Comparison of Aviax® Plus with Other Nicarbazin and Ionophore Combination Products

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Abstract

A floor pen study was conducted to compare the anticoccidial efficacy of Aviax® Plus, a combination of semduramicin and nicarbazin, with other ionophore and chemical combination products in starter and grower diets up to 28 days of age. A randomized block design with 10 replicates of 50 birds per pen was used for each of the 7 treatment groups. On day 17 of the trial, birds were challenged with *Eimeria acervulina*, *E. maxima* and *E. tenella*. All treatment groups were fed the same diet with salinomycin from days 29 to 42 to be able to better assess differences in performance from the various treatment groups early in the trial.

Coccidiosis lesion scoring was done on day 23. Other performance parameters measured included mortality, body weight and feed conversion.

All treatments showed statistical improvement compared to untreated controls in all parameters measured. For the trial period of 0 to 28 days, both Aviax Plus groups had statistically better average body weight, the lowest numerical feed conversion ratios, were among the lowest coccidiosis lesion scores for *E. acervulina* and *E. tenella* and had statistically significant lower scores for *E. maxima*.

Introduction

With the goal of reducing resistance, manufacturers have developed alternatives for anticoccidial feed additives by combining existing medications. These products offer great potential for broiler producers.

Aviax Plus is a unique anticoccidial formulation that blends two ingredients - semduramicin and nicarbazin - into a single granule, creating a synergistic effect for excellent activity against *Eimeria acervulina*, *E. maxima* and *E. tenella*. Semduramicin is the market's most recent ionophore and studies have shown it to be the most effective ionophore against *E. maxima* [1,2,3]. Aviax Plus combines semduramicin with the chemical nicarbazin, which has been in the market since 1955 and has very few known cases of cccida resistance. Furthermore, the single-granule formulation helps ensure consistent dosing and blending of feed for optimum coccidia control.

This study was initiated to compare Aviax Plus at 500 or 625 grams per metric ton (g/MT) with other combination products during the first two diet phases, evaluate efficacy against coccidia challenge and measure standard performance parameters. The Aviax Plus use level has a range of 500 to 625 grams per metric ton to allow producers flexibility to dose according to coccidiosis challenge conditions.

Materials and Methods

The floor pen study included seven treatment groups. Each treatment was replicated 10 times with 50 Cobb male broilers per pen. One group was not treated to serve as a negative control. The other 6 treatment groups were fed a specific ionophore and nicarbazin combination for days 0 – 28 (see table below).

Treatment Number	Combination Product Fed Days 0-28
1	Untreated controls
2	Aviax Plus 550 grams/MT – 44 ppm nicarbazin & 16.5 ppm semduramicin
3	Aviax Plus 600 grams/MT – 48 ppm nicarbazin & 18 ppm semduramicin
4	Product A 625 grams/MT - 50 ppm nicarbazin & 50 ppm narasin
5	Product B 500 grams/MT - 40 ppm nicarbazin & 3.75 ppm maduramicin
6	Product C 625 grams/MT - 50 ppm nicarbazin & 50 ppm monensin
7	Product D 500 grams/MT - 50 ppm nicarbazin & 50 ppm salinomycin

The 6 treated groups were changed to salinomycin for the remainder of the trial (550 grams per metric ton days 29 – 37 and 500 grams per metric ton days 38 - 42). All 7 groups were fed virginiamycin at a level of 33 grams per metric ton for the entire trial.

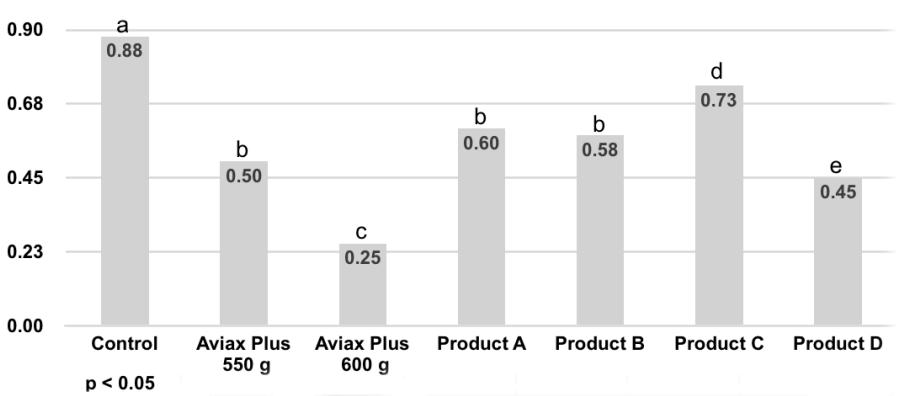
On day 17, trial feeds were removed temporarily and for 4 hours birds were given a feed mixed with *Eimeria acervulina*, *E. maxima* and *E. tenella* strains. Coccidiosis lesion scoring was done on day 23 on four broilers from each pen using the Johnson & Reid lesion scoring method.

