Ciências Agrárias
SEMINA

DOI: 10.5433/1679-0359.2021v42n3Supl1p1941

Performance and meat quality of broilers fed different levels of alpha-tocopherol[1]

Desempenho e qualidade de carne de frangos de corte alimentados com diferentes níveis de alfa-tocoferol

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Highlights

The 50% alpha-tocopherol level met the birds' needs.
The different levels of alpha-tocopherol did not influence the performance of broilers.
The amounts of alpha-tocopherol did not influence the meat quality of broilers.

Abstract

This study aimed to evaluate the performance and meat quality of broilers fed different levels of alpha-tocopherol. A total of 240 one-day-old Cobb 500® male broiler chicks were reared until day 7 of life, as recommended by the commercial line, and were fed at only 50% of the alpha-tocopherol requirement. At day 8, the chicks were weighed, homogenized, and allotted in a completely randomized design with four treatments (50, 100, 150, and 200% alpha-tocopherol requirement) and six replicates of ten chickens per experimental unit. Several variables were evaluated: weight gain, feed intake, feed conversion, carcass yield and prime cuts (drumstick, thigh, and breast), edible viscera (heart, liver, gizzard), immune organs (cloacal bursa and spleen), intestine weight and length, abdominal fat, breast meat color (lightness, redness, and

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Received: Oct. 30, 2020 - Approved: Feb. 11, 2021

yellowness), pH, cooking loss, and shear force of the breast meat. Dietary alpha-tocopherol levels did not influence broiler performance, carcass yield, and prime cuts at 42 days of age. The edible viscera, immune organs, the length of the small intestine, and the abdominal fat, as well as the meat color (lightness, redness, and yellowness), pH, cooking loss, and shear force of the breast meat, were not influenced. However, the small intestine yield increased linearly with increasing levels of alpha-tocopherol. The dietary levels of alpha-tocopherol did not influence the performance and meat quality of broilers from 8 to 42 days of age.
Key words: Antioxidant. Micronutrient. Productive performance. Carcass yield. Vitamin E.

Resumo

Objetivou-se avaliar o desempenho e a qualidade de carne de frangos de corte alimentados com diferentes níveis de alfa-tocoferol. Foram utilizados 240 pintos de corte, machos, da linhagem Cobb 500®, de um dia de idade, criadas até o sétimo dia de vida, de acordo com a recomendação da linhagem e recebendo ração com apenas 50% da exigência de alfa-tocoferol. Aos oito dias, as aves foram pesadas, homogeneizadas e os tratamentos distribuídos em delineamento inteiramente casualizado, com quatro tratamentos (50, 100, 150 e 200% das exigências de alfa-tocoferol) e seis repetições de dez aves por unidade experimental. As variáveis avaliadas foram o ganho de peso, o consumo de ração, a conversão alimentar, os rendimentos de carcaça e cortes nobres (coxa, sobrecoxa e peito), as vísceras comestíveis (coração, fígado, moela), os órgãos imunes (Bolsa cloacal e Baço), peso e comprimento do intestino delgado, a gordura abdominal, a coloração (luminosidade, vermelho e amarelo), o pH, a perda de peso por cocção e a força de cisalhamento do músculo do peito. Observou-se que os níveis de alfa-tocoferol, não influenciaram as variáveis de desempenho das aves aos 42 dias de idade. Da mesma forma, não influenciaram o rendimento de carcaça e cortes nobres. As vísceras comestíveis, os órgãos imunes, o comprimento do intestino delgado e a gordura abdominal, também não foram influenciadas, assim como, a coloração (luminosidade, vermelho e amarelo), o pH, a perda de peso por cocção e a força de cisalhamento do músculo do peito. Porém, houve efeito linear crescente para o rendimento do intestino delgado. Os níveis de alfa-tocoferol nas dietas, não influenciaram o desempenho e a qualidade de carne de frangos de corte dos 8 aos 42 dias de idade.
Palavras-chave: Antioxidante. Desempenho produtivo. Micronutriente. Rendimento de carcaça. Vitamin E.

