

The Effect of Supplementation of Fulvic Acid on Internal Organ and Gastrointestinal Tract of Broiler Chicken

Permana, I.G., M. Wulandari, Sumiati & H.A. Sukria

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

Introduction

Fulvic acid is an organic acid that is formed naturally during the decomposition of organic matter called humus or humic compounds. Molecule structure of fulvic acid is very light and small and easily absorbed into the tissues and cells (Islam *et al.*, 2005). Fulvic acid has carboxyl levels three times higher than humic acid.

Fulvic acid influences enzymes secretion, hormones structure, and vitamin requirement. Fulvic acid can also absorb heavy metals and toxic pollutants. The use of humic acid as feed supplement was observed in broilers. Kompiang and Supriyati (2007) reported that humic acids can improve broiler performance. The use of fulvic acid as supplement improved performance and immune system of broiler chickens that can produce good quality chicken, safe, and healthy.

The purpose of this study was to evaluate the effect of fulvic acid on the ration of the weight of carcasses, internal organs, as well as total cholesterol of broiler meat.

Materials and Methods

The experiment was conducted using 375 CP-707 DOC. The DOC was randomly divided into 5 treatments and 5 replications. The animals were provided with feed and water *ad libitum*. The diet were formulated from corn, soybean meal, coconut meal, corn gluten meal, meat bone meal, wheat pollard, CPO, CaCO₃, dicalcium phosphate, salt, premix, DL-Methionine and L-lysine. The energy metabolism (EM) of starter and finisher were 3,050 and 3,200 kcal/kg, while the cruder protein contents were 21.6 and 20.0% respectively. The levels of fulvic acid in the diet were 0, 0.25, 0.50, 0.75 and 1.0%.

The variables measured were live weight, carcass percentage, weight and percentage of internal organs (liver, heart, spleen, proventriculus, ventriculus, duodenum, jejunum, ileum, cecum, and bursa fabricius). The abdominal fat and total cholesterol were also measured.

The experiments used a completely randomized design and the data were analyzed by ANOVA and Duncan's range test.

Results and Discussion

The effect of fulvic acid supplementation on live weight, carcass and digestion organ is presented in Table 1.

Live weight and carcass percentage

Final body weight of the chicken aged 5 weeks ranged from 1,515 – 1,590 g. The supplementation of fulvic acid up to 1.0% tended increased broiler live weight. Supplementation of 0.50% fulvic acid in the ration decreased percentage of the carcass. Fulvic acid affected the percentage of feather weight on broiler.

Effect of fulvic acid of internal organ

Supplementation of fulvic acid on the ration did not affect on weight of liver, hearth and spleen. Fulvic acid did not negative affect on the internal organs. Meanwhile, the

percentage of bursal fabricius was influenced by fulvic acid level in the diet. Chickens that received 1.0% supplementation of fulvic acid in the ration significantly increased the percentage of weight of bursa fabricius compared with the control.

Table 1. Effect of fulvic acid on live weight, carcass and digestion organs of broiler

Variable	Level of Fulvic Acid (%)					
	0	0.25	0.50	0.75	1.0	
Live weight (g)	1515 ± 33	1539 ± 81	1558 ± 58	1590 ± 77	1528 ± 78	
Carcass	(g)	1058 ± 46.6 ^{ab}	1034 ± 56.80 ^{ab}	1007 ± 55.78 ^b	1084 ± 56.5 ^a	1041 ± 48.6 ^{ab}
	(%)	68.4 ± 1.46 ^a	67.4 ± 1.38 ^{ab}	66.2 ± 1.99 ^b	67.6 ± 1.80 ^{ab}	68.8 ± 1.34 ^a
Liver	(g)	36 ± 2.7	35 ± 3.9	34 ± 3.8	37 ± 3.4	32 ± 2.7
	(%)	2.3 ± 0.14	2.3 ± 0.20	2.2 ± 0.19	2.22 ± 0.22	2.1 ± 0.17
Hearth	(g)	7.2 ± 0.57	7.0 ± 0.58	7.5 ± 0.60	7.8 ± 0.38	7.0 ± 0.36
	(%)	0.50 ± 0.04	0.45 ± 0.05	0.5 ± 0.04	0.48 ± 0.02	0.46 ± 0.03
Spleen	(g)	1.9 ± 0.94	2.8 ± 2.27	2.5 ± 1.57	1.86 ± 0.63	1.6 ± 0.71
	(%)	0.12 ± 0.06	0.11 ± 0.03	0.13 ± 0.04	0.12 ± 0.04	0.10 ± 0.05
Bursal Fabricius	(g)	0.75 ± 0.25	0.80 ± 0.17	0.82 ± 0.18	0.68 ± 0.17	0.92 ± 0.15
	(%)	0.05 ± 0.02 ^b	0.05 ± 0.01 ^{ab}	0.05 ± 0.01 ^{ab}	0.04 ± 0.01 ^b	0.06 ± 0.01 ^a

Effect of fulvic acid on gastrointestinal tract

The weight of the gastrointestinal tract of broiler aged 5 weeks is presented in Table 2. The data showed that the supplementation of fulvic acid did not affect on gastrointestinal tract.

Table 2. The effect of fulvic acid on gastrointestinal tract of broiler

Variable	Level of Fulvic Acid (%)				
	0	0.25	0.50	0.75	1.0
Proventriculus	6.65 ± 1.18	6.87 ± 0.56	7.32 ± 0.94	7.91 ± 0.74	6.96 ± 0.76
Ventriculus	23.65 ± 4.44	25.32 ± 4.34	28.14 ± 2.45	23.56 ± 3.91	27.94 ± 2.26
Duodenum	10.44 ± 1.25	11.29 ± 1.33	9.11 ± 1.26	10.42 ± 1.21	8.46 ± 0.99
Jejunum	20.42 ± 3.43	20.47 ± 2.09	19.98 ± 2.44	17.67 ± 2.40	17.10 ± 2.04
Ileum	16.28 ± 1.71	16.23 ± 2.01	15.12 ± 1.20	15.05 ± 2.50	14.73 ± 1.70
Secum	5.20 ± 0.61	5.40 ± 0.88	6.04 ± 0.95	5.14 ± 0.93	5.79 ± 0.89
Colon	2.75 ± 0.48	2.40 ± 0.38	2.45 ± 0.22	2.26 ± 0.45	2.16 ± 0.34

Conclusion

The supplementation of 0.50% fulvic acid in broiler ration improved the efficiency of absorption of nutrients in the digestive tract of broiler chickens. The supplementation of 1.0% fulvic acid in broiler ration had no negative effect on internal organs, however increased cholesterol levels in chicken meat.

References

- Islam, K.M.S., A. Schuhmacher & J.M. Gropp. 2005. Humic acid substances in animal agriculture. *Pakistan Journal of Nutrition*. 4(3): 126-134.
- Karaoglu, M., M. Macit, N. Esenbuga, H. Durdag, O.C. Bilgi & L. Turgut. 2004. Effect of supplemental humate at different levels on growth performance, slaughter and carcass traits of broilers. *Journal of Poultry Science*. 3(6): 406-410.
- Kocabagli, N., M. Alp, N. Acar & R. Kahraman. 2002. The effect of dietary humate supplementation on broiler growth and carcass yield. *Journal of Poultry Science*. 81: 227-230.
- Supriyati. 2007. Pengaruh prebiotik asam fulvat terhadap kandungan kolesterol dalam daging ayam. *Prosiding Seminar Nasional Hari Pangan Sedunia XXVII*. Balai Penelitian Ternak, Bogor.