Performance parameters measured included mortality, body weight and feed conversion. Means and analysis of variance (ANOVA) were calculated for each period and for the total period, using the General Linear Models (GLM) procedures in R. The level of significance adopted was 5%. Due to bird deaths between feed changes, feed-related measurements are presented without adjustment.

Results

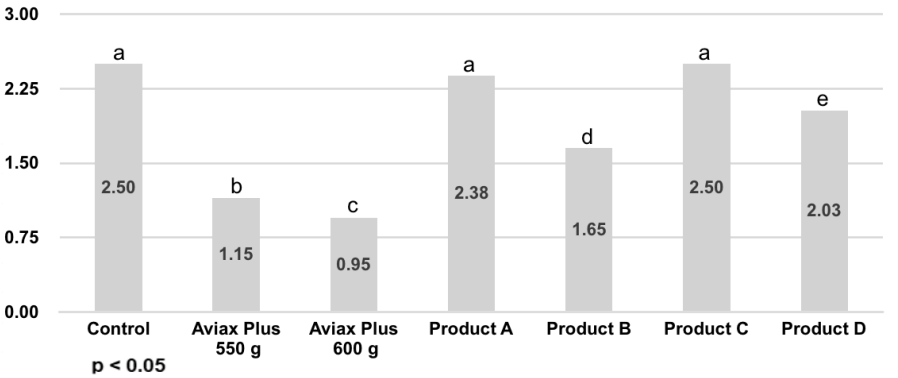
Coccidiosis lesion score results are shown in Figures 1 – 3. Lesion scores were statistically significantly lowered by both Aviax Plus treatment levels compared to untreated controls for all three coccidiosis species. Also, Aviax Plus fed at 600 grams per metric ton had the statistically significant lowest score of any treatment for all three coccidiosis species. Products B and D also consistently had statistically significant reductions for all species. Products A and C had statistically significant reductions for *E. acervulina* and *E. tenella*.

Figure 1. *E. acervulina* Lesion Scores



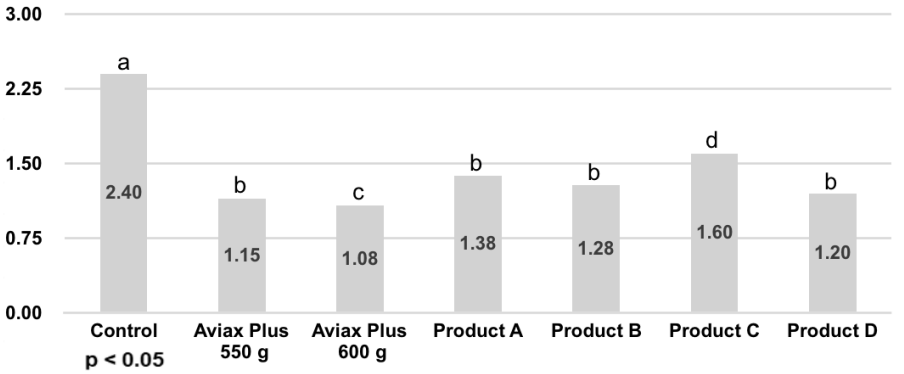
Product A 625 grams/metric ton - 50 ppm nicarbazin & 50 ppm narasin
Product B 500 grams/metric ton - 40 ppm nicarbazin & 3.75 ppm maduramicin
Product C 625 grams/metric ton - 50 ppm nicarbazin & 50 ppm monensin
Product D 500 grams/metric ton - 50 ppm nicarbazin & 50 ppm salinomycin