Introduction

Commercial diets for broilers are based on the combination of several ingredients, in quantities adequate to meet their nutritional requirements at different stages, with the objective of maximum performance and minimum cost. Among the various components used in the production of feed are micronutrients, including vitamins and minerals. Since broilers cannot synthesize all vitamins in sufficient quantities for the perfect functioning of the organism, these are supplemented in the diet (Félix, Maiorka, & Sorbara, 2009).

Alpha-tocopherol, one of the fat-soluble vitamins, is essential for the health and development of different animal species; is important for the integrity of the organs, the reproductive system, nervous system, muscle, bone, skin, bone marrow and even blood; participates in antioxidative processes; and can improve the immune response and the productive performance of broilers raised under high temperatures. These benefits, which may be related to it being a functional nutrient, have aroused interest in its use in diets at quantities above the requirements of the birds (Galli et al., 2017; Kuttappan et al., 2012).

Vitamin E is the generic name given to eight tocopherol and tocotrienol compounds: alpha (α), beta (β), gamma (γ) and delta (δ) tocopherol or tocotrienol. All are considered natural antioxidants, found in variable fractions in oils, eggs, liver, wheat and some dark green vegetables (Dalólio, Albino, Lima, da Silva, & Moreira, 2015). The main difference in the structures of these compounds is the number of side chain bonds, which result in changes in the activity of the vitamin. Alpha-tocopherol is the most abundant and biologically active form, with the highest antioxidant capacity, and is distributed throughout the plasma and in animal and plant tissues (Urso et al., 2015).

There are several benefits of vitamin E, among them, the ability to improve the production performance and the quality of broiler meat, considerably improving the oxidative quality of the meat when administered in quantities above the standard requirement. These benefits have aroused the interest of researchers seeking improvements in production and in the quality of the final product (Wu et al., 2012; Félix et al., 2009; Kuttappan et al., 2012).

In a study evaluating the effects of the dietary supplementation of ascorbic acid (115 and 230 ppm) and alpha-tocopherol (150 and 300 ppm) on broilers kept until 42 days of age in a high temperature environment, de Souza et al. (2011) noticed that although the combined vitamins positively influenced feed conversion and the breast yield of the birds, neither the single nor combined vitamins affected the performance, spleen weight, or blood parameters of the chickens. When combined with zinc (50 mg/kg feed), however, alpha-tocopherol (100 mg/kg feed) regulated the blood health indices and improved the performance of heat-stressed broilers (Hosseini-Mansoub, Chekani-Azar, Tehrani, Lotfi, & Manesh, 2010). Conversely, according to Lopes et al. (2015), zinc (0 and 120 mg/kg diet) and alpha-tocopherol (0, 300, and 600 mg/kg diet) did not improve the feed intake, weight gain, production viability, or production efficiency index of broilers maintained for the first 21 days of life at high temperatures and reared on re-used litter.

Contrasting results were found by Kakhki, Bakhshalinejad, Hassanabadi and Ferket (2017), who evaluated the effect of three levels of alpha-tocopherol acetate (0, 150 and 300 mg / kg of food) and three levels of zinc (0 , 60 and 120 mg / kg of feed) on performance, meat quality and the amount of zinc, selenium and alpha-tocopherol in the breast and thigh muscle and liver of broilers. The authors noted that zinc and alpha-tocopherol acetate did not influence carcass performance or yield parameters; however, alpha-tocopherol and zinc supplementation increased alpha-tocopherol deposition in the liver, chest and thigh. They concluded that dietary supplementation of 300 mg / kg of alpha-tocopherol can improve nutritional content and stability to muscle oxidation without any adverse effect on the growth performance of broilers.

