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EFFECT OF SODIUM BENTONITE AS AFLATOXIN BINDER IN B.ROILER FEEDS CONTAINING FUNGAL INFECTED GRAINS

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A study was undertaken to compare two levels of sodium bentonite as a preventive measure to minimize the effect of aflaloxin (B) on the performance of broiler chicks. One hundred and twenty day-old broiler chicks were distributed at xmdoru into 12 replicates of 10 chicks each and were allotted 4 rations i.e. A (no bentonite, no aflatoxin), B (aflatoxin 100 ppb), C (aflatoxin 'Otl ppb + sodium bentonite (0) 0.75%) and D (aflatoxin 100 ppb + sodium bentonite ((I~1.5%), respectively. Significant increase in body weight (20.95 to 28.5 I%) was observed in birds fed ration having sodium bentonite @ 1.5%. In aflatoxin coiltainiug ration (B). feed consumption was significantly reduced as compared to other rations. Feed conversion ratio was improved per unit gain on ration A than other rations. Significantly better feed conversion ratio (2.0 I) was found in case of chicks fed ration D compared to those on ration A (2,04). C (2.15) and B (2.211). Use of bentonite at 1.5% improved the profit marginally.

Key words: aflatoxin. bentonite, broiler feed

INTRODUCIION

Variations in poultry production are due to a number of factors including feed related problems. The quality of feed during 'Certain parts of the year is adversely affected due to feed ingredients infestation by fungi. Poor storage conditions are considered responsible for such an infestation. The fungi (Aspergillus sp.) produce toxins commonly known as aflatoxin (Edds and Bortell, 1983). These toxins are extremely effective, even in minute quantities. and their presence in feed leads to a poor performance of broilers (Huff et al.. 1986). Every year the poultry industry encounters a great deal of economic loss due to aflatoxicosis. A number of efforts have been made to minimize the effects of these toxins in poultry feeds including manipulation of macro- and micronutrients (Kryukov et al., j 985) and inclusion of sodium bentonite (Nick and Wyatt, 1995) as toxin binder.

Sodium.bentonite and some form of hydrated SOdium-calcium aluminosilicate as well as a number of other dietary additives have been shown to decrease seven ty of aflatoxin in chicken. Hydrat~d sodium-calcium aluminosilicateand phylIosiIicate clay have been reported to selectively absorb the aflatoxin in the feeds of chicken and turkey (Harvey et al., 1989; Huff et al.. 1992). Sodium bentonite has been found to antagonize the aflatoxin in broiler feeds (Araba and Wyatt, 1991). Hydrated sodium-calcium aluminosilicate is the active ingredient in sodium bentonite. This study was planned 10 further derernune the ability of sodium bentonite as an aflatoxin binder 10 minimize the effects of aflatoxin in broiler feeds.

MATEmALSANDMETHODS

The experiment was conducted at the Poultry Research Centre. University of Agriculture, Faisalabad, by using one hundred and twenty day-old Hubbard broiler chicks of mixed sexes. These chicks were randomly divided into 12 experimental units (replicates) of ten chicks each. All lite birds were raised under standard manageme Ulal conditions Maize grains were infested with fungus A,\pergillus flavu» and incubated at 45°C and 90% relative humidily for a period of one week. The level of aflatoxin produced due to fungal growth on the maize grains was determined b~ thin layer chromatography (Nabney and Nesbitl. 1964;) b, running a standard aflatoxin along with the sample. These grains were used as a source of aflatoxin in mi.xed feeds for broilers.

Four broiler starter and finisher rations (containing 22/% protein and 3000 Kcal/kg metabolizable energy) were prepared without or with infested grains so that ration A neither contained infested maize nor sodium bentonite. However, the experimental rations B, C and D contained such qllamilies of infested maize grains that gave 100 ppb aflaloxin bUI without or with 0.75 or 1.5% sodium bentonite respectively Each of these rations was randomly fed to three groups of ten chicks each, from day-old to 28 days .of age. i\fle, 4th week, the birds were shifted to respective broiler finisher rations (containing 20% protein and 3200 Kcallkg tnetnbolizable energy) that contained similar levels of aflatoxin and additives. These rations were fed for 5th and fJIII week of broiler raising.

