Academic Journal of Life Sciences
ISSN(e): 2415-2137, ISSN(p): 2415-5217
Vol. 7, Issue. 1, pp: 14-16, 2021
URL: https://arpgweb.com/journal/journal/18
DOI: https://doi.org/10.32861/ajls.71.14.16

Academic Research Publishing Group

Original Research **Open Access**

Comparison of Selected Meat Qualities of Broiler Chickens as Affected by Feed Restriction and Strain at Finisher Phase

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Article History
Received: January 28, 2021
Revised: February 21, 2021
Accepted: February 27, 2021
Published: March 3, 2021

Abstract

The present investigation aimed at comparing meat qualities of broiler chickens reared on deep litter as affected by skip-a-day feed restriction and strain. A total number of two hundred and eighty eight (288) unsexed day-old broilers comprising of 96 chicks each of Arbor acre, Marshall and Hubbard strains of broiler chickens raised on intensive housing systems were used to evaluate the organoleptic attributes. The chicks were allotted randomly to 12 pens per strain. The birds were distributed into four treatments with three replicates per treatment. Organoleptic test was carried out using the breast muscle at the 8th week. The cuts were salted and kept inside labeled polythene bags and steamed to the temperature of 72^{0}C. A total of ten trained individuals aged between 20 and 30 years (males and females) were employed to assess the coded meat samples. Equal bite size from each treatment was coded, replicated thrice and served for evaluation by the trainees. Analyzed results revealed that the organoleptic parameters such as Aroma, flavor, tenderness, juiciness, texture and overall acceptability were not significantly affected by both the different feeding regimes and strains of broiler chickens.

Keywords: Strain; Organoleptic; Chicken; Feed restriction; Aroma.

1. Introduction

Poultry producers have over the years selected vigorously for lines of chicken that grow faster, convert feed more efficiently to produce more meat desirable and acceptable by all age groups since there is no taboos to its production and consumption in any society. Associated with these improvements are unintended negative effects such as overeating because of free access to feed which most often lead to obesity, various leg disorders, contact dermatitis, incidence of ascites, heart disease, impaired immune function and sudden death syndrome [1, 2]. Apart from the economic losses resulting from above-mentioned diseases, meat consumers are becoming increasingly conscious of the implications of high dietary fat as it relates to human health. Therefore, there is an increasing desire to purchase meat products which are low in fat. Excessive fat does not only reduce carcass yield and feed -efficiency but also it leads to difficulties in processing causing rejection of the meat by consumers.

To ameliorate these negative impacts and possibly reduce feed cost, several approaches both quantitative and qualitative feed restriction regimes have been employed [3, 4]. Feed restriction is a management tool designed to limit bird's access to feeds during a definite period of time which could either be quantitative or qualitative program [5]. There are divergent views as regards the response of different strains of broiler chickens to feed restriction. Farmers need to be guided in order to choose the best strain that will adapt to different feed restriction programs without compromising their meat qualities such as aroma, flavour, tenderness, juiciness, texture and overall acceptability.

The aim of the present study therefore, was to examine the meat qualities of different strains of broiler chickens as affected by feed restriction regimen

2. Materials and Methods

The study was carried out at Poultry Unit, Teaching and Research Farm, Faculty of Agricultural Sciences, Ekiti State University, Ado-Ekiti, Nigeria. Ado-Ekiti is situated entirely within the tropics. It is located between longitudes 40◦ 51' and 50◦ 451' east of the Greenwich meridian and latitudes 70◦ 151' and 80◦ 511' north of the Equator.

2.1. Management of the Experimental Birds

Two hundred and eighty eight (288) day old broiler chicks comprising 96 chicks each of Arbor Acre, Hubbard and Marshal were purchased from reputable hatcheries. The chicks were distributed randomly at the starter phase into 12 pens per strain, that is, four treatments with three replicates per treatment and 8 chicks per replicate. The experiment was a completely randomized design arranged in a 3×4 factorial design.

The four treatments are: **A**- full feeding, **B**-feed restricted (5th week, 29-35th day), **C**- feed restricted (6th week, 36-42nd day) and **D**- feed restricted group (7th week, 43-49th day). After each feed restriction regime the birds were restored to full feeding until the termination of the experiment on the 56th day. Commercial broiler starter feed containing 22% CP and 3000kcalkg^{-1} were given from 1 – 28 days while broiler finisher feed having 21% CP and 3100kcalkg^{-1} were offered from 29 to 56 days. Water was given *ad libitum.*

2.2. Data Collection

Organoleptic test was carried out using the breast muscle at the 8th week. The cuts were salted and kept inside labeled polythene bags and steamed to the temperature of 72^{0}C. A total of ten trained individuals aged between 20 and 30 years (males and females) were employed to assess the coded meat samples. Equal bite size from each treatment was coded, replicated thrice and served for evaluation by the trainees. This was carried out using a 9-point hedonic scale on the following parameters: aroma, colour, flavour, tenderness, juiciness, texture, saltiness and overall acceptability.

