

CARCASS TRAITS OF BROILER CHICKENS FED WHITE (*PIPER NIGRUM*) AND CAYENNE PEPPER (*CAPSICUM FRUTESCENS*) POWDERS AS ADDITIVES

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ABSTRACT

An investigation was carried out to evaluate carcass traits of chickens fed white pepper (wp) and cayenne pepper (cp) powders fed as additives. 360-day old broiler (Cobb) chicks were sourced while three hundred and thirty-six 2-weeks old broiler chicks were randomly assigned into 7 treatment groups. Each consists of 48 randomly selected birds and four replicates of twelve birds each. Additives were formulated into 7 treatment diets as experimental diets were assigned after two weeks of collective brooding as treatment diets were fed for 28 days. At day-28, carcass indices were measured data obtained were subjected to a one - way Analysis of Variance (ANOVA) in a completely randomized design. Dressed weight, neck, head, back, breast and thigh percentages were influenced ($P<0.05$) by treatment diets. Group fed Basal diet+200wp had best ($P<0.05$) value for carcass parts except back part that was heaviest (%) in groups offered Basal diet+100wp+100cp. The study concluded that inclusion of cayenne pepper powder singly at 200 g/100kg of basal feed best improved carcass characteristics of broiler chicken meat.

Key words: Broiler chickens, carcass yield, feed additives, white pepper powder, cayenne pepper powder

INTRODUCTION

Rapid conversion of feed to meat and increased rearing of meat type chickens is the trend in modern commercial poultry with special emphasis laid on high yield and quality meat. Nutritional compositions have been adjusted with significant impact on poultry meat yield and safety. Published findings abound on the effect of probiotics, vitamin and mineral mixture mix on carcass characteristics of broiler chicken in harmony with the economics of broiler production (Singh *et al.*, 2018). Trend of purchase of poultry products necessitates augmenting improved breed of poultry birds by diet to achieve significant economic yields. Fluctuations in price of chicken meat owing to the continuous increase in cost of quality feed ingredients necessitates the search for botanicals that can influence yield without quality compromise. Mondal *et al.* (2015) referred to feed additives as all products excluding commonly known feedstuffs that can be incorporated into ration to obtain desired outcomes. White pepper (*Piper nigrum*) powder has been acclaimed with a wide range of applications, like “spices” and “antioxidant” (Heerasing *et al.*, 2019). Notable examples include the incorporation of *Piper nigrum* in the diet of chickens detailed in the report of Tazi-Safa *et al.*, (2014) and Ndelekwute *et al.* (2015). Dietary trials have been conducted to examine the effect of red peppers on performance of broiler chickens (Galib *et al.*, 2011; Adegoke *et al.*, 2018). Hence, an investigation on the effect of white and cayenne pepper powders as additives on carcass traits of broiler chickens was investigated.

MATERIALS AND METHODS

This experiment was carried out at the Poultry Unit of Directorate of University Farms (DUFARMS), Federal University of Agriculture Abeokuta (FUNAAB), Ogun State, Nigeria.

Experimental birds and management: 360-day old broiler (Cobb) chicks were sourced from a reputable hatchery in Ibadan. Birds were floor-brooded collectively for the first two weeks in a deep litter pen prior to the random allotment of three hundred and thirty-six (336) birds into seven treatment groups that consists of 48 birds per treatment. Each group was subdivided into 4 replicates containing 12 birds each. Treatments were – Basal, B+200wp, B+250wp, B+200cp, B+250cp, B+100wp+100cp and B+125wp+125cp groups.

Table 1. Composition of basal diets at the starter and finisher phases of the experiment

Ingredients Composition (%)	Starter	Finisher
Maize	50.000	54.000
Wheat offal	5.500	10.500
Soybean Meal	25.000	14.000
Groundnut cake	13.000	16.000
Fishmeal (72%)	1.000	0.000
Bonemeal	3.000	3.000
Limestone	1.500	1.500
Salt	0.250	0.250
*Mineral and Vitamin Premix	0.250	0.250
Methionine	0.300	0.250
Lysine	0.200	0.250
Cayenne Pepper	0.000	0.000
White Pepper	0.000	0.000
Total	100.000	100.000

Procedure for carcass evaluation: Upon expiration of feeding dietary additives at day-28, one bird with weight close to the average weight of each replicate was selected and fasted for 10 hours to empty gut content. Live weight was documented prior to slaughter. Dressing of carcass and evaluation of cutup parts were modelled towards procedure described by Choo *et al.* (2014) and Diarra *et al.* (2014). Abdominal fat at sites described by Cahaner *et al.* (1986) was measured and the meat to bone ratio calculated. Additionally, the right drumstick of each carcass was used for meat to bone evaluation. Two drumsticks from two carcasses were selected from the four replicates randomly to estimate the ratio of meat to bone conformation.

Statistical analysis: Carcass data were analysed by one-way ANOVA to determine significant effect of treatments on response and significant means were separated using Duncan Multiple Range Test of SPSS (2012) version 21.