However, other studies have found that alpha-tocopherol improved broiler performance and the quality of broiler meat raised up to 38 days of age (Hashizawa, Kubota, Kadowaki, & Fujimura, 2013), as well as sensory attributes in chickens raised up to 63 days of age (Zdanowska-Sąsiadek et al., 2016). Given the variation in alpha-tocopherol supplementation at levels above the needs of the birds examined so far, the objective of this study was to evaluate the performance and quality of chicken meat fed with different levels of alpha-tocopherol.

Material and Methods

The experiment took place in the Poultry Sector of the Faculty of Veterinary Medicine and Zootechnics of the Federal University of Tocantins, located in Araguaína, Brazil (latitude 07º11'27"S, longitude 48º12'22"W and altitude 236 m), from 30 March to May 11, 2018. It was carried out according to a protocol approved by the Ethics Committee on the Use of Animals at the Federal University of Tocantins (CEUA-UFT) (nº 23.101.004458.2017-51).

A total of 240, one-day-old, male, Cobb 500 broilers, were raised to 7 days, according to lineage recommendations, and fed a diet containing only 50% of the alpha-tocopherol requirements (alpha-tocopherol). At 8 days of age, birds with an average weight of 187.3 ± 14.47 g were randomly assigned to the four treatments (50, 100, 150, and 200% of the alpha-tocopherol requirements, as recommended by Rostagno et al., 2017) (Table 1) in a completely randomized experimental design, with six replicates of ten birds per experimental unit.

Table 1
Alpha-tocopherol levels in diets for broilers at different stages of breeding

Breeding stage	Treatment (UI kg feed)			
	50%	100%[a]	150%	200%
8-21 days	22.9	45.8	68.7	91.6
22-42 days	18.0	36.1	54.1	72.2

[a] Requirements recommended by Rostagno et al. (2017).

The composition of the diets was calculated considering the nutritional needs of the birds, based on the recommendations of Rostagno et al. (2017) from 1 to 7, 8 to 21 and 22 to 42 days of age (Table 2). The birds were housed in an experimental shed, managed according to the behavior of the birds, with concrete floors, side curtains and thermoacoustic tiles, and 24 2.0 m^2 boxes, with tubular feeders and pendant drinkers. Feeders were filled, waterers were cleaned and refilled twice a day, allowing free access to water and food throughout the experimental period.

Table 2
Composition of the diets for broiler chickens in different breeding phases (days)

Ingredient	Quantity (g kg)		
	Breeding phase (days)		
	1 to 7	8 to 21	22 to 42
Corn (7.88%)	561.00	581.10	627.00
Soybean meal (45%)	370.90	344.40	305.90
Dicalcium phosphate	19.00	16.70	11.70
Soy oil	21.20	30.90	34.60
Limestone	11.20	9.90	8.30
Common salt	5.00	5.00	4.40
DL-Methionine	3.80	3.80	2.40
L-Lysine	3.10	3.30	2.00
L-Threonine	1.30	1.50	0.50
Mineral supplement	1.00	1.00	1.00
Vitamin supplement	1.00	1.00	1.00
Choline chloride	0.90	0.80	0.60
Salinomycin	0.50	0.50	0.50
Butylated hydroxytoluene	0.10	0.10	0.10
Total	1000.00	1000.00	1000.00
Calculated nutritional composition			
Metabolizable energy (kcal kg)	2975	3050	3175
Crude protein (g kg)	222.00	208.00	195.70
Calcium (g kg)	9.70	8.80	6.90
Available phosphorus (g kg)	4.60	4.20	3.30
Digestible lysine (g kg)	13.00	12.50	10.70
Methionine + digestible cystine (g kg)	9.60	9.30	7.90
Digestible methionine (g kg)	6.50	6.50	5.00
Digestive threonine (g kg)	8.60	8.30	7.00
Sodium (g kg)	2.20	2.20	2.00

