

EFFECT OF RED HOT PEPPER (*Capsicum annum*) ON PEROXIDE VALUE, FREE FATTY ACID AND THIOBARBITURIC ACID OF MEAT OF HUBBARD BROILER CHICKENS

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Abstract

This study aims to evaluate the effect of using Red Hot Pepper (RHP) as a dietary additive on peroxide value, free fatty acid and thiobarbituric acid levels of meat of Hubbard broiler chickens. For this purpose, 120-day old broiler chickens were fed diets containing varying levels of RHP. The birds were kept on deep litter throughout the duration of the study. A complete randomized design with 4 treatments and 3 replicates per treatment, with 4 levels of RHP supplementation (0%, 1.00%, 1.25%, 1.50%) was used for the experiment. Each replicate contained 10 birds making 30 birds/treatment. The results showed that at 8 weeks, addition of RHP did not significantly ($p > 0.05$) effect all the parameters measured. It was concluded that, RHP as an additive in Hubbard broiler chicken's diets had no negative impact on the meat quality parameters of interest.

Keywords: Red hot Pepper, Hubbard broilers, peroxide value, thiobarbiturate, free fatty acid.

Introduction

There is growing interest in the use of herbs as growth promoters and additives in the feed of birds. Evidence suggest that some herbs and spices have different active substances (Al-Kassie and Witwit, 2010) which could impact on the productivity of broiler chickens. The inclusion of dried red hot pepper for instance is reported to have a positive effect on the feed consumption of broiler chickens (Yoshioka *et al.*, 1999). Red hot pepper increases the ability of birds to reduce the deposition of cholesterol and fat in the body and contributes to decreasing the level of triglycerides and hence, work to support the vascular system in the body (Al-kassie et al 2010). Hencken (1991) opined that dried red hot pepper is rich in vitamin C which helps tremendously in improving production through its contribution in the reduction of heat stress. Reduction of heat stress is based on the fact that bird's consumption of dried red hot pepper induces a considerable change in energy balance when given free access to food (Yoshioka *et al.*, 2001).

Alkassie *et al.* (2011) revealed from their study, that the inclusion of red hot pepper at levels of 0.50, 0.75 and 1.00% in the diets of hybrid line Ross 308 broiler chickens, improved body weight gain and feed conversion ratio. The investigation of Thiamhirunsopit *et al.* (2014) using different forms of red hot peppers showed that better growth performance was observed in chickens fed experimental red hot pepper treatments in comparison to those fed the control diet. However, research works done to test the response of broiler chickens fed $>1.00\%$ red hot pepper is scarce. Therefore, the objective of this study is to evaluate the effect of feeding higher levels ($>1.00\%$) of powdered red hot pepper on peroxide value, free fatty and thiobarbituric acids of meat obtained from Hubbard broiler chickens.

Materials and Methods

The experiment was conducted at Mike farm located at Shango area, Minna, Niger state, Nigeria. Minna is located in the Southern Guinea Savanna zone on latitude $9^{\circ} 31'$ and $9^{\circ} 42'$ North and Longitude $6^{\circ} 29'$ and $6^{\circ} 41'$ East with annual rainfall range of 1,200-1,300mm, and temperature range of $38-40^{\circ}\text{C}$. The area has an altitude of 1,475m above sea level, and is characterized by two seasons; wet season (April-October) and dry season (November-March). The average temperature is 27.3°C (FUTMIN, 2012).

The powdered hot red pepper was purchased from Minna Central market and was further dried at room temperature to retain its reddish colour and reduce the moisture content. It was ground with a Polystar blender (PV-BL999B, China) to pass through a 1.5mm sieve. Complete randomized design was used for the experiment, with the 120 day old chicks used for the research, divided into four treatment groups each with three replicates of 10 birds per replicate. The same commercial starter and finisher feed were fed to all the birds. The distinguishing factor is the dried powdered red hot pepper which was incorporated into the diets at 0.00, 1.00, 1.25 and 1.50%, respectively. The experimental birds were raised on deep litter. Before the arrival of the birds, the house was cleaned and disinfected with a germicide to avoid transmission of diseases to the new chicks. On arrival of the chicks, their initial body weight was taken and recorded. They were given broad spectrum antibiotics and supplied with anti stress and glucose in water. A known amount of feed was given to the birds in each treatment based on their dietary treatment. They were vaccinated against Newcastle and Infectious bursal diseases. The parameters measured were the peroxide level, free fatty acid level and thiobarbituric acid levels of meat obtained from the broiler chickens. Meat obtained from the chickens were stored at refrigerated temperature (2- 4°C) and on a daily basis, samples was taken and analysed for a maximum of fourteen days. Meat were sampled at 2 days interval (2, 4, 8, 10, 12 and 14, respectively) and analysed using the method as described by guy et al.,(2013). Data collected were analyzed using the statistical package for social scientists (SPSS, 2016).