2.3. Statistical Analysis

Data obtained were subjected to analysis of variance (ANOVA) using SAS [6]. Duncan's Multiple Range test was used to separate differences among the means at (P=0.05).

The statistical model used was:

$\mathbf{Y_{ijk} = \mu + G_i + R_j + (GR)ij + \varepsilon_{ijk}}$

Y_{ijk} = observation on kth population, of ith strain and jth feed restriction

μ = common mean

G_i = fixed effect of strain (i=3)

R_j = fixed effect of feed restriction (j=4)

$(GR)_{ij}$= interaction

ε_{ijk} = error term

3. Results

Table 1 shows the effect of strain on organoleptic parameters of broiler chickens at 8th week. The result revealed that there was no significant (p>0.05) effect of strain of broilers on Aroma, flavor, tenderness, and juiciness, texture and overall acceptability. This implies that the three strains had similar mean values regardless of the treatment imposed on them.

Table-1. Least squares means showing the effect of strain on broilers organoleptics at week eight

Sensory values	ARBOR ACRE	HUBBARD	MARSHALL
Aroma	52.50 ±2.00	57.58 ±2.00	54.08 ±2.00
Flavour	56.50 ±2.16	59.42 ±2.16	56.83 ±2.16
Tenderness	56.17 ±2.44	56.17 ±2.44	58.17 ±2.44
Juiciness	58.00 ±2.07	57.67 ±2.07	58.33 ±2.07
Texture	60.42 ±2.62	61.83 ±2.62	61.33 ±2.62
Overall Acceptability	68.17 ±2.05	72.25 ±2.05	69.12 ±2.05

Means along rows with similar superscripts are not significantly different (p>0.05)

Table 2 presents the effect of feed restriction regimes on broilers meat quality at 8 weeks. The result revealed that there were no significant (p>0.05) effects of feed restriction regimes on aroma, flavor, tenderness, juiciness, texture and overall acceptability of the broiler chickens. The different feed restriction recorded similar mean values regardless of the strain of broilers.

Table-2. Least square means showing the effect of feed restriction on Broiler meat quality

Sensory values	Control *(ad libitum)*	5th Week Feed Restriction	6th Week Feed Restriction	7th Week Feed Restriction
Aroma	53.78 ±2.31	55.33 ±2.31	55.00 ±2.31	54.78 ±2.31
Flavour	57.89 ±2.50	56.78 ±2.50	57.67 ±2.50	58.00 ±2.50
Tenderness	56.44 ±2.82	58.11 ±2.82	55.89 ±2.82	56.89 ±2.82
Juiciness	58.11 ±2.39	56.44 ±2.39	58.33 ±2.39	59.11 ±2.39
Texture	61.44 ±3.02	60.33 ±3.02	60.44 ±3.02	62.55 ±3.02
Overall Acceptability	71.67 ±2.36	68.67 ±2.36	70.33 ±2.36	68.78 ±2.36

Means with no superscripts along rows are not significantly different (p>0.05)

4. Discussion

In the present study, the organoleptic parameters such as Aroma, flavor, tenderness, juiciness, texture and overall acceptability were not significantly affected by the different strains of broiler chickens at week eight implying that strain had no effect on the meat qualities of broiler chickens. This result was in accordance with the findings of Zollitsch, *et al.* [7] who reported no significant effect in various characteristics of subjective quality traits of breast meat. However, it contradicts the report of Choo, *et al.* [8] who concluded that meat quality differs among breeds of chicken. In addition, different feed restriction regimes had no effect on all the meat qualities in this study. This was in agreement with the findings of Butzen, *et al.* [9] who reported that meat quality evaluated were not affected by the feed restriction programs.

5. Conclusion

The present study indicates that all the three strains recorded similar mean values in all the organoleptic parameters regardless of feeding restriction employed. In addition, the different feed restriction regimen produced similar mean values regardless of the strain of broiler chickens. Therefore, any of the strains and feeding regimes could be adopted for desired organoleptic properties.

Acknowledgements

The authors appreciate the staff and management of Ekiti State University, Teaching and Research Farm for their support during the course of this study.

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