[a] Recommendation and vitamin supplement composition per kg of diet formulated at the 100% level according to Rostagno et al. (2017)
[b] Mineral supplement (kg/t feed): Broiler: pre-initial, 1,25; initial, 1.10; growth I (22-35 days), 1.00. Supplementation composition (mg/kg feed) in the growth phase: copper, 10; iron, 50; iodine, 0.8; manganese, 65; selenium, 0.30; zinc, 60
[c] Vitamin (Vit.) supplement (kg/t feed): Broiler: pre-initial, 1,25; initial, 1.10; growth I (22-35 days), 1.00. Vit. A, 8,000.00 IU; Vit. D, 1,600.00 IU; Vit. K, 1400 mg; Vit. B1, 1,200 mg; Vit. B2, 4,000 mg; nicotinic acid, 28.00 mg; pantothenic acid, 9,600 mg; Vit. B6, 1900 mg; Vit. B12, 10 mg; folic acid, 560 mg; biotin, 56 mg.

Until day 14 of life, the birds were artificially heated using incandescent bulbs (60 W), which were installed inside all boxing. The adopted light program was continuous light (24 h light, natural + artificial). During the experimental period, the environmental conditions (air temperature, relative air humidity, and black globe temperature) inside the facilities were monitored and recorded every 30 min, using Onset HOBOware (version 3.4.1; Onset Computer Corp., Bourne, MA, USA) data loggers, placed in the middle of the boxing. The mean values obtained were converted into the black globe humidity index (BGHI) (Buffington et al., 1981). The mean values of the air temperature, maximum air temperature, and minimum air temperature inside the shed during the experimental period were 26.7, 34.7, and 19.7 °C, respectively, and the relative humidity was 88%, equivalent to BGHI values of 77.1 and 77.9, respectively, for the initial and final phases.

The variables evaluated included the feed intake; weight gain; feed conversion; carcass yield; yields of noble cuts (thigh, drumstick, and breast), edible viscera (heart, liver, gizzard), and immune organs (cloacal bursa and spleen); the weight and length of the small intestine; abdominal fat; color of the breast meat (L* = luminosity, a* = redness, b* = yellowness); pH; temperature; weight loss by cooking; and shear force.

Birds and feed were weighed at the beginning and at the end of the experimental period to determine weight gain and feed intake. The feed intake was calculated considering the amount of feed supplied and the leftovers in the feeders. The feed conversion was defined as the ratio between the ingested feed intake and the weight gain of the birds during the experimental period.

At 42 days of age, two birds from each plot, with a body weight close to the average of the plot (±5%), were submitted to an 8-h fast and slaughtered by cervical dislocation. Afterwards, they were submitted to bleeding, scalding, plucking, and evisceration procedures, in order to evaluate the weights of their whole carcasses (feet, neck, and head) and noble cuts (thigh, drumstick, and chest).

The edible viscera, immune organs, abdominal fat, and small intestine were collected during evisceration, cleaned, dried on paper towels, and weighed separately on a precision scale. From the gizzard, all the adhered fat, its contents, and the koilin membrane were removed. In addition to the weight, the length of the small intestine was measured from the beginning of the duodenum to the ileocecal junction. The relative weight of the plucked and eviscerated carcass was calculated in relation to fasting weight. The relative weights of the cuts, edible viscera, immune organs, and small intestine were measured in relation to the plucked and eviscerated carcass.

The pH value of the raw meat of the chicken breast (without bone, skin, ligaments, and fat) was measured, and its color (CIELAB system) was evaluated (L*, a*, b*) using a colorimeter (Chroma meter®). Readings were performed at three different points to obtain a mean value.

To determine the weight loss by thawing, the frozen breast fillets were weighed, placed in a refrigerator for 24 h for thawing, and then weighed again. To determine the weight loss by cooking, the previously weighed breasts were roasted in an electric oven at 170 °C until reaching an internal temperature of 40 °C, at which stage they were turned over and roasted until they reached an internal temperature of 70 °C. The samples were placed on absorbent paper for cooling to a temperature of 20 to 25 °C. They were then weighed, and the weight loss after cooking was determined, followed by storage at 4 °C for 24 h, according to a method adapted from Froning and Uijttenboogaart (1988).