Results

The results (Table 1) shows the effect of red hot pepper (*Capsicum annum*) on the peroxide value of meat obtained from Hubbard broiler chickens. There was no significant ($p>0.05$) differences observed between the treatments in the peroxide value on day 2, 4, 6, 8, 10, 12 and 14, respectively. The addition of RHP in the diets of the birds did not also affect ($p>0.05$) the peroxide value cumulatively from day 2-14 days.

Table 1: Effect of red hot pepper (*Capsicum annum*) on the peroxide value of meat from Hubbard broiler chickens

Days	T ₁	T ₂	T ₃	T ₄	SEM	LOS
2	64.83	53.00	65.50	67.30	6.59	NS
4	137.92	140.00	118.28	113.18	7.65	NS
6	144.17	149.58	135.17	137.29	8.09	NS
8	156.25	155.42	146.29	138.23	9.58	NS
10	268.33	230.00	265.35	229.69	10.35	NS
12	232.50	251.25	222.39	258.72	14.69	NS
14	258.33	268.33	250.09	282.72	10.70	NS

SEM = standard error of mean; T₁= control diet (0% RHP); T₂ = RHP inclusion at 1.00%; T₃ = RHP inclusion at 1.25%; T₄ = RHP inclusion at 1.50%; LS = level of significant; ns = not significant ($p>0.05$).

Presented in Table 2, is the result of the effect red hot pepper (*Capsicum annum*) on the free fatty acid level of meat of Hubbard broiler chickens. The results showed no significant ($p>0.05$) difference between the treatments from day 2 to 14 in the values of free fatty acids. Cumulatively, no significant ($p>0.05$) effect of RHP was observed in the free fatty acid of the meat from birds fed the different inclusion levels of RHP.

Table 2: Effect of red hot pepper (*Capsicum annum*) on free fatty acid level of meat from Hubbard broiler chickens

Days	T ₁	T ₂	T ₃	T ₄	SEM	LOS
2	0.66	0.53	0.49	0.66	0.15	NS
4	1.77	1.42	1.67	1.58	0.22	NS
6	1.95	1.80	1.88	2.17	0.25	NS
8	1.88	1.48	1.45	2.37	0.45	NS
10	2.08	1.84	1.87	2.00	0.25	NS
12	3.09	3.53	3.01	3.32	0.45	NS
14	3.89	3.76	3.78	3.59	0.46	NS

SEM = standard error of mean; T₁= control diet (0% RHP); T₂ = RHP inclusion at 1.00%; T₃ = RHP inclusion at 1.25%; T₄ = RHP inclusion at 1.50%; LS = level of significant; ns = not significant (p>0.05).

Table 3 shows the result of the effect of red hot pepper (*Capsicum annum*) on the free fatty acid level of meat of Hubbard broiler chickens. The results showed no significant (p>0.05) difference between the treatments from day 2 to 14 in the values of free fatty acids. Cumulatively, no significant (p>0.05) effect of RHP was observed in the free fatty acid of the meat from birds fed the different inclusion levels of RHP.

Table 3: Effect of red hot pepper (*Capsicum annum*) on thiobarbituric acid level of meat from Hubbard broiler chickens

Days	T ₁	T ₂	T ₃	T ₄	SEM	LOS
2	0.14	0.14	0.12	0.14	0.003	NS
4	0.41	0.40	0.42	0.45	0.012	NS
6	0.45	0.46	0.47	0.51	0.14	NS
8	0.58	0.60	0.59	0.51	0.25	NS
10	0.64	0.77	0.72	0.69	0.25	NS
12	0.96	0.97	1.0	0.97	0.16	NS
14	1.52	1.50	1.50	1.63	0.36	NS

SEM = standard error of mean; T₁= control diet (p>0.05); T₂ = RHP inclusion at 1.00%; T₃ = RHP inclusion at 1.25%; T₄ = RHP inclusion at 1.50%; LS = level of significant; ns = not significant (p>0.05).

Discussion

The experiment materials, influences the quality of the fat deposited on broiler carcass (Bai and Lara, 2005). The result of this study showed no difference between birds fed the control and those fed the RHP based diets. This means that meats of the birds fed the control and the RHP based diets are less susceptible to peroxidation and the production of free fatty acid and thiobarbituric acid. Oxidation of meat could reduce the shelf life of meat and meat products. Contrary to results obtained In the current, Puvaca *et al.* (2015) reported that broiler chickens fed diets containing spices achieved better lipid profile status compared with those on un-supplemented feed. This could probably be due to the anti peroxidase effect of the spice used. Possibly, a higher level of RHP in the feed could elicit a similar reaction and or effect.

Conclusion

The results of the study Indicates the the use of dry red hot pepper as an additive up to 1.50%, prevented spoilage of meat obtained from Hubbard broiler chickens. No difference was observed in the peroxide value, free fatty acid and thiobarbituric acid levels of the birds fed the control and those fed the RHP based diets.

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