

The Effect of Supplementation of DL-Methionine in Diet Containing Aflatoxin on Broiler Performance

Permana. I.G., Nahrowi & A. Lotong

Department of Animal Nutrition and Feed Technology
Faculty of Animal Science, Bogor Agricultural University
Jl. Agatis Kampus Darmaga -16680 Bogor, Indonesia

Summary

This research was to evaluate the effect of supplementation of DL-Methionine on aflatoxin contaminated diet on broiler performance. The experimental was arranged with factorial completely randomized design with three level of DL-methionine (0%, 0.25%, and 0.35% for starter, and 0%, 0.20% and 0.30% for finisher), two level of aflatoxin contaminated corn in the diet (0% and 25%), and four replications. The aflatoxin contaminated corn were prepared by inoculation of *Aspergillus flavus* into the corn and incubated in room temperature for four weeks. Four hundred eighty day-old broiler chick (strain Ross) were used in this experiment for six weeks. Measured variable were water intake, feed intake, weight gain and feed conversion.

The result showed that the level of aflatoxin in the diet varied from 19.24 – 34.50 ppb in starter diet and 66.67 – 78.50 ppb in finisher diet. In general, the supplementation of DL-methionine influenced significantly ($p < 0.01$) water intake, feed intake and body weight gain. During finishing period, the supplementation of 0.25% DL-methionine increased significantly ($p < 0.01$) feed intake from 2,578 g/head in control group to 2,746 g/head, however the diet supplemented with 0.35% DL-methionine was not significantly different comparing to the control diet. During starting period, there was significantly effect of DL-methionine on water and feed intake. The supplementation of 0.25% DL-methionine increased significantly ($p < 0.01$) body weight gain (1,498 g to 1,726 g). The diet containing aflatoxin had no effect on feed intake and final body weight, however aflatoxin level increased water consumption significantly ($p < 0.01$). The supplementation of DL-methionine and aflatoxin had not significant effect on feed conversion.

Keywords: aflatoxin, DL-methionine, corn, broiler, performance

Introduction

Corn is major component in broiler ration, because more than 50% of broiler ration is corn. The quality of corn depends not only on nutrient content but also on unwanted components such as aflatoxin.

Aflatoxin is secondary metabolic produced by *Aspergillus flavus* and *Aspergillus parasiticus* (Bryden, 1999). *Aspergillus* grows on some feed especially on corn. There are four type of aflatoxin such as aflatoxin type B1, B2, G1 and G2 (Lillehoj, 1986), type B1 aflatoxin is the most danger. Aflatoxin contamination causes reduced feed quality and reduced animal efficiency either through poor conversion of nutrients or problems such as reproductive abnormalities (Oguz and Kurtoglu 2000).

Methionine is major essential amino acid for broiler. The supplementation of methionine in the diet increase the growth, repaired body tissue and increase body resistance against diseases and toxin from aflatoxin at a certain level. Methionine is also can reduce the effect of aflatoxin by binding the aflatoxin in the digestion tract so that the toxin can not be absorbed and excreted in the feses (Kinh et al., 2010).

The aim of this experiment was to evaluate the effect of supplementation of DL-methionine on aflatoxin contaminated diet on broiler performance.

Material and Method

Four hundred eighty day-old broiler chicks (Strain Ross) were used in this experiment. The chicks were subjected into 3x2 randomized factorial design with 4 replications. The factors were level of DL-methionine (0, 0.25 and 0.35% during starting period and 0, 0.20 and 0.3% during finishing period) and level of aflatoxin contaminated corn (0 and 25% of aflatoxin contaminated corn). Aflatoxin contaminated corn were prepared by inoculation of *Aspergillus flavus* into the corn and incubated in room temperature for four weeks. The experimental was carried out over 42 days. The ingredient and chemical composition of experimental diets are shown in Table 1.

Table 1. Ingredient and chemical composition of experimental diets

Ingredient (%)	0-3 week	4-6 week
Corn	47.95	51.64
Soybean meal	12.01	12.48
Rice bran	25.00	19.26
Corn gluten meal	6.70	3.06
Meat bone meal	5.00	8.09
Crude palm oil	1.59	5.00
Dicalcium phosphate	1.00	-
Salt	0.27	0.22
Limestone	0.24	-
Premix	0.25	0.25
Chemical Composition (%)		
Dry matter	85.25	88.21
Ash	6.77	5.80
Crude Protein	23.37	20.24
Crude Fiber	4.52	4.13
Ether Extract	3.82	5.99
Nitrogen Free Extract	34.75	52.05
Ca	1.17	1.21
P	1.00	0.86
Metionine	0.42	0.51
Lysine	0.95	1.27
ME (kcal/kg)	3100	3100

The body weight of the birds was measured individually and feed intake were recorded weekly. Feed conversion ratio was calculated at the end of the 21st and 42nd day experiment. Mortality was recorded daily and used to adjust the total number of birds to determine the total feed intake per bird.

