

ASSESSMENT OF CARCASS CHARACTERISTICS AND ORGAN WEIGHTS OF FINISHED BROILER CHICKENS FED UREA PLUS METHIONINE TREATED AND FERMENTED SORGHUM BEER RESIDUE

*[†]Ndams, S. S[†], Sekoni, A.A[§] Duru, S[¶] and Olugbemi, T.S[¶]

[†]Division of Agricultural Colleges, CAAS/A.B.U. Mando Kaduna, Nigeria

[¶]Department of Animal Science, Ahmadu Bello University Zaria, Nigeria

[§]National Animal Production Research Institute, Shika, A.B.U. Zaria, Nigeria

*Corresponding Author's Email: Samuel_ndams@yahoo.com; Tel: +234 808 618 3938

ABSTRACT

The carcass yield and Organ weights of finished broiler chickens fed urea plus methionine supplemented and re- fermented sorghum beer Residue (RSBR) were investigated after a 4-week finisher period. At the end of the finisher phase, three birds from each pen were selected for carcass analysis. The dressing percentage of birds on 50% RSBR diet was significantly higher ($P < 0.05$) than those on control and other diets. The breast weight percentage for birds on the control was observed to be highest significantly ($P < 0.05$) while that for birds on 100% RSBR diet to be the lowest significantly ($P < 0.05$). The thigh percentage of birds on control and 50% RSBR diets were similar but significantly ($P < 0.05$) higher than those of birds on other diets. Heart and gizzard percentages of birds on 100% RSBR diet were significantly higher ($P < 0.05$) than those on control and other diets. This study indicates that up to 75% RSBR can adequately support carcass yield and organ weights without detrimental effect on finisher broiler chickens.

Key word: Broilers, re-fermented sorghum beer residue, Carcass yield, Organ weights, fermentation.

INTRODUCTION

Today, broiler chicken production is among one of the fastest means of producing animal protein because of their short generation interval (Babatunde, 1980). However, the cost of production of broiler products has remained high due to high cost of feed. The feed deficit situation is further compounded with the advent of Covid-19 pandemic that has impacted negatively to national economies. Groundnut cake (GNC) has been used as a protein supplement in broiler diets but its price has continued to increase in our markets (Isekweni, *et al.*, 2008). Sorghum beer residue (SBR) is a possible alternative to groundnut cake (GNC) because of its nutritional qualities that are comparable to GNC. SBR is cheap and readily available and contributes to the protein, amino acids and energy content of formulated feeds. The need to further recycle SBR through the process of fermentation in order to reduce its fibre content, obtain a high protein biomass and interesting amino acid composition by treatment with urea-nitrogen and methionine (sulfur) is imperative. Urea and Methionine have been recommended for use as sources of nitrogen and sulfur for ruminant animals respectively by Loest *et al.* (2001). Therefore, the objective of this study was to subject SBR into a second stage fermentation after pretreatment with urea grade fertilizer plus methionine and the assessment of its dietary effects on carcass yield and organ weights when fed to finisher chickens.

MATERIALS AND METHODS

Fermentation of sorghum beer residue for On-farm feeding.

The inoculation of sorghum beer residue prior to fermentation was carried out as described by Ndams *et al.* (2011). SBR was moistened with water at a ratio of 1:5 (w/w). SBR was treated with urea and methionine concentrations at a ratio of 1.5: 0.37 % (Ndams, 2009). The quantities of methionine, urea, SBR, water and inoculum used and the process of fermentation carried out was as described by Ndams, (2015). The fermented product (RSBR) was sundried for 7days on concrete floor and samples taken for proximate analysis according to AOAC (2000) procedures at the Department of Animal Science, A.B.U. Zaria.

Feeding Trial/ Broiler finisher phase (4 weeks)

The carcass yield and organ weights were evaluated after a 4-weeks feeding trial where urea plus methionine supplemented and fermented SBR (as a test ingredient) was used to replace groundnut cake (GNC) at 0, 25, 50, 75 and 100% levels on protein equivalent basis during the finisher phases. The ingredient composition of the broiler finisher diet used is shown in Tables 1.