Figure 2. *E. maxima* Lesion Scores



Product A 625 grams/metric ton - 50 ppm nicarbazin & 50 ppm narasin
Product B 500 grams/metric ton - 40 ppm nicarbazin & 3.75 ppm maduramicin
Product C 625 grams/metric ton - 50 ppm nicarbazin & 50 ppm monensin
Product D 500 grams/metric ton - 50 ppm nicarbazin & 50 ppm salinomycin

Figure 3. *E. tenella* Lesion Scores



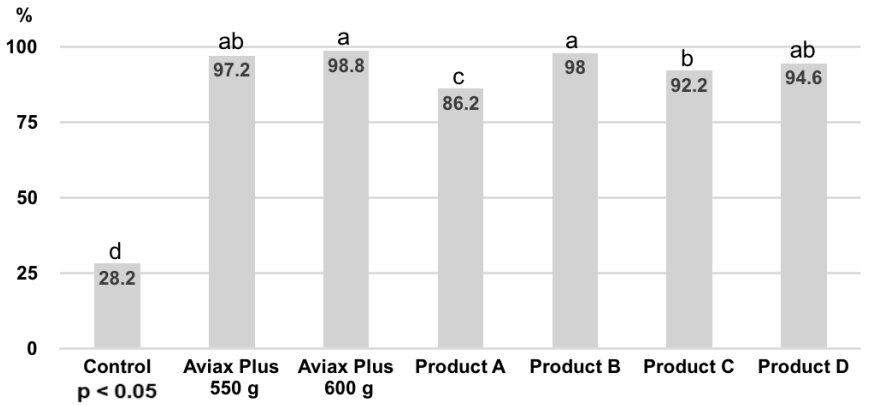
Product A 625 grams/metric ton - 50 ppm nicarbazin & 50 ppm narasin
Product B 500 grams/metric ton - 40 ppm nicarbazin & 3.75 ppm maduramicin
Product C 625 grams/ metric ton - 50 ppm nicarbazin & 50 ppm monensin
Product D 500 grams/ metric ton - 50 ppm nicarbazin & 50 ppm salinomycin

Performance results to day 28 are shown in Figures 4 - 6. The severe coccidiosis challenge resulted in 71.8% mortality in the untreated control group. The Aviax Plus groups, Product B and Product D all had statistically related higher livability. The Aviax Plus 600 grams per metric ton group had the highest livability of 98.8%. Products A and C had statistically significant improvements in livability compared to untreated controls.

Both Aviax Plus groups had the highest mean body weights at day 28 with statistically significant differences. Product B had some statistical similarity to the Aviax Plus 550 grams per metric ton group and all other groups had some statistical improvement compared to untreated controls.

Feed conversion results demonstrate product performance differences after an extremely severe coccidiosis challenge. Both Aviax Plus groups had the lowest feed conversion results which were also statistically significantly better than other groups. Product B did have statistical correlation with Aviax Plus fed at the 550 gram per metric ton level. The other products all had statistically higher feed conversions.

Figure 4. Livability - Day 28



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Product C 625 grams/metric ton - 50 ppm nicarbazin & 50 ppm monensin
Product D 500 grams/metric ton - 50 ppm nicarbazin & 50 ppm salinomycin