To determine the shear force, samples of the cylindrical breast fillets (1.27 cm in diameter) were placed with the fibers oriented perpendicular to the blades of the Warner-Bratzler apparatus.

The data of the evaluated variables were submitted to the normality (Crámer-von Mises) and homoscedasticity (Levene) tests. To check the adjustment of the equation, the results of the "F" test for models, the "t" test for the parameters (β0, β1 and β2) of the models, and the coefficient of determination (R^2 = SS regression/ SS total) were considered significant at $p \leq 0.05$. The statistical analysis was performed using Sisvar software (Ferreira, 2011).

Results and Discussion

In the current study, the levels of alpha-tocopherol in the diets had no significant effect ($p > 0.05$) on the feed intake, weight gain, feed conversion, or body weight of broilers at 42 days of age (Table 3).

Table 3
Mean values of feed intake (FI), weight gain (WG), feed conversion (FC), and weight at 42 days (CP) of broilers from 8 to 42 days of age according to the alpha-tocopherol level

Variable	Alpha-tocopherol (%)				Mean	P			CV[a] (%)
	50	100	150	200		LE	QE	LD	
FI[b] (g)	5321.77	5212.33	5140.18	5165.55	5209.96	0.215	0.484	0.888	4.44
WG[b] (g)	3163.20	3193.83	3178.52	3198.78	3183.58	0.533	0.874	0.578	2.48
FC[b] (g g)	1.682	1.632	1.617	1.614	1.637	0.076	0.374	0.843	3.91
CP[b] (g)	3349.45	3380.33	3363.35	3383.78	3369.23	0.563	0.875	0.566	2.38

[a] Coefficient of variation (%)
[b] $\hat{Y}$ = NS
LE linear effect, *QE* quadratic effect, *LD* linearity deviation, *p* probability of type I error at 5% using the F-test.

The absence of effects on the productive performance of birds indicates that the lowest level of vitamin E, i.e. 50% of the requirements, corresponding to 2.29 and 1.80 g/100 kg (Table 1) for the initial and growth phases, respectively, met the nutritional requirements of broilers from 8 to 42 days of age.

A similar study, in which male broilers aged 21 to 39 days received alpha-tocopherol levels of 10, 30, 50, 75 and 100 mg/kg of feed, without any effect on the production parameters, led to the conclusion that the lowest level of alpha-tocopherol supplementation (10 mg/kg) met the requirements of the birds in the initial and growth stages (Pompeu et al., 2015).

Likewise, no impact on the performance and carcass composition of broilers from 21 to 49 days was found by Almeida, Pinto, Poloni, Ponsano, & Garcia (2009), when up to 400 mg/kg alpha-tocopherol and linseed (flaxseed) oil (in substitution of soybean oil) were incorporated into the diet. However, the experimental rations used in their study also contained alpha-tocopherol associated with the use of flaxseed oil, whereas the present study sought to evaluate only the effects of alpha-tocopherol on the productive performance of birds.

The levels of alpha-tocopherol in the diets did not affect ($p > 0.05$) the carcass, thigh, drumstick, or breast yields, or the abdominal fat of broilers slaughtered at 42 days of age (Table 4).

Consistent with these results, Kuttappan et al. (2012) reported no effect of alpha-tocopherol levels of 15, 50, 100, 200, and 400 mg/kg feed on carcass yields, cuts, or striated breast development in broilers. Likewise, broilers fed diets with alpha-tocopherol (0 and 250 mg/kg) and ascorbic acid (0, 150, 300, and 450 mg/kg) showed no differences in their carcass and breast yield at up to 49 days of age (Fernandes, Sakamoto, Peiter, Gottardo, & Tellini, 2013). Accordingly, the authors suggested that the use of ascorbic acid and alpha-tocopherol levels below the mean values used by the industry did not interfere with the productive performance of the birds (Fernandes et al., 2013).

