REPLACING MAIZE WITH CASSAVA FEELS IN FINISHER RATION OF COCKERELS. THE EFFECTS ON CUT-UP PIECES OF THE EVISCERATED CARCASS

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ABSTRACT

The effects of partial replacement of maize with graded levels of sundried cassava peels in the finisher ration of cockerels on the yields of various cut-up pieces of eviscerated carcass were determined in a 7-week study using 2,835 13-week old cockerels of Isa White breed. Seven finisher rations containing 0, 5, 10, 15, 20, 25 and 30% sundried peels were respectively given to a group of 405 cockerels. The results showed that the birds fed 25 and 30% cassava peels rations had the least response in terms of body weight and eviscerated weight. The proportions of head, shank and viscera were significantly higher in the cockerels fed these rations than those fed with lower grades. This indicates that 25 and 30% cassava peel rations induced the development of inedible offals at the expense of edible meat. Finisher ration containing 20% cassava peels supplied the optimum nutrients for optimum performance in terms of eviscerated yield, growth, body weight and feed conversion efficiency beyond which these parameters started to decline. The results also showed that the low cost of production of cockerels fed rations of highest level of cassava peels (30%) overcompensated for the drop in their performance. Including 20% cassava peels in the cockerel finisher ration for optimum edible meat yield and 30% cassava peels for potential economic gain is therefore recommended.

Key Words:- Cockerel, Carcass, cassava peels, finisher ration

INTRODUCTION

Carcass composition relates to the relative proportions of lean, fat and bone. Therefore a carcass of high quality is in most cases regarded as one with a large amount of muscle and small amounts of bone and fat (Devendra and Fuller, 1979).

The proportion of dressed weight to live body weight is often used as a measure of meat production in farm animals although eviscerated poultry carcasses are not completely comparable with the dressed carcasses of other kinds

of livestock (McNally and Spicknall, 1948; Brown and Bean, 1952). A study of the relationship between eviscerated carcass weight and body weight may be of help in the evaluation of meat production.

The relative weights of body parts:- legs (thigh + drumstick), breast, wings, back and neck have received much attention in the recent past. Harshaw (1943) found that the percentage of drawn breast and drumstick tended to increase and weight of giblets (liver + heart + gizzard) decrease as the weight of the carcass increased. Hayse and Marion (1973) however found that the weight of the gizzard and breast did not follow this pattern reported by Harshaw (1943) though the other body parts increased with increase in body parts.

Cassava peel has not received much research attention when compared with other by-products such as rice bran, brewers grain, wheat offals and distillers yeast. While cassava peel supplies energy it also has the advantage of low cost and ready availability. Cassava peels, which is slightly richer in crude protein (2-3%) than the edible portion of cassava (1-2%) (Oyenuga, 1968), could partially or wholly replace maize grains if adequately furnished with protein sources. This trial thus examines the effects of graded levels of cassava peels as a component of finisher rations on yields of carcass of cockerels.

MATERIALS AND METHODS

This experiment was carried out in the poultry section of Teaching and Research Farm Complex, Oyo State College of Education, Ila-Orangun, Nigeria (08°0'N, 04°54'E) between June and October, 1989.

Management of the birds

Five thousand day-old cockerel chicks of Isa White Breed, purchased at Amo Farm Enterprises, Awe, Oyo, Nigeria, were brooded with electricity as the heating medium (200 watts/100 chicks) on deep litter floor using flat feeder and shallow drinker for the first four weeks of age to supply feed and water, respectively.

TABLE 1: PERCENTAGE COMPOSITION OF EXPERIMENTAL FINISHER RATIONS

Ingredients	T R E A T M E N T S						
	A	B	C	D	E	F	G
Maize grains	63.00	57.60	52.27	47.02	41.83	36.72	31.67
Cassava peels	0.00	4.97	9.86	14.69	19.46	24.15	28.79
G N C	27.70	28.18	28.70	29.19	29.65	30.15	30.61
Fish Meal	2.00	1.99	1.97	1.95	1.95	1.93	1.92
Blood Meal	2.00	1.99	1.97	1.96	1.95	1.93	1.92
Vit-Min Premix	0.30	0.30	0.30	0.29	0.29	0.29	0.29
Palm oil	2.30	2.28	2.27	2.25	2.24	2.22	2.21
Rice Bran	0.40	0.40	0.39	0.39	0.39	0.39	0.38
Common salt	0.30	0.30	0.30	0.29	0.29	0.29	0.29
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Calculated							
M.E. (Kcal/kg)	2951.00	2971.00	2990.00	3008.00	3027.00	3045.00	3063.00
Calculated							
C.P. (%)	19.80	19.87	19.42	19.32	19.23	19.14	19.10

