

QUALITY ATTRIBUTES OF GROUND TURKEY PATTIES AS AFFECTED BY HOUSING SYSTEM AND CUT-PART USED

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ABSTRACT

To determine the effects of housing system and cut-part used on quality attributes of ground turkey patties, 200 four-week old poulters were raised in two different housing systems (deep litter and outdoor run) for 10 weeks. Afterwards, fresh breast and thigh from slaughtered carcasses were collected and used as the raw material for ground patties which were subjected to physiochemical and sensory analysis. Data obtained were arranged in a 2 × 2 factorial layout and subjected to Analysis of Variance. Results showed housing system effect was negligible ($p > 0.05$) on physicochemical and sensory analysis of ground turkey patties. However, ranges of values recorded for pH (6.45 – 6.74), cooking loss (25.06 – 28.85%), chilling loss (4.41 – 7.92%), and diameter shrinkage (11.77 – 14.58%) revealed patties prepared from thigh was significantly ($p < 0.05$) higher. Sensory scores; appearance (3.90 – 4.92), flavour (5.53 – 6.23) and overall acceptability (5.48 – 6.65) were significantly ($p < 0.05$) higher in breast patties while oiliness was significantly ($p < 0.05$) higher in thigh patties. Therefore, the use of turkey breast for ground patties production is recommended.

Keywords: turkey, housing system, cut-up part, ground patties, sensory

INTRODUCTION

Value-added poultry products present enormous opportunities for poultry producers, processors and sellers. Unlike fresh meat, many meat products can be made shelf-stable (Heinz and Hautzinger, 2007). A typical example is patties; a minced meat mixed with condiments and spices, shaped and then cooked by frying, grilling or baking (Gujral *et al.*, 2002). However, since meat quality is influenced by many interacting factors before and after slaughter, the consumers of many meat products are getting more concerned about the origin and safety of the meat used for processing (Araújo *et al.*, 2011). Thus, the purpose of investigation was to determine the quality attributes of ground turkey patties as affected by housing system and cut-parts used on.

MATERIALS AND METHODS

Experimental Site

Turkeys were reared in the Turkey Unit of the Directorate of University Farms, Federal University of Agriculture, Abeokuta while patties production and analysis were carried out in the Animal Products and Processing Laboratory of the Department of Animal Production and Health of the same institution.

Ground patties preparation

A total of 200 four-weeks old poulters from local strain were divided into two different housing systems (deep litter and outdoor run) and fed commercial turkey starter *ad libitum* for 10 weeks. The birds were each subdivided into 10 replicates consisting of 10 birds per replicate. At the end of the trial, two birds per replicate were selected and slaughtered. The birds were bled completely followed by removal of skin. Fresh breast and thigh were collected and used as the raw material for patties production. Two hundred grams (200 g) of fresh breast and thigh, respectively from each replicate were processed into patties as described by Heinz and Hautzinger (2007). The meats were manually

cut into small pieces and minced using a food processor and seasonings (2.4 g Salt, 0.3 g black pepper, 0.06 g nutmeg, 0.1 g ginger and 0.06 g coriander) were added to the minced followed by mixing for 5 minutes. Afterwards, fat (10 g of butter) was added and mixed for another 10 min until they homogenized. The homogenous mixture (approximately 80 g) was transferred to a patty shaper, pressed and a round-shaped patty was obtained. The shaped patties were cooked to an internal temperature of 74° C in a microwave.

Data collection

1. Physicochemical analyses:

- pH Measurement: Ten (10) g of prepared patty samples were homogenized with 90 ml of distilled water (in the ratio of 1:9), using a laboratory blender for 1 min at low speed setting. Digital pH meter was used after standardizing it with two-buffer solutions; one in pH 7.0, and the other in pH 4.0. The pH of patties was obtained in the slurry with the direct insertion probe electrode of the pH meter.
- Chilling Loss (%) = $\frac{(\text{Weight of raw patty} - \text{Weight of chilled patty after 24 hours})}{\text{Weight of raw patty}} \times 100$
- Cooking loss (%) = $\frac{(\text{Weight of raw patty} - \text{Cooked Patty weight})}{\text{Weight of raw patty}} \times 100$
- Diameter shrinkage (%) = $\frac{(\text{Diameter of raw patty} - \text{Diameter of cooked patty})}{\text{Diameter of raw patty}} \times 100$

2. Sensory Evaluation:

A total of 20 untrained panellists, all of whom were college students' ages ranging 18 to 30 years and 60% of whom were male, evaluated the patties. Panellist were screened and trained accordingly. Hedonic testing was used to assess the consumer acceptance of patties from each treatment. The patties were cut into cubes (1.3 cm × 1.3 cm × cooked patties thickness) and panellists were instructed to taste patty samples from left to right and to take water between each sample. The serving order of patties was also rotated to reduce potential bias caused by positions. Panellists rated sensory attributes using hedonic scales based on a 9-point Likert scale for appearance (1 = extremely bumpy, 9 = extremely smooth), oiliness (1 = extremely dry, 9 = extremely oily), chewiness (1 = extremely chewy, 9 = extremely crumbly), flavour (1 = extremely bland, 9 = extremely tasty), and overall acceptability (1 = dislike extremely, 9 = like extremely).