Table 4
Mean values of carcass yield (RY), thigh carcass yield (TCY), drumstick carcass yield (DSCY), breast yield (BY), and abdominal fat (AF) in broilers slaughtered at 42 days of age, according to the alpha-tocopherol level

Variable	Alpha-tocopherol (%)				Mean	*p*-value			CV[a] (%)
	50	100	150	200		LE	QE	LD	
RY[b] (%)	85.11	84.50	84.53	85.05	84.80	0.945	0.227	0.933	1.32
TCY[b] (%)	10.21	9.96	9.96	9.89	10.01	0.401	0.719	0.770	6.04
DSCY[b] (%)	13.18	13.17	13.19	12.64	13.05	0.193	0.316	0.620	5.04
BY[b] (%)	32.98	32.91	32.90	32.29	32.77	0.401	0.626	0.795	4.08
AF[b] (%)	1.63	1.64	1.61	1.54	1.60	0.636	0.799	0.994	21.17

[a] Coefficient of variation (%)
[b] $\hat{Y}$ = NS
LE linear effect, *QE* quadratic effect, *LD* linearity deviation, *p* probability of type I error at 5% using the F-test.

Divergent results were found by Zdanowska-Sąsiadek et al. (2016), who evaluated the effect of diets containing alpha-tocopherol (44 and 200 mg/kg feed) on the productive performance and meat quality of broilers up to 63 days of age and found that alpha-tocopherol supplementation of 200 mg/kg did not influence the productive performance, but increased the carcass yield.

The levels of alpha-tocopherol in the diets did not affect ($p > 0.05$) the relative weights of the heart, gizzard, liver, spleen, or bursa. However, there was a linear effect ($p < 0.05$) on the small intestine yield of broiler chickens slaughtered at 42 days of age (Table 5).

Table 5
Relative weight of the edible viscera (heart, gizzard, and liver), immune organs (cloacal bursa and spleen), and abdominal fat, and weight and length of the small intestine (m) of broilers at 42 days old according to the alpha-tocopherol level

Variable	Alpha-tocopherol (%)				Mean	*p*-value			CV[a] (%)
	50	100	150	200		LE	QE	LD	
Heart[b] (%)	0.34	0.38	0.36	0.36	0.36	0.788	0.064	0.208	8.31
Gizzard[b] (%)	1.10	1.01	1.02	1.03	1.04	0.337	0.230	0.598	9.82
Liver[b] (%)	1.35	1.46	1.43	1.41	1.41	0.565	0.248	0.601	9.91
Spleen[b] (%)	0.08	0.07	0.08	0.07	0.08	0.472	0.536	0.096	20.36
Bursa[b] (%)	0.18	0.18	0.18	0.19	0.18	0.399	0.635	0.943	13.98
Intestine weight[c] (%)	1.57	1.72	1.79	1.76	1.71	0.043	0.222	0.952	9.57
Length of intestine[b] (m)	1.91	1.92	1.90	1.92	1.91	0.941	0.985	0.726	5.77

[a] Coefficient of variation (%)
[b] $\hat{Y}$ = NS
[c] Linear effect: ID = 1.548 + 0.00129 NVE ($p = 0.043$; $R^2 = 0.75$) where NVE = alpha-tocopherol level
LE linear effect, *QE* quadratic effect, *LD* linearity deviation, *p* probability of type I error at 5% using the F-test.

The linear increase in the relative weight of the small intestine can be attributed to the fact that the size of the metabolically active viscera is reduced when birds are raised in environments above the thermoneutral zone, in order to promote the loss of heat to the environment (Lopes et al., 2015). Lopes et al. (2015) found similar results, demonstrating a linear increase in absolute small intestine weight of broiler chickens fed increasing levels of alpha-tocopherol (300 and 600 mg/kg). The small intestine is of fundamental importance for the development of the birds since most of the nutrient absorption occurs in this organ. Thus, when the size of the organ is compromised, the absorption of the nutrients is impaired (Reis et al., 2016).