The chicks were fed chicks mash purchased from Ladokun Feed Limited, Ibadan for the first seven weeks and water was supplied *ad libitum*. At seven weeks old, the birds were placed on growers mash for 6 weeks bringing them to 13 weeks old. During the brooding stage, the chicks were given all recommended vaccinations against Newcastle, Coccidiosis, Gumboro and Fowl pox diseases.

Experimental rations preparation

The experimental finisher rations used were as shown on Table 1. All ingredients except cassava peels were purchased from Hope Farm Enterprises, Ibadan. The wet cassava peels had earlier been properly sundried before milling. Diet compositions were made to be isocaloric and isonitrogenous. The crude protein and metabolizable energy content of the rations were calculated using the values of Fox and Ray (1980), Fetuga and Tewe (1985) and Devendra and Fuller (1979).

Experimental period

Two thousand eight hundred and thirty five (2,835) 13-week old cockerels were randomly selected from the existing 5,000 used for this experiment. The 2,835 cockerels were divided into seven treatment groups of 405 cockerels per group. There were nine replicates per treatment

with 45 cockerels making up a replicate. Each replicate was kept on deep litter changed every six weeks.

The control group (A) contained 0% cassava peels while others (B-G) contain 5, 10, 15, 20, 25 and 30% cassava peels, respectively. All the treatments were run concurrently for seven weeks excluding one week adjustment period. Water was offered *ad libitum* while feeds were supplied at the rate of 140 gm per fowl once daily. The birds were carefully observed every morning for any ailment resulting from treatment effect or management error. Every morning, the drinkers and feeders were cleaned and replaced with fresh water and feed, respectively. The stale feeds after

Slaughtering and Dressing

Five cockerels randomly selected from each replicate were kept off from feed for 12 hours before slaughtering. Each bird was killed by slashing the throat, bled and the feathers removed manually after scalding in warm water. It was weighed to obtain the dressed weight and then clean dressed to obtain eviscerated weight and cut-up pieces as described by (Oluymi and Roberts, (1979). The percentage of the cut parts were calculated in relation to the respective eviscerated weights.

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TABLE 2: AVERAGE BODY WEIGHT, GROWTH RATE, FEED CONVERSION EFFICIENCY, COST OF PRODUCTION, SELLING PRICE AND PROFIT PER KILOGRAMME LIVE WEIGHT

Parameters	TREATMENTS						
	A	B	C	D	E	F	G
% Cassava peels:	0	5	10	15	20	25	30
Total feed consumed per treatment (kg)	1808.45	1803.23	1814.61	1750.65	1888.47	1865.98	1878.40
Average feed consumption per fowl per day (gm)	106.317	106.010	106.679	102.919	111.021	109.699	110.429
Average body weight per fowl (kg)	1.806	1.891	1.804	1.888	1.929	1.756	1.752
Average growth rate/ fowl/day (gm)	12.90	13.51	12.89	13.49	13.78	12.54	12.51
Average feed conversion efficiency	4.43	4.24	4.27	4.12	3.97	4.77	4.80
Cost of maize used (N)	1772.1	1631.25	1490.85	1370.7	1209.6	1069.85	928.35
Cost of Cassava peels used (N)	0	70.2	140.85	211.05	281.25	351.45	422.1
Cost of GNC used (N)	759.6	775.35	796.05	815.4	836.1	856.8	877.05
Cost of other ingredients (N)	3428.1	3428.1	3428.1	3428.1	3428.1	3428.1	3428.1
Reduction in the cost of ingredients used (N)	-	54.9	103.95	134.55	204.75	255.6	304.2
Reduction in the cost of production (%)	-	2.17	4.11	5.32	8.39	10.10	12.02
Average cost of production/fowl (N)	14.72	14.58	14.45	14.38	14.21	14.04	13.96
Average cost of production per kg live weