

Evaluation of the efficacy of increasing dose rate of a premixture of flavoring compounds in broilers fed on pelleted diets

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INTRODUCTION

The maintenance of a stable microflora within the digestive tract of broilers is an essential pre-requisite for high performance. The use of free benzoic acid in poultry diets can result in a reduction in bird performance when fed at 0.25 – 0.75% (Jozefiak et al., 2006) although at a lower inclusion rate (0.1%) body weight gain was improved in the first 2 weeks of growth (Jozefiak et al., 2008). The current experiment was designed to evaluate the effect on broiler performance of AVIMATRIX[®], Novus International Inc, a blend of protected aromatic compounds (BPAC) which incorporates benzoic acid, calcium formate and vegetable fats as major ingredient, and compare this with the effect of using free benzoic acid in poultry diets.

MATERIALS AND METHODS

2400 male Ross 308 broilers were randomly allocated to 6 treatments and each treatment consisted of 10 replicates of 40 birds. Feeds were pelleted, based on wheat and soybean meal and fed in 3 phases: Starter (0-12 days), Grower (12-25 days) and Finisher (25-42 days). Feed and birds were weighed at days 0, 12, 25 and 42 in order to calculate weight gains, feed intake and feed conversion ratios. Mortalities and any health problems were also recorded. The 6 treatments are shown in Table 1.

TABLE 1:
Description of treatments

Treatment	Description
T1 Negative Control	Basal diet, no additive
T2 Positive Control 1	Basal diet + 300g/t Benzoic acid/essential oils (250g/t benzoic acid)
T3 Positive Control 2	Basal diet + 250g/t Benzoic acid
T4 BPAC	Basal diet + BPAC 266g/t (125g/t benzoic acid)
T5 BPAC	Basal diet + BPAC 532g/t (250g/t benzoic acid)
T6 BPAC	Basal diet + BPAC 1064g/t (500 g/t benzoic acid)

The trial was carried out according to European Food Safety Agency guidelines and data analyzed as a randomized block design by GENSTAT and treatment means subjected to analysis of variance to determine significant differences.

CONCLUSIONS

In contrast to the use of free benzoic acid, the inclusion of BPAC in the diet of broilers resulted in a significant improvement in body weight at 42 days of age. There was also an improvement in FCR compared to the basal diet. These data suggest that the delivery of benzoic acid to the small intestine rather than the crop and the gizzard in poultry is a more effective way of improving bird performance.

RESULTS AND DISCUSSIONS

Throughout the trial the birds performed well and overall mortality was low with a total of 20 birds (<1%) culled over the 42 day period. The effects of the treatments on body weight at 42 days and Feed Conversion Ratio (g feed/g gain) over the trial period are shown in Table 2. These data show that benzoic acid at low inclusion rates can improve broiler performance. The inclusion of BPAC in the diets of broilers had a significant effect ($p < 0.05$) on both weight gain and FCR when compared to the basal diet with no additive. In addition the birds fed diets containing BPAC were significantly heavier at 42 days ($p < 0.05$) than birds fed diets containing free benzoic acid plus essential oils or free benzoic acid alone. These data demonstrate that the site in the digestive tract at which benzoic acid is released has a significant effect on bird performance. In this trial T2, T3 and T5 all contained the same inclusion level of the acid (250g/t) but only the benzoic acid present in the fat matrix (BPAC) improved body weight at 42 days. This protection technology results in the component acid being released in the small intestine, where they are available to influence the balance of the microflora, rather than in the crop and gizzard where the free acid would be expected to be active.

It is also interesting that even at the lowest level of BPAC inclusion (T4, equivalent to 125g benzoic acid/t) there were significant improvements in both body weight and FCR at 42 days when compared to the Basal diet ($p < 0.05$). In addition when comparing the response of the broilers to inclusion rate of BPAC it is apparent that this is curvilinear with the optimum inclusion rate at 532g/t equivalent to 250g/t of benzoic acid.

TABLE 2:
Effect of dietary treatment on body weight (kg) and FCR (g feed/g gain) between 0 and 42 days

Treatment	Body Weight (kg)	FCR (g feed/g gain)
T1 Basal	2.511 ^a	1.818 ^a
T2 Basal + Benzoic acid/EO	2.591 ^a	1.784 ^{ab}
T3 Basal + Benzoic acid	2.590 ^a	1.780 ^{ab}
T4 Basal + BPAC 266g/t	2.686 ^b	1.761 ^b
T5 Basal + BPAC 532g/t	2.794 ^c	1.761 ^{ab}
T6 Basal + BPAC 1064g/t	2.763 ^{bc}	1.759 ^b
SEM (pooled)	31.1	0.0148

Values with a different superscripts differ significantly ($p < 0.05$)