Statistical Analysis

The data obtained were arranged in a 2 × 2 factorial were analyzed with Analysis of Variance (ANOVA) using the GLM procedure of statistical analysis software Minitab[®] version 17.1.0. Significant (p<0.05) differences among treatment means were determined using Tukey Test as contained in the Minitab[®] software.

RESULTS AND DISCUSSION

Though literature (Sogunle *et al.*, 2012; Damaziak *et al.*, 2013) has firmly established housing system as a major factor influencing physical and sensory properties of meat, this study observed housing system effect was negligible on physiochemical properties of ground turkey patties (Table 1). This could be due to the fact that raw meats that were obtained from turkey carcasses were processed into patties using similar degree of mincing to achieve similar particle size and structure. This corroborates the report of Fernández-López *et al.* (2000) that cutting and mincing of raw meat were particularly important processes that greatly tenderized the initial material thus leading to a homogenous final product. However, the effect of cut-part used significantly (p<0.05) affected all parameters measured. Ranges of values recorded for pH (6.45 – 6.74), cooking loss (25.06 – 28.85%), chilling loss (4.41 – 7.92%), and diameter shrinkage (11.77 – 14.58) revealed patties prepared from thigh was significantly (p<0.05) higher.

In Table 2, housing system effects on sensory analysis of ground turkey patties was not significant. However, the effect of cut-part significantly (p<0.05) affected all parameters measured except chewiness. The range of sensory scores; appearance (3.90 – 4.92), oiliness (4.28 – 6.20), flavour (5.53 – 6.23) and overall acceptability (5.48 - 6.65) were significantly (p<0.05) higher in breast patties. However, the score for oiliness was higher in thigh patties which could be traced to the fat content of the raw material used for patty production. Earlier studies (Huda *et al.*, 2011; Chen *et al.*, 2016)

reported higher fat content in the thigh of poultry when comparing with breast. Thus, indicating that a raw material with a high fat content will equally increase the oiliness of the final product. Furthermore, interaction between sex and muscle type significantly ($p < 0.05$) influenced patty appearance.

CONCLUSION AND RECOMMENDATION

From this study, breast patties had reduced oiliness score as well as better pH and overall acceptability. Therefore, the use of turkey breast as raw material for ground patties production was recommended.

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Table 1: Effects of housing system and cut-part used on physiochemical properties of ground turkey patties

Parameters		pH	Cooking loss (%)	Chilling loss (%)	Diameter shrinkage (%)
Housing system	Deep litter	6.58	26.00	6.75	13.80
	Outdoor run	6.62	27.92	5.57	12.54
Cut-part	Thigh	6.74 ^a	28.85 ^a	7.92 ^a	14.58 ^a
	Breast	6.45 ^b	25.06 ^b	4.41 ^b	11.77 ^b
SEM		0.03	0.75	1.05	0.65
		P value			
HS		0.302	0.083	0.436	0.179
CP		<0.0001	0.001	0.027	0.005
HS×CP		0.014	0.804	0.285	0.153

Means on the same column having different superscript differ significantly at $P < 0.05$.

HS = Housing system, CP = Cut-part

Table 2: Effects of housing system and cut-part used on sensory analysis of ground turkey patties

Parameters		Appearance	Oiliness	chewiness	Flavour	Overall acceptability
Housing system	Deep litter	4.50	5.20	4.08	5.97	6.12
	Outdoor run	4.32	5.28	4.37	5.80	6.02
Cut-part	Thigh	3.90 ^b	6.20 ^a	4.37	5.53 ^b	5.48 ^b
	Breast	4.92 ^a	4.28 ^b	4.08	6.23 ^a	6.65 ^a
SEM		0.25	0.20	0.26	0.21	0.22
P value						
HS		0.607	0.763	0.442	0.578	0.745
CP		0.005	<0.0001	0.442	0.021	<0.0001
HS×CP		0.963	0.366	0.514	0.739	0.194

Means on the same column having different superscript differ significantly at $P < 0.05$.

HS = Housing system, CP = Cut-part