Figure 5. Mean Body Weight - Day 28

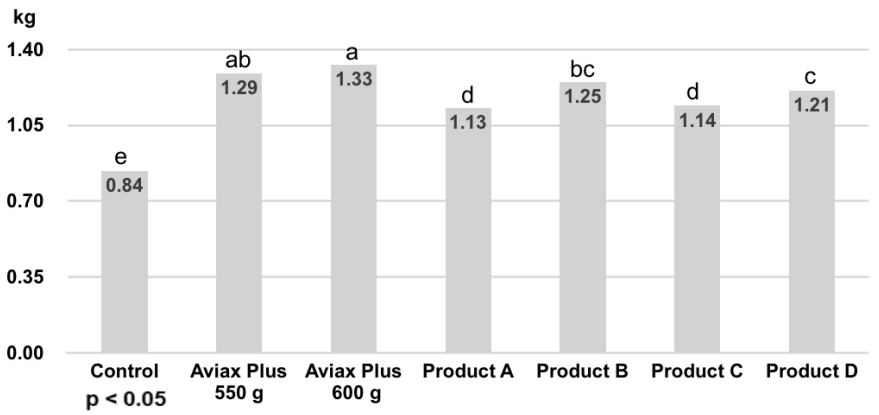

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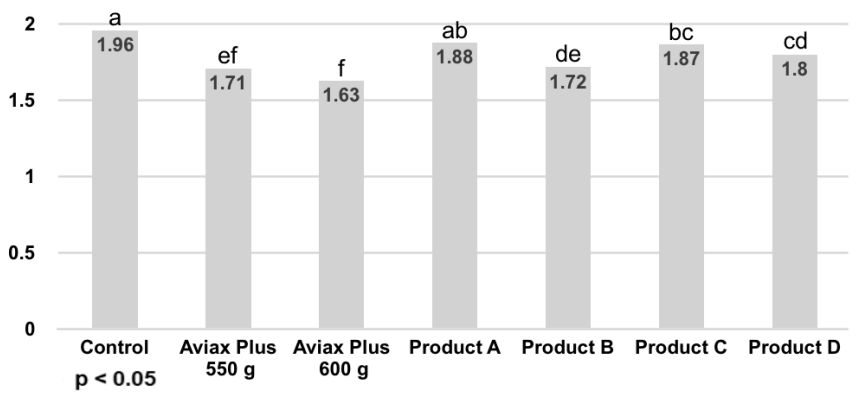
Figure 6. Feed Conversion - Day 28



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Product C 625 grams/metric ton - 50 ppm nicarbazin & 50 ppm monensin
Product D 500 grams/metric ton - 50 ppm nicarbazin & 50 ppm salinomycin

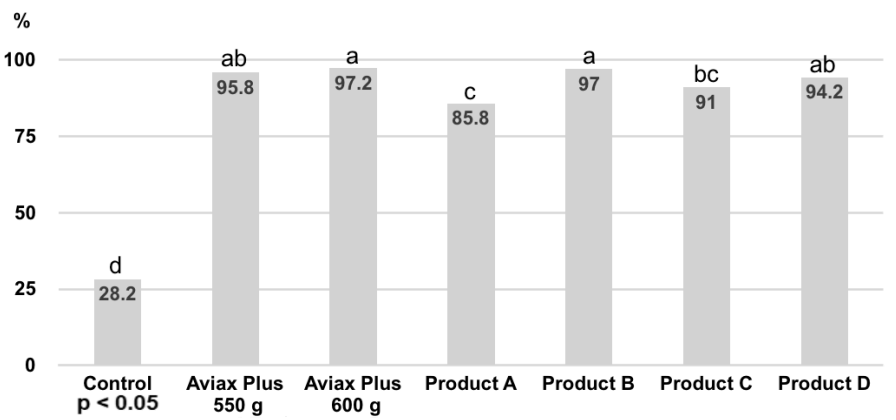
On day 29 all groups except the controls were switched to salinomycin at 550 grams per metric ton and then on day 38 the same groups were fed salinomycin at 500 grams per metric ton until day 42. Hence, it is possible to evaluate performance differences between products during the critical early challenge period of the trial and observe impact on final performance.

Results to day 42 are shown in Figures 7 - 9. Both Aviax Plus groups along with Products B and D had statistically significant higher livability compared to controls and Products A and C. The Aviax Plus 600 gram per metric ton group had the highest numerical livability.

All groups recovered from the weight depression of the coccidiosis challenge and finished the trial with statistically similar weights. The Aviax Plus groups had the highest numerical weights.

Due to high mortality in the control group, feed conversion results were distorted and reported to be quite low in the controls which affected statistical results. The Aviax Plus groups had 8- and 9-points better feed conversion than Product D which had the next best feed conversion ratio. The other three products all had even higher feed conversion results at Day 42.