During the experimental period. weekly weigh: g:UII or individual bird, feed consumption of each experimental unu (of 10 chicks) and monabry were recorded. The data thus collected were subjected to analysis of variance technique in completely randomized design and significant differences were compared by Duncan's multiple range test (Steel and Tome. 1981).

RESULTS AND DISCUSSION

The mean values for gain in body weight. feed consumpuon and feefl - 'version rates have been given ill Table "

The maximum weight gain was recorded on ration **O** (1746 g). followed, by **kJ** 1568 g), C (1527 g) and B (1283 g). .the diiferences'dinong rations were significant (P<0.05). The comparison' of means revealed that birds on ration D gained significantly (P<O.05) more weight compared to those on all other rations. However, those fed on rations A and C gained sirhilar weight.while those on ration B gained less weight as compared~l other rations. Maximum feed consumption was observed in birds on ration D (1387 g) with non-significant differences from A (3274 g) and C (3365 g) rations. However, those fed on rationB consumed, significantly less feed compared to all other rations. Significant differences (P<0.05) were also observed among rations in respect of feed gain ratio. The best feed conversion was observed on ration D (2.01), followed by A (2.04). C (2.15).

Table 1. Average weight gain, feed consunption and feed conversion ratio of experiment broiler chicks from 0-6 weeks

Description	Rations			
	A (Control)	B (Aflatoxin 100 ppb)	C (Aflatoxin 100 ppb+sodium bentonite 0.75%)	D (Aflatoxin 100 ppb+ sodium bentonite 1.5%)
W~ight gain per chick (g)	1568b	1283c	1527b	1746a
Avg. feed consumed per chick (g)	3274a	2930b	3365a	3387a
Feed conversion ratio (feed/gain)	2.04b	2.21a	2.I5b	2.0Ic
Mortality	1	9	2	1

abc,Means within a row with a different letter differ significantly *(P<O.OS).*

Statistical analysis revealed that the feed conversion ratios of A and C rations were similar, while' that of the ration B was the poorest (P<0.05). Aflatoxins depressed growth rate, feed consumption and feed conversion ratio but sodium bentonite minimized such effects. Doerr et at (1983) and Huff et al. (1988) reported that aflatoxin in broiler rations significantly reduced weight gain, while Kubena et. al. (1987) ad Jothf et al. (1989) reported improved weight gain when broiler rations were supplemented with sodium bentonite. The toxicity of aflatoxin was characterized by reduction in body weight gain as aflatoxins interfere with normal metabolic pathway through the inhibition of protein synthesis and enzyme system that is involved in carbohydrate metabolism and energy release. Asa consequence, the weight gain of birds on ration B containing aflatoxin without sodium bentonite was the lowest, whereas the chicks fed on rations containing sodium bentonite as aflatoxin binder showed better weight gain than control, being the maximum in case of ration containing 1.5% bentonite. Okotie et al. (1997) and Anonymous (1997) reported that dietary addition of bentonite has been shown to reduce some toxic effects of T_2 toxin and improve the bird performance.

The birds fed on ration containing sodium bentonite also showed better feed consumption. Harvey et al. (1991), Sahota and Bhatti (1994) and Kubena et al. (1997) reported that supplementation of feed with sodium bentonite @ 1.5% level increased feed intake and improved bird performance. Kubena et al. (1990) supplemented hydrated sodium-calcium aluminosilicate in broiler rations and reported increased feed intake in treated birds than control. The best feed conversion ratio (2.01) was observed on ration D due to binding ability of bentonite to aflatoxin in the intestine of birds. The findings of Huff et al. (1986) and Kubena et al. (1987) also confirmed the results of the present study. They reported that aflatoxin reduced growth rate. Mortality percentage was the highest in chicks fed on ration B followed by those given rations C. A and D. respectively. The lowest mortality on ration D may be due to the production of DNA binding proteins as described by (Glawits et al., 1998). The results of the present study indicated that adverse effects of aflatoxins on the performance or the birds can be minimized by supplementing their rations with sodium bentonite @ 1.5% of the compound ration.

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