Collected data were subjected to analyses of variance, and where significant different were observed, means were further subjected to Duncan's multiple range test by using SPSS for Windows (SPSS, 1993).

Results and Discussion

Water Consumption and Feed Intake

The aflatoxin content in feed starter was 19.2 – 34.5 ppb, while the aflatoxin content in feed finisher was 66.6 – 78.5 ppb. The effect of supplementation of DL-methionine and use of aflatoxin contaminated corn on water consumption and feed intake is presented in Table 2 and Table 3 respectively. There was no interaction between use of aflatoxin contaminated corn and supplementation of DL-methionine on water consumption and feed intake. Total water consumption in chickens fed 25% corn contaminated with aflatoxin was significantly higher compared with the control. While supplementation of 0.20% DL-methionine in the diet increased water consumption significantly ($p < 0.05$), however did not affect in diet supplemented with 0.3% DL-methionine.

The supplementation of DL-methionine in the diet during starter period (0-3 week) did not significantly affect feed intake of birds, while during finishing period (4-6 week) supplementation of 0.25% DL-methionine increased the feed intake significantly ($p < 0.05$), however there was no differences during all week (0-6 week). The use of aflatoxin contaminated corn in the diet did not influence on feed intake.

Table 2. The effect of DL-methionine and aflatoxin contaminated corn on total water consumption (ml/head).

	Level of DL-methionine (%)	Level of aflatoxin contaminated corn (%)		Average
		0	25	
0-6 week	0	9644.6 \pm 48.1	10230.3 \pm 44.4	9937.5 ^a \pm 58.0
	0.25	10615.8 \pm 47.7	11034.9 \pm 74.4	10825.4 ^b \pm 64.3
	0.35	10345.3 \pm 74.22	11104.3 \pm 44.0	10724.8 ^b \pm 82.3
	Average	10201.9 ^a \pm 74.9	10789.9 ^b \pm 76.3	

Mean values with different superscripts within a column and row differ significantly ($p < 0.05$)

Table 3. The effect of DL-Methionine and aflatoxin contaminated corn on total feed consumption (g/head).

	Level of DL-methionine (%)	Level of aflatoxin contaminated corn (%)		Average
		0	25	
0-3 week	0	953.9 \pm 7.9	1192.9 \pm 22.8	1073.5 \pm 35.6
	0.25	1206.8 \pm 17.2	1146.0 \pm 63.4	1176.4 \pm 43.8
	0.35	974.2 \pm 70.4	1206.1 \pm 28.7	1090.1 \pm 58.6
	Average	1045.0 \pm 48.4	1181.7 \pm 38.8	
4-6 week	0	2593.9 \pm 67.2	2562.2 \pm 53.8	2578.1 ^a \pm 56.5
	0.25	2788.4 \pm 10.2	2704.2 \pm 10.0	2746.3 ^b \pm 14.6
	0.35	2613.4 \pm 31.3	2595.4 \pm 5.5	2605.9 ^a \pm 20.9
	Average	2665.3 \pm 45.3	2621.6 \pm 32.8	
0-6 week	0	3547.9 \pm 32.0	3755.2 \pm 35.6	3651.5 \pm 34.3
	0.25	3995.2 \pm 13.4	3850.2 \pm 35.8	3922.7 \pm 26.8
	0.35	3587.6 \pm 23.3	3804.5 \pm 15.5	3696.0 \pm 23.4
	Average	3710.2 \pm 34.3	3803.3 \pm 28.1	

Mean values with different superscripts within a column differ significantly ($p < 0.05$)

Weight Gain and Feed Conversion

The effect of supplementation of DL-methionine and use of aflatoxin contaminated corn on weight gain and feed conversion ratio (FCR) are presented in Table 4. The supplementation of DL-methionine in the diet did not significantly affect weight gain of the broiler.

Table 4. The effect of DL-Methionine and aflatoxin contaminated corn on weight gain (g/head) and feed conversion ratio.

	Level of DL-methionine (%)	Level of aflatoxin contaminated corn (%)		Average
		0	25	
Weight Gain 0-6 week	0	1472.8±190.9	1523.4±125.9	1498.1±152.1
	0.25	1725.4±99.6	1725.9±42.3	1725.6±70.9
	0.35	1642.1±133.6	1606.4±179.9	1624.2±148.0
	Average	1613.4±171.9	1618.3±145.6	
FCR 0-6 week	0	1.81±0.33	1.85±0.15	1.83±0.24
	0.25	1.74±0.12	1.67±0.13	1.70±0.12
	0.35	1.64±0.13	1.78±0.21	1.71±0.18
	Average	1.73±0.21	1.77±0.17	

Mortality

The mortality of the birds was 5.4%. The supplementation of DL-methionine and use of aflatoxin contaminated corn did not affect on the mortality. There was no interaction effect of DL-methionine and use of aflatoxin contaminated corn.

Conclusion

It is concluded that supplementation of DL-methionine in the ration containing aflatoxin reduced the negative effect of aflatoxin in broiler.

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