Figure 7. Livability - Day 42



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Product C 625 grams/metric ton - 50 ppm nicarbazin & 50 ppm monensin
Product D 500 grams/metric ton - 50 ppm nicarbazin & 50 ppm salinomycin

Figure 8. Mean Body Weight - Day 42

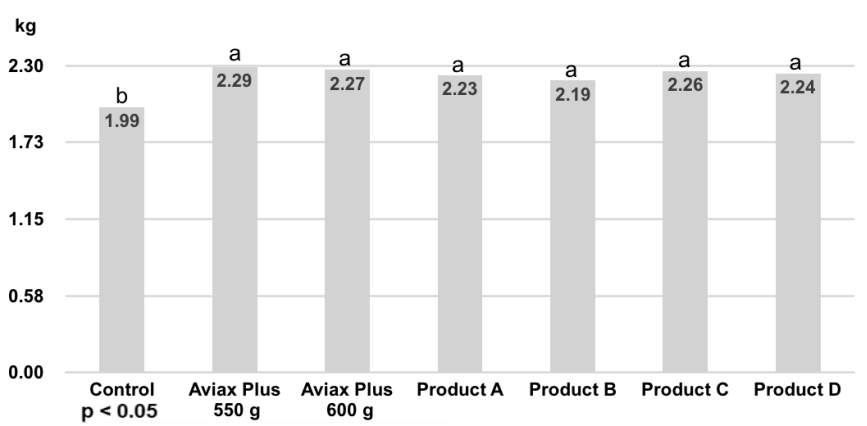

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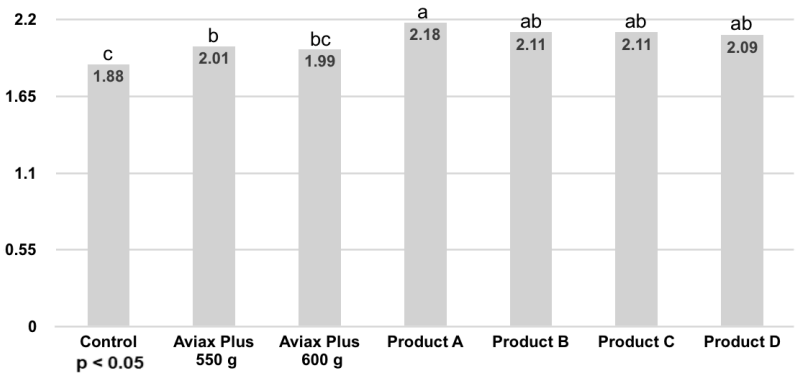
Figure 9. Feed Conversion - Day 42



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Discussion

This trial compared Aviax Plus fed at two different levels with four other nicarbazin combination products in a severe coccidiosis challenge model. Results of 3 strains of coccidiosis lesions after challenge showed the Aviax Plus groups consistently had the lowest lesion scores indicating greater protection against coccidiosis challenge. Livability results also showed both Aviax Plus groups among the statistically significant highest livability groups.

Body weights at day 28 (eleven days after the severe coccidiosis challenge) also showed the Aviax Plus groups with the highest numerical and statistical results. That numerical trend was maintained in final day 42 body weights as well.

Feed conversion ratios of the Aviax Plus groups were also the best both numerically and statistically at day 28. This also was dramatically demonstrated with at least 8 points lower feed conversion at the end of the trial.

The Aviax Plus 600 gram per metric ton group had the best numerical results in all measured parameters with one exception. These results indicate feeding at the higher level when a severe coccidiosis challenge is expected.

References

1. McDougald L.R., G.F. Mathis and D.P. Conway. Effect of semduramicin, salinomycin, and monensin on performance, shank pigmentation, and coccidial lesions in broiler chickens in floor pens. Avian Diseases. 40:68-71. 1996.

2. Conway D.P., V. Guyonnet, S. Michener, L.R. McDougald and G.F. Mathis. Efficacy of semduramicin and salinomycin against *Eimeria maxima* in a laboratory test using two levels of oocyst inocula. *Poultry Science*. 74:1942-7. 1995.

3. Logan, N.B., M.E. McKenzie, D.P. Conway, L.R. Chappel and N.C. Hammet. Anticoccidial efficacy of semduramicin. 2. Evaluation against field isolates including comparisons with salinomycin, maduramicin, and monensin in battery tests. *Poultry Science*. 72:2058-63. 1993.