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The Effect of Different Levels of AD₃E Vitamins Alone or with Added Vitamin C on the Productive Performance of Broiler Chicks

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Abstract: A study was conducted to investigate the effect of an extra supplement of different levels of vitamin AD₃E alone or with added vitamin C on the productive performance of broiler chicks. A total of 900 day old straight run broiler hybrid (Ross) chicks were allocated at random to six dietary treatments in the three replicates of 50 chicks each per treatment (control, 1.25 ml/l AD₃E, 1.25 ml/l AD₃E+15 g vit.C, 2.5 mg/l AD₃E+15 g vit.C, 3.75 ml/l AD₃E+15 g C, 5 ml/l AD₃E+15 g vit. C). Mean body weight and feed conversion ratios of chicks fed with the diets fortified with an extra supplement of vitamins AD₃E alone or with added vitamin C were significantly ($P<0.05$) better than that of the control group. Further more, supplementing the diets with an extra amount of vitamins AD₃E and vitamin C significantly ($P<0.05$) increased Ca and P blood levels compared with those of the control group.

Key words: Vitamin AD₃E, vit C., broilers, Ca blood level, P blood levels

Introduction

Poultry feeding is based on the knowledge of nutrient requirements of the particular breed, strain or hybrid and the age of bird. Looking at one of those nutrient categories, namely the vitamins, these are organic substance which are effective in minute amounts. Animals of higher order, including poultry, are dependent on their exogenous supply for maintenance, growth and reproductive performance (Frohli, 1988).

With the development of new broiler hybrids, several workers have shown that their requirements for AD₃E vitamins were slightly above those stated by Anonymous (1994) in order to support their increased growth rate and improved feed conversion ratio, particularly when subjected to any kind of stress or poor rearing conditions (Orban *et al.*, 1993; Deyhim *et al.*, 1996; Aslam *et al.*, 1998).

Many studies have indicated that under heat stress or in case of disease infection, the synthesis of vitamin C became insufficient to meet the bird requirements. Therefore, addition of vitamin C to the feed is necessary to cover the requirements (Schmeling and Nockels, 1978). Katri and Cherry (1984) and Pardue *et al.* (1985) showed that dietary supplementation with vitamin C improved growth rate of broilers. Furthermore, Mohammed (1995) found that vitamin C supplementation improved feed conversion ratio of broiler chicks at 7 weeks of age.

The objective of the present study was to investigate the effect of varying levels of AD₃E vitamins alone or with added vitamin C on the productive traits of broiler chicks.

Materials and Methods

A total of 900 one-day old straight run broiler chicks (Ross) were housed in 18 pens. Birds were reared on deep litter from one to 52 days of age under continuous lighting. Chicks were fed a commercial starter diet from one day to four weeks of age, followed by a finisher diet to marketing age (Table 1). Feed and water were available *ad libitum*.

The chicks were distributed randomly into six dietary treatments in 3 replicates per treatment, with 50 chicks per replicate. The dietary treatments were the following:

- T1 Control-no added extra vitamins
- T2 1.25 ml/l vitamins AD₃E in drinking water
- T3 1.25 ml/l vitamins AD₃E+15 g/l vitamin C in drinking water
- T4 2.50 ml/l vitamins AD₃E+15 g/l vitamin C in drinking water
- T5 3.75 ml/l vitamins AD₃E+15 g/l vitamin C in drinking water
- T6 5.0 ml/l vitamins AD₃E+15 g/l vitamin C in drinking water

Birds were weighted at the end of each dietary treatment (two birds per replicate) were bled from the wing vein for the collection of blood samples for the determination of calcium and phosphorus levels in the blood calcium plasma levels were determined according to the methods of Annio (1964), while phosphorous levels were determined according to association of Official Agricultural Chemist (1995).

Table 1: Composition of starter and finisher diets used in the present study.

Ingredients	Starter %	Finisher %
Corn	63.0	72.0
Soybean meal 44%	27.0	20.0
Meat meal	5.0	4.5
Fish meal	4.5	3.0
Salt	0.3	0.3
Pre mex	0.2	0.2
Total	100.0	100.0
Calculated nutritive value:		
A. Starter:	B. Finisher:	
Metabolisable energy: 3050 Kcal/Kg	M.E.: 3140 Kcal/Kg	
Crude Protein : 22.6%	C.P.: 20%	
Ether Extract: 2.638%	Ether Extract: 2.658%	
Crude fibers: 2.6%	Crude fibers: 3.1%	

The present experiment was carried out according to the complete randomized design, data was subject to statistical analysis using the general linear model (Anonymous, 1986). Differences between treatment means were assessed for significance by the multiple F-test (Duncan, 1955). Statistical significance was accepted at $P < 0.05$.