RESULTS AND DISCUSSION

Analysed carcass result is presented in Table 2. Dressed percentage range between 70.43 and 75.52 % among birds offered the Basal and B+200cp diets. The highest ($P<0.05$) dress percentage in groups fed B+200 was similar as groups fed B+250wp, B+250cp and B+100cp+100wp diets. The shank, wings, thigh and drumstick were not significantly ($P>0.05$) influenced by dietary additives. The head, neck, back and breast were significant ($P<0.05$) among the carcass cut-up parts. The head and neck of chickens fed no pepper additive had the highest ($P<0.05$) weight with the neck weight being the same ($P<0.05$) as groups given B+200cp diet. Back weight ranged from 14.54 – 16.98 %. Carcass percentage back weight was heaviest among birds fed B+100wp+100cp diet, though comparable statistically as weight obtained from animals given white pepper powder singly at 200 and 250 g/100kg; as well as B+250cp and B+125wp+125cp diets. Larger ($P<0.05$) breast parts of 26.70 and 26.81 % among broiler chickens fed B+200cp and B+250cp diets vary significantly ($P<0.05$) from the 23.53% of the basal group. Meat: bone ratio was best in carcass of chickens fed B+200cp diet but comparable statistically with other treatment groups excluding B+250 group with least ($P<0.05$) value. The internal organs (heart, kidney, gizzard, spleen and liver), abdominal fat and intestine + ceca weight were not influenced ($P>0.05$) by additives. The positive effect of herbal ingredients or phyto-additives on carcass and meat quality have been reported. In this study, chickens fed dietary treatments had significantly improved content per weight basis in groups supplied B+200cp powder. Hot red pepper according to Puvaca *et al.* (2015) plays an important role in regulating cholesterol and fat deposition, suppresses triglycerides levels as well as supports the vascular system in the body which supports the aggregation of muscle that results in limited adipose tissue for fat deposition. This possibly translates into better dressed percentage. Ogbuwu *et al.* (2018) pointed to concentrations (100: 100 of each pepper) of active ingredients (principally piperine and

capsaicin) and their interactions (B+100wp+100cp diet) with other active components in feed as potent when additives exert influence on energy and fat levels, resulting in increased intestinal movements, turnover and yield. Notable high yield for breast meat and meat: bone ratio conforms with the pattern observed in the group with the highest dressed percentage. Though Puvaca *et al.* (2019) reported significant impact of dietary additives on carcass yield at 1.0 g/100g of feed, this study demonstrates highest dressed percentage at 0.2 g/100g inclusion of cayenne pepper powder which corroborates outcome declared by Adegoke *et al.* (2016), that dietary cayenne pepper at 0.2 g/100g of feed resulted in best dressed percentage. Best yield value from birds supplied B+100wp+100cp diet suggests interaction of peppers at optimum concentration and combinations resulted in heaviest back weight.

Table 2. Carcass yield of broiler chickens fed dietary peppers (*Capsicum frutescens* and *Piper nigrum*) as additives

Parameters	Basal (B)	B+200wp	B+250w p	B+200c p	B+250c p	B+100w p +100cp	B+125w p +125cp	SEM
Live weight (wt)	2041.50	2003.75	2022.50	2026.25	2087.75	2024.00	2066.25	11.08
Carcass Yield								
Eviscerated wt	1671.25	1660.25	1695.50	1719.75	1730.75	1691.00	1675.50	10.91
Dressed wt	1437.50	1445.75	1470.00	1530.50	1517.50	1490.25	1470.00	11.83
Dressed (%)	70.43 ^c	72.13 ^{bc}	72.69 ^{abc}	75.52 ^a	72.66 ^{abc}	73.62 ^{ab}	71.15 ^{bc}	0.43
Cut-up parts (%)								
Head	2.69 ^a	2.36 ^{ab}	2.30 ^{ab}	2.06 ^b	2.47 ^{ab}	2.41 ^{ab}	2.28 ^{ab}	0.06
Shank	3.95	3.77	4.03	3.49	3.71	3.67	3.88	0.06
Neck	4.62 ^a	4.15 ^{abc}	4.27 ^{ab}	4.68 ^a	3.34 ^c	3.64 ^{bc}	4.38 ^{ab}	0.13
Wings	8.13	8.18	8.12	8.11	7.50	7.77	7.31	0.16
Back	14.57 ^b	14.89 ^{ab}	16.52 ^{ab}	14.54 ^b	14.87 ^{ab}	16.98 ^a	16.06 ^{ab}	0.30
Breast	23.53 ^b	25.16 ^{ab}	24.09 ^{ab}	26.81 ^a	26.70 ^a	25.71 ^{ab}	24.45 ^{ab}	0.38
Thigh	10.90	11.71	11.71	11.91	11.20	11.03	10.75	0.19
Drumstick	11.65	11.50	11.69	11.39	11.08	11.36	10.94	0.15
Meat: Bone ratio	4.96 ^{ab}	4.56 ^{ab}	5.08 ^{ab}	5.71 ^a	4.21 ^b	5.10 ^{ab}	5.47 ^{ab}	0.17
Internal Organs (%)								
Heart	0.42	0.35	0.47	0.41	0.48	0.41	0.41	0.03
Kidney	0.27	0.36	0.41	0.35	0.36	0.35	0.41	0.02
Gizzard	1.72	1.65	1.69	1.53	1.47	1.66	1.63	0.04
Spleen	0.05	0.04	0.04	0.04	0.03	0.03	0.04	0.00
Liver	1.38	1.46	1.46	1.38	1.40	1.46	1.45	0.04
Abdominal fat	0.81	0.69	1.10	0.70	0.67	0.77	0.85	0.07
Intestine + Caeca	3.12	2.65	2.92	2.99	2.71	2.89	3.15	0.07

^{a, b} - Means on the same row with different superscripts differ significantly ($p < 0.05$).

cp – Cayenne pepper powder; wp- white pepper powder; wt – weight

CONCLUSION AND RECOMMENDATION

Chickens offered cayenne pepper powder at 200 g/100kg of basal had best carcass traits among treatment groups with no deleterious effect on the birds

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