Table 1: Ingredient composition (%) of broiler finisher diets containing replacement levels of urea plus methionine supplemented and fermented sorghum beer residue (4-8 weeks)

Ingredient (%)	Levels of RSBR inclusion (%)				
	0	25	50	75	100
Maize	48.00	43.85	42.50	42.40	40.11
Maize offal	10.00	10.00	10.00	10.00	10.00
RSBR	0.00	7.90	18.05	24.30	36.39
GNC	32.40	25.90	17.00	10.85	0.00
Fishmeal	3.80	3.80	3.80	3.80	3.80
Bone meal	2.50	2.50	2.50	2.50	2.50
Limestone	0.40	0.40	0.40	0.40	0.40
Palm oil	1.82	4.50	4.50	4.50	5.55
Lysine	0.40	0.40	0.40	0.40	0.40
Methionine	0.25	0.25	0.25	0.25	0.25
¹ Vit/Min Premix	0.30	0.30	0.30	0.30	0.30
Salt	0.30	0.30	0.30	0.30	0.30
Total	100.00	100.00	100.00	100.00	100.00

Calculated nutrients

ME.kcal/kg	2948.09	3027.18	2963.91	2947.09	2945.31
CP (%)	20.53	20.52	20.47	20.46	20.50
EE (%)	5.49	4.86	4.13	3.66	2.76
CF (%)	4.32	5.21	5.61	6.16	7.12
Ca (%)	1.28	1.29	1.30	1.31	1.32
Avail.P(%)	0.88	0.87	0.87	0.86	0.86
Lysine(%)	1.23	1.18	1.17	1.15	1.20
Met. + Cyst. (%)	0.83	0.91	1.01	1.05	1.16
Cost ₦/kg	103.62	103.61	96.91	92.72	86.89

¹Vitamin/ mineral premix (Animal Care.Optimix^R) Each 1.25kg supplied: Vit A 12,000,000 I.U; D₃ 3000,000 I.U; Vit. K 2500mg; B₁, 200mg; B₂ 500mg; B₆ 3,500mg; Niacin 40,00mg; B₁₂ 20mg; Pantothenic acid 10mg; Folic acid 1,000mg; Biotin 80mg; Choline chloride 200,000gm; Anti oxidant 125,000mg; Manganese 70,000gm; Iron 40,000gm; Copper 8000mg; Iodine 1,200mg; Selenium 250mg; Cobalt 250mg.

At the end of the broiler finisher phase (4-weeks), three birds from each pen whose weights were equal or close to the mean weight of the birds in the pen were selected. The sampled birds were sacrifice for carcass analysis. They were slaughtered, de-feathered and eviscerated. The breast,

thigh, back, neck, wings, legs, head, liver, heart, gizzard, pancreas and the abdominal fat were weighed and expressed as percentages of the live weights.

Data analysis

Data collected were subjected to Analysis of variance procedure. (ANOVA-Single factor) using “Analyse-it” for Microsoft Excel (3.03) Standard. Significant means were separated using the Duncan Multiple Range Test (Duncan, 1995) taking $P < 0.05$ as significance level

RESULTS

Carcass Characteristics and Organ weights of finished birds

Table 2 shows the result of carcass analysis and the organ weights of the experimental birds. There were no significant differences ($P > 0.05$) in dressing percentage, among birds on 0 and 25% RSBR diets and also among birds on 75 and 100% RSBR diets.

Table 2: Carcass characteristics and organ weights of finished broiler chickens fed urea plus methionine supplemented and fermented SBR in diets (4-8 weeks)

Parameter	Levels of RSBR inclusion (%)					SEM
	0	25	50	75	100	
Final live weight (g/bird)	2803.33 ^a	2723.33 ^a	2823.33 ^a	2436.67 ^b	1766.67 ^c	193.34
Dressing %	80.3 ^b	80.17 ^b	82.05 ^a	77.99 ^c	77.36 ^c	0.85
Breast weight (%)	25.03 ^a	22.16 ^c	23.62 ^b	20.48 ^d	19.15 ^e	1.05
Thigh weight (%)	23.25 ^a	21 ^b	23.93 ^a	20.2 ^b	14.57 ^c	1.66
Back weight (%)	14.86 ^b	14.69 ^b	13.64 ^d	14.23 ^c	15.28 ^a	0.28
Wings (%)	7.49 ^c	8.51 ^a	7.02 ^d	8.14 ^b	8.77 ^a	0.32
<u>Organs</u>						
Liver (%)	2.32 ^c	2.63 ^a	2.36 ^c	2.6 ^a	2.55 ^b	0.06
Gizzard (%)	2.32 ^c	2.26 ^c	2.3 ^c	2.6 ^b	2.92 ^a	0.13
Heart (%)	0.48 ^c	0.49 ^c	0.47 ^c	0.55 ^b	0.66 ^a	0.04
Abdominal fat (%)	2.32 ^a	1.53 ^c	2.42 ^a	1.85 ^b	1.79 ^b	0.17
Intestinal length (cm)	216 ^c	227.67 ^b	229.67 ^b	263.33 ^a	211.33 ^c	9.11

^{a,b,c,d} Means within rows with different superscripts differ significantly ($P < 0.05$)