The levels of alpha-tocopherol in the diets did not influence ($p>0.05$) the color (*L**, *a**, *b**), pH, temperature, shear force, or weight loss by cooking of the breast muscle of chickens slaughtered at 42 days of age (Table 6).

Table 5
Mean values of luminosity (*L), redness (*a**), yellowness (*b**), pH, temperature, shear force, and cooking weight loss cut at 42 days of age**

Variable	Alpha-tocopherol (%)				Mean	*p*-value			CV[a] (%)
	50	100	150	200		LE	QE	LD	
*L**[b]	61.57	60.25	61.61	60.66	61.02	0.608	0.750	0.071	2.36
*a**[b]	10.32	11.02	10.80	11.05	10.80	0.297	0.585	0.465	9.29
*b**[b]	11.00	11.49	10.77	11.12	11.10	0.893	0.908	0.415	13.42
pH[b]	6.16	6.23	6.06	6.15	6.15	0.527	0.881	0.133	2.84
Temperatureb (°C)	12.90	16.03	11.51	16.37	14.20	0.359	0.543	0.013	24.18
Weight loss by cooking (%)	22.59	21.76	24.37	23.99	23.18	0.207	0.847	0.232	12.33
Shear force (kgf/cm²)	1.20	1.21	1.24	1.42	1.27	0.066	0.333	0.721	15.88

[a] Coefficient of variation (%)
[b] $\hat{Y}$ = NS
LE linear effect, *QE* quadratic effect, *LD* linearity deviation, *p* probability of type I error at 5% using the F-test.

Hu et al. (2015) compared the effects of α-tocopherol acetate and vitamin E, micro encapsulated on the production performance and meat quality of broiler chickens and did not observe effects on the levels of luminosity (L *), red (a *), yellow (b *), in the loss of weight by cooking and in the shear strength of the breast of broilers raised until 42 days of age. Divergent results were found by Hashizawa et al. (2013), who evaluated the effect of vitamin E supplementation on the quality of breast meat from broilers raised under heat stress up to 38 days of age and observed an effect on red (a *) levels.

In a similar study, Zdanowska-Sąsiadek et al. (2016) evaluated two levels of vitamin E (44 mg / kg of vitamin E, basal diet and 200 mg / kg of vitamin E, experimental diet) and observed an effect for calorimetry, where the meat of the group that received the highest level of vitamin E, obtained a higher content of red and lower content of yellow, when compared to the control group, for weight loss by cooking, the lowest values were found in the meat of birds that received the level of 200mg / kg of vitamin E.

In general, it was observed that the levels of alpha-tocopherol used in the present study did not influence the performance parameters and meat quality of broilers slaughtered at 42 days of age, these results may be related to the amounts of alpha- tocopherol added to the diets, the levels used, were lower than those reported by Silva et al. (2011) who used levels of 75, 150, 225 and 300 mg / kg of alpha-tocopherol, Zaboli, Bilondi, & Miri, (2013) level of 200 mg / kg of alpha-tocopherol and Zdanowska-Sąsiadek et al. (2016) with levels of 44 and 200 mg / kg of alpha-tocopherol in the diets, in which the results showed better parameters of performance and meat quality, when the birds were fed diets containing higher levels of alpha-tocopherol.

Conclusion

Concludes the alpha-tocopherol levels examined did not influence the performance parameters and quality of broiler meat from 8 to 42 days of age.

Acknowledgment

We wish to acknowledge the Coordination for the Improvement of Higher Education Personnel - CAPES, for the scholarship grant, the Federal University of Tocantins - UFT, for the support and availability of the facilities, as well as Teacher Luiz Fernando Albino and the companies Bonasa Alimentos and GRANFORTE for the supply of raw materials for the experiments.

"The development of this research benefited from the UFT Institutional Productivity Research Program (PROPESQ / UFT)".

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