Magni-Phi® Ultra

# Technical Bulletin

**Information from Phibro Technical Services**

# *Comparative Effects of Eubiotic and Antibiotic Feed Additives on Performance, Coccidial Lesion Scores and Fecal Clostridial Counts in Challenged and Disease-Free Broilers*

A study was conducted in growing broilers to compare the effects of eubiotic and antibiotic feed additives in improving performance and reducing the incidence of coccidial lesions and fecal clostridial counts. Effects were determined in both disease-free broilers and those challenged with *Eimeria* and *Clostridium*.

## Objective

The objective of this study was to evaluate the comparative performance responses of coccidiosis-vaccinated broilers fed one of three commonly used feed additives (Magni-Phi® Ultra*, Bacitracin Methylene Disalicylate (BMD®) or Xtract® used at standard feeding levels) in two different disease challenge environments.

## Materials and Methods

Two different challenge conditions were used in this test: 1) a clean environment – new litter was used in each pen and no disease organisms were intentionally introduced, and 2) a moderate disease challenge involving used litter that was known to contain *Eimeria acervulina* and *E. maxima* oocysts and the spores of *Clostridium perfringens*. Additional procedures used are described in Bafundo et al. (2021). Dividers were used between pens to limit the cross contamination of pathogens from one pen to another.

Eight treatments were used in the test. Four feeding programs (non-treated control, Magni-Phi Ultra – 125 ppm [MPu]; Bacitracin MD – 55 ppm [BMD], and Xtract – 200 ppm [XT]) were administered in each of the two challenge environments described above. Each product was fed for the duration of the 42-day test. At day-of-age, all broilers in the trial were vaccinated for coccidiosis at the hatchery with Coccivac®-B52.

Treatments were arranged in a randomized complete block design involving 12 blocks. Pens contained 55 Ross 708 broilers at the start of the study and coccidial lesion scores were determined on day 21 of the test (Johnson and Reid, 1970). At this same time point, fresh fecal samples were collected and evaluated for *Clostridium perfringens* using the procedures described in Bafundo et al. (2021). Performance was measured at days 21 and 42 of the trial. Mortality was determined daily but is expressed as the total mortality (from all causes) from placement until day 21 and total mortality (day 42) recorded for the entire trial.

## Results and Discussion

Data presented in Table 1 show the effects of the two distinct challenges used in this trial. Birds raised on clean litter without supplemental challenge had significantly lower intestinal lesion scores and fewer *C. perfringens* CFU/g feces than those reared under challenge. In addition, comparisons of challenged versus unchallenged controls showed that challenged broilers experienced higher levels of mortality at both 21 and 42 days of age. These results indicate that the methods used in this test produced levels of intestinal disease needed to quantify performance results of these products at both low and moderate challenge levels.

In both challenged and unchallenged broilers, the lowest levels of coccidial lesions were observed in MPu and BMD treatments (Table 1). With the exception of *E. maxima* lesions in challenged broilers, these collective responses were significantly lower than the XT and control treatments ($P < 0.05$). Compared to controls, MPu and BMD challenged broilers had significantly reduced *C. perfringens* numbers in

feces. While this effect is expected for BMD, the MPu response in clostridial numbers helps to explain the low mortality figures recorded for MPu-fed broilers (Table1). Previous studies have reported similar Magni-Phi effects when broilers were reared under clostridial challenge (Bafundo et al., 2021).

In the absence of challenge, all supplements improved weight gain compared to controls at d 21, but MPu and BMD provided the greatest improvements in gain (Table 2). Both BMD and MPu significantly improved feed conversion rate (FCR) compared to XT and controls, but at day 21, BMD produced the greatest improvements in FCR. In the absence of challenge, MPu and BMD produced final performance figures that were significantly better than XT and the nontreated controls.

Under challenge conditions at both 21 and 42 days, the effects of BMD on body weights and feed conversion were evident, and this response is likely related to reduction of *C. perfringens* and other intestinal bacteria that affect performance. Although it is clear that MPu is not as effective as an antibiotic under these challenge conditions, it significantly reduced clostridial numbers at day 21 (Table 1), thereby providing performance improvements that were competitive to the antibiotic (Table 2). Under the dual challenge conditions used in this study, performance responses of MPu-fed broilers were better than those of XT and control treatments ($P < 0.05$).

## Summary of Research Findings

- The effects of disease challenge were evident: Birds reared under challenge had higher lesion scores and fecal clostridial counts than those reared without imposed challenge. Performance was affected similarly.
- Coccidia lesion scores and fecal clostridial counts were reduced by MPu and BMD.
- In the absence of challenge, MPu and BMD produced comparable body weights, but BMD improved FCR values at day 21. Final weight gain and FCR responses were statistically equivalent for BMD and MPu. Both were significantly improved compared to XT and controls.
- Under challenge, BMD provided the best body weight and feed conversion. However, MPu also improved these variables but not to the extent provided by the antibiotic. Both BMD and MPu significantly improved performance variables compared to XT and to controls.

Given the positive results seen in this study, more studies to further explore the value of Magni-Phi Ultra as an alternative to replace antibiotics are required.