Results and Discussion

Birds fed the diet supplemented with 2.5 ml/l vitamins AD₃E+15 g vit. C (T4) were significantly ($P < 0.05$) heavier than birds from all other dietary treatments, the mean body weight of birds from T4 was 19.5% heavier than that of birds from the control group (Table 2). Mean body weight of birds from treatments T2, T3, T5 and T6 were 2.5, 8.1, 8.8 and 6.2%, respectively heavier than that of the control group, the difference were also significant ($P < 0.05$) (Table 2). Furthermore, birds given the diet supplemented with vitamins AD₃E+ vit. C were significantly ($P < 0.05$) heavier than those given the diet supplemented with vitamins AD₃E alone.

As with respect to feed conversion ratio (Table 2), the results indicated that the birds fed the diets supplemented with vitamins AD₃E alone or with added vitamin C had a significantly ($P < 0.05$) better feed conversion ratio when compared with that of the control group, however, feed conversion ratio of birds fed the diets supplemented with vitamins AD₃E+vit. C. (T3, T4, T5 and T6) was significantly ($P < 0.05$) better than that of birds given the diet containing vitamins AD₃E alone (T2).

Birds fed any of the diets supplemented with vitamins AD₃E alone or with added vitamin C had significantly ($P < 0.05$) higher Ca and P blood levels compared with those of the control group (Table 3).

Furthermore Ca and P blood levels were also significantly ($P < 0.05$) higher in birds that fed the diets containing vitamins AD₃E+vit. C compared with those of birds fed the diet containing vitamins AD₃E alone. However, the difference in Ca and P levels between birds from T3, T4,

Table 2: The effect of supplementing the diet with vitamins AD₃E alone or with added vitamin C on live body weight and feed conversion ratio (FCR) of broiler chicks at 52 days of age

Treatments	Mean live body weight/kg*	Difference in body weight from the control group (%)	F.C.R kg feed: kg gain	Difference in F.C.R. from controls %
T1	2.204d	100.0	2.44d	100.00
T2	2.259c	+2.5	2.33c	-4.50
T3	2.382b	+8.1	2.28b	-6.72
T4	2.634a	+19.5	2.18a	-10.90
T5	2.399b	+8.8	2.20a	-10.00
T6	2.341b	+6.2	2.19a	-10.40

Table 3: The effect of supplementing the diet with vitamins AD₃E alone or with added vitamin C on calcium and phosphorus blood levels of broilers at 52 days of age

Treatments	Minerals blood level mg/100ml	
	Ca	P
T1	6.5e*	4.80e
T2	7.83d	5.30d
T3	8.20c	5.20c
T4	9.63b	5.73a
T5	9.97ab	5.80b
T6	10.13a	5.77ab
Level of significance	$P < 0.05$	$P < 0.05$

* Mean in each column bearing different superscripts differ significantly ($P < 0.05$)

T5 and T6 (different levels of vitamin AD₃E + vitamin C) were not always significant.

The overall results of the present study indicated that an extra supplement of vitamins AD₃E in drinking water improved the productive performance of broiler, which indicate the increased requirements of modern broiler hybrids for such vitamins, particularly when reared under commercial conditions. Further improvement was also observed when vitamin C was added to the diet. These results are supported by the findings of Katri and Cherry (1984), Pardue *et al.* (1985), Schmeling and Nockels (1978). One of the interesting features of the present study was the improved feed conversion ratio of birds fed the diets supplemented with vitamins AD₃E alone or with added vitamin C. The improved of this important trait ranged from 4.5-10.9% compared with that of the control group, this indicate that birds required less feed to produce one unit of weight gain. Such findings are of economic importance to broiler producers. These results are in agreement with the finding of Mohammed (1995) who showed that the addition of vitamin C to broiler diet significantly improved feed conversion ratio.

The significant increase in Ca and P blood levels as a results of feeding extra amount of vitamin AD₃E and C reflect the overall improvement in birds ability to utilize their feed and increasing the absorption of these two important elements from the digestive tract into the blood and consequently improve bone formation in broiler chicks.

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