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Dietary ascorbic acid supplementation in broiler finisher diets

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Introduction

The effect of supplementing broiler diets with ascorbic acid has been inconclusive, with some authors reporting little or no effect (Sifri, Kratzer and Norris, 1977; Pardue, Thaxton and Brake, 1985) and others showing some beneficial effect (Njoku, 1986). This study was conducted to investigate the effects of supplementary dietary ascorbic acid on some nutritional, physiological and performance factors in the finishing phase of broiler production.

Material and methods

Four hundred and eighty day-old Cobb 500 broiler chicks were randomly assigned to three groups of 160 birds each. During the first 20 days post hatching all three groups were given a starter diet based on crushed soya bean (*Glycine max*) and yellow maize meal (*Zea mays*).

Ascorbic acid was added at two levels of 220 and 330 mg/kg to isonitrogenous, isocaloric broiler finisher ration based on mhunga (*Pennisetum typhoides*) and soya bean (*Glycine max*).

From 21 days of age group 1 received a control diet containing no ascorbic acid and groups 2 and 3 were given diets containing 220 and 330 mg/kg of ascorbic acid respectively. Throughout the trial, the birds had food *ad libitum* and clean water at all times.

At 21, 28, 35 and 42 days, six birds from each group were killed. Each bird was eviscerated and the whole carcass (with feathers) minced, homogenized and a sample stored at –20°C to await assay for protein and ether extract.

Whole carcass protein was determined by the Kjeldahl method (Association of Official Analytical Chemists (AOAC), 1970). The ether extract was determined according to the methods of AOAC (1970).

Table 1 *Effects of ascorbic acid supplementation on carcass crude protein, ether extract and ash content*

	Ascorbic acid supplementation level (mg/kg diet)					
	0		220		330	
	Mean	s.d.	Mean	s.d.	Mean	s.d.
Crude protein (g/kg)						
28 days	601	34	634	24	678	57
35 days	633	59	689	2	688	25
42 days	678	24	658	17	678	14
Ether extract (g/kg)						
28 days	131[a]	5	265[b]	56	247[b]	37
35 days	155[a]	20	189[a]	19	273[b]	35
42 days	166[a]	12	174[ab]	20	210[b]	39
Crude ash (g/kg)						
28 days	78	12	78	21	77	17
35 days	32	7	46	34	34	12
42 days	43	22	36	8	57	28

[a,b] Different superscripts within rows indicate a significant difference ($P < 0.05$).

The results from the trial were subjected to analysis of variance and tested for significance using the *t* test (Snedecor and Cochrane, 1971).

Results and discussion

Dietary supplementation with ascorbic acid did not significantly affect broiler food intake from 21 to 42 days of age. This result is consistent with earlier reports by Pardue *et al.* (1985) and Njoku (1986), but contrasts with that of Sifri *et al.* (1977) who found slight increases in food intake when ascorbic acid was added to poultry diets.

The food conversion efficiency was not significantly affected by supplementary ascorbic acid even though the group receiving ascorbic acid supplementation showed a trend towards better food conversion rates.

The heaviest live body weights at 35 and 42 days were recorded in the birds on a 330 mg/kg ascorbic acid diet.

The protein content of the eviscerated carcasses in the current study was not significantly influenced by ascorbic acid supplementation, although higher carcass protein values were measured in the ascorbic acid supplemented groups. The carcass crude fat content in this study was significantly increased by ascorbic acid supplementation ($P < 0.05$) (Table 1). This would imply improved fat utilization and or fat synthesis by broilers as a direct response to supplementary vitamin C. However, a similar response has not been reported by other researchers and comparison is therefore impossible.

The serum mineral levels of calcium, phosphorus, magnesium, copper, zinc and iron were not significantly affected by ascorbic acid supplementation.

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