**Table 1. The Effect of Eubiotic and Antibiotic Supplemented Feeds on the Occurrence of Coccidial Lesions, Fecal *Clostridium* Counts and Mortality in the Absence and Presence of Intestinal Disease Challenge[1]**

| | *E. acervulina* lesions D21 | *E. maxima* lesions D21 | *C. perfringens* CFU $Log_{10}$ per g Feces D21 | Total Mortality D21 Percent | Total Mortality D42 Percent |
|---|---|---|---|---|---|
| **Treatment ppm** | | | **Without Disease Challenge** | | |
| Non-treated | 0.48$^{b}$ | 0.53$^{b}$ | 2.778$^{b}$ | 0.64$^{a}$ | 0.69$^{a}$ |
| Magni-Phi Ultra 125 | 0.19$^{a}$ | 0.25$^{a}$ | 2.187$^{a}$ | 0.64$^{a}$ | 0.87$^{a}$ |
| BMD 55 | 0.10$^{a}$ | 0.08$^{a}$ | 2.261$^{a}$ | 0.80$^{a}$ | 0.87$^{a}$ |
| Xtract 200 | 0.46$^{b}$ | 0.56$^{b}$ | 2.468$^{b}$ | 0.80$^{a}$ | 1.04$^{a}$ |
| **Treatment ppm** | | | **With Disease Challenge** | | |
| Non-treated | 1.65$^{d}$ | 1.58$^{d}$ | 3.846$^{d}$ | 3.69$^{b}$ | 5.56$^{b}$ |
| Magni-Phi Ultra 125 | 0.65$^{b}$ | 1.10$^{c}$ | 3.214$^{c}$ | 0.64$^{a}$ | 0.87$^{a}$ |
| BMD 55 | 0.54$^{b}$ | 1.21$^{c}$ | 3.305$^{c}$ | 0.80$^{a}$ | 1.04$^{a}$ |
| Xtract 200 | 1.29$^{c}$ | 1.25$^{c}$ | 3.626$^{d}$ | 1.44$^{a}$ | 1.74$^{a}$ |

[1]Data are the means of 12 replicates in which each pen contained 55 broilers. All birds were vaccinated for coccidiosis at the hatchery.
[a-d] Means were separated by Tukey's HSD ($P < 0.05$); data within columns not sharing a common letter are statistically different.

**Table 2. The Effect of Eubiotic and Antibiotic Supplemented Feeds on Intermediate and Final Performance in the Absence and Presence of Intestinal Disease Challenge[1]**

| | Weight Gain g D21 | FCR g:g D21 | Weight Gain g D42 | FCR g:g D42 |
|---|---|---|---|---|
| **Treatment ppm** | | **Without Disease Challenge** | | |
| Non-treated | 862$^{c}$ | 1.318$^{cd}$ | 2735$^{cd}$ | 1.785$^{b}$ |
| Magni-Phi Ultra 125 | 909$^{a}$ | 1.289$^{b}$ | 2834$^{a}$ | 1.752$^{a}$ |
| BMD 55 | 913$^{a}$ | 1.269$^{a}$ | 2853$^{a}$ | 1.738$^{a}$ |
| Xtract 200 | 881$^{b}$ | 1.306$^{cd}$ | 2781$^{b}$ | 1.772$^{b}$ |
| **Treatment ppm** | | **With Disease Challenge** | | |
| Non-treated | 827$^{d}$ | 1.369$^{f}$ | 2631$^{f}$ | 1.890$^{f}$ |
| Magni-Phi Ultra 125 | 855$^{c}$ | 1.321$^{d}$ | 2702$^{de}$ | 1.834$^{d}$ |
| BMD 55 | 879$^{b}$ | 1.303$^{bc}$ | 2742$^{c}$ | 1.816$^{c}$ |
| Xtract 200 | 839$^{d}$ | 1.341$^{e}$ | 2677$^{e}$ | 1.869$^{e}$ |

[1]Data are the means of 12 replicates in which each pen contained 55 broilers. All birds were vaccinated for coccidiosis at the hatchery.
[a-f] Means were separated by Tukey's HSD ($P < 0.05$); data within columns not sharing a common letter are statistically different.

## Literature Cited

Bafundo, K. W., I. Duerr, J. L. McNaughton and A. B. Johnson. 2021. The effects of a quillaja/yucca saponin combination on performance, *Clostridium perfringens* counts and percentage of *Salmonella* positive broiler chickens. EC Veterinary Science 6:40-45. **DOI**: 10.31080/ecve.2021.06.00371

Johnson, J., and W. M. Reid. 1970. Anticoccidial drugs: Lesion scoring techniques in battery and floor pen experiments with chickens. Exp. Parasitol. 28:30-36.

*Magni-Phi Ultra is a new version of the original Magni-Phi that is more concentrated and features an 8% total saponin content. Since the new formula contains twice the saponin content, one-half of the standard amount is needed to achieve the desired level of Magni-Phi per ton of feed. To achieve a level of 113 grams of Magni-Phi per 2,000 lb of feed, 0.25 lb of Magni-Phi Ultra should be added to each short ton. For metric system applications, 125 grams of Magni-Phi Ultra should be added to 1,000 kg of feed.

**To learn more about Magni-Phi, visit https://www.pahc.com/magniphi or talk with a Phibro expert at 800.677.4623.**

This information has been prepared for industry technical professionals.