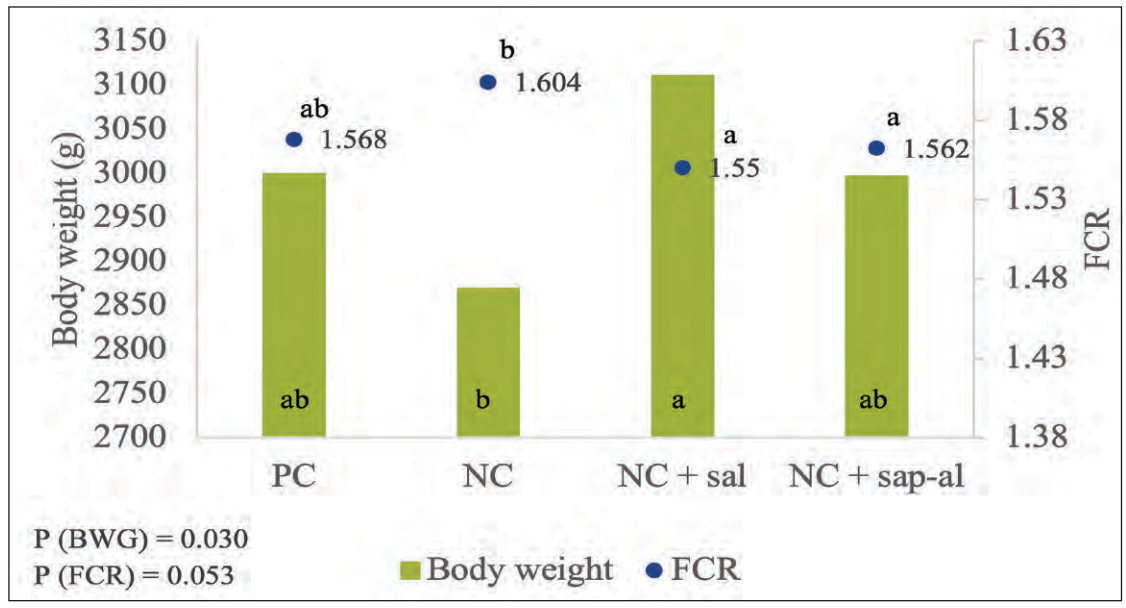


Figure 1 – Effects of treatments on broiler body weight gain and mortality corrected feed conversion ratio from 0 to 42 days of age.

# Resilience to coccidiosis in broilers

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contain a fat-soluble nucleus (sapogenin) and water-soluble carbohydrate side chains.

The sapogenin portion of saponins can form complexes with cholesterol in the protozoal cell membrane, which can affect the integrity of the parasite membrane and prevent the parasites from invading intestinal cells and replicating.

By reducing coccidiosis pressure, the saponin-aluminosilicate blend was able to improve the growth of coccidiosis-challenged broilers to a similar level as the unchallenged broilers and broilers fed salinomycin, an anticoccidial drug.

Coccidiosis generally occurs concurrently with necrotic enteritis, which is caused by toxins produced by Clostridium perfringens.

In this study, the improved performance of the broilers fed the saponin-aluminosilicate blend may also have been related to the aluminosilicate carrier, which adsorbed toxins produced by opportunistic pathogens in the coccidiosis-challenged broilers, reducing intestinal damage and thereby improving growth.

These results indicate that the saponin-aluminosilicate blend can promote the resilience in broilers to coccidiosis.

This blend can be implemented to further reduce the negative effect of subclinical coccidiosis on growth and feed efficiency in broilers and reduce the costs associated with these performance losses.

For more information, contact Madri Brink at brink@orffa.com

**Madri Brink**
**Central Technical Manager**
**Orffa Additives**

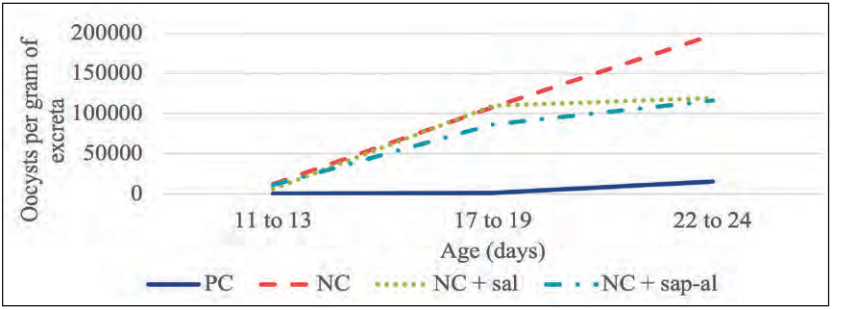


Figure 2 – Effects of treatments on oocyst counts in excreta of broilers during three collection periods.