The breast weight percentage for birds on the control was observed to be highest significantly ($P < 0.05$) while that for birds on 100% RSBR diet to be the lowest significantly ($P < 0.05$). The thigh percentage of birds on control and 50% RSBR diets were similar but significantly ($P < 0.05$) higher than those of birds on other diets. The percentage back of birds on 100% RSBR diet was the highest significantly ($P < 0.05$) compared to those of birds on other diets. The percentages for wings of birds on the 25 and 100% RSBR diets were similar and the highest ($P < 0.05$) compared to those of birds on control and other RSBR diets. The percentage liver of birds on 25 and 75% RSBR diets were similar ($P > 0.05$) but significantly ($P < 0.05$) higher than those on 0, 50 and 100% RSBR diets. The percentage liver of birds on 0 and 50% RSBR diets were similar ($P > 0.05$) but significantly ($P < 0.05$) lower compared to those on 100% RSBR diet.

The gizzard and heart percentages for birds on 0, 25, and 50% RSBR diets were similar but significantly ($P < 0.05$) lower than those for birds on 75 and 100% RSBR diets. The intestinal length for birds on 75% RSBR diet was the highest ($P < 0.05$) while the intestinal length of birds on 25 and 50% RSBR diets were similar ($P > 0.05$) but significantly ($P < 0.05$) higher than those on control and 100% RSBR diets which were similar ($P > 0.05$). The intestinal length for birds on 75% RSBR diet was the highest ($P < 0.05$) while the intestinal length of birds on 25 and 50% RSBR diets were similar ($P > 0.05$) but significantly ($P < 0.05$) higher than those on control and 100% RSBR diets which were similar ($P > 0.05$).

DISCUSSION

The carcass weight in relation to the live weights (dressing percentage) of birds on all diets except those on 100% RSBR diets were comparable to the standard (80%) for broilers at marketing (Barry, 2006). The

percentage breast of birds was observed to be depressed on RSBR supplemented diets compared to those on control. This findings is in agreement with that previously observed by Ndams *et al.* (2009). Birds on 25, 75 and 100% RSBR diets had significantly lower percentage thigh compared to those on control and 50% RSBR diets. This observation is in agreement with the findings of Lemme and Petri (2002) who reported a decrease in percentage thigh with higher dietary levels of lysine in wheat diets as well as Ndams *et al.* (2009) who reported a decrease in percentage thigh with increased dietary supplementation of amino acid and enzymes in re-fermented brewers' dried grains (RBDG) diets.

CONCLUSION

In conclusion, the results of this study indicates that up to 75% urea plus methionine RSBR can adequately support carcass yield and organ weights without detrimental effect to finisher broiler chickens.

RECOMMENDATION

75% urea plus methionine RSBR can be fed as a protein source in place of groundnut cake to finishing broiler chickens for adequate carcass yield and organ weights without detrimental effect.

REFERENCES

- Association of Official analytical Chemists (2000). Official methods of analysis, 15th ed. AOAC, Arlington, Virginia, U.S.A, Pp. 12-98.
- Babatunde, G. M. (1980). Role of Nigerian poultry industry in protein; bridging the animal protein gaps. Inaugural lecture, University of Ibadan, Ibadan Nigeria.
- Barry, S. (2006). The Farming Handbook, ACTA. Sharing knowledge, improving rural livelihoods. University of KwaZulu-Natal Press. 431pp
- Duncan, D.B. (1995). New Multiple Range and Multiple F-Test. *Biometrics* 11: 1-42
- Isikwenu, J.O., Apkodiete, O.J. and Bratte, L. (2007). The effect of Urea-Treated and Fermented Brewer's Dried Grains Diets on performance in Broilers: A Preliminary Study. *Tropical Journal of animal Science*.10: (1- 2) 253-357
- Lemme, A and Petri, A. (2002). Economic determination of optimum amino acids levels essential in compound feed formulation. *Feedstuffs* (Special report). May 20, 2002: 24-26.
- Loest, C. A., Titgemeyer, E. C., Drouillard, J. S. Lambert, B. D. and Trater, A. M. (2001). Urea and biuret as non-protein nitrogen sources in cooked molasses blocks for steers fed prairie hay. *Animal Feed Science Technology*. 94:115.
- Ndams, S. S., Tegbe, T.S.B., Ogundipe, S.O. (2009). Effect of feeding Graded levels of Re-fermented brewers' Dried Grains on performance and Carcass Characteristic of Broiler Chickens. *Journal of Applied Agricultural Research*. 1:37-45
- Ndams, S. S., Tegbe, T.S.B., Ogundipe, S.O. and Sheyin, Z. (2011). Determination of the optimum inoculums concentration and fermentation period and their effect on nutrient composition of Brewers dried grains. *Science World Journal*.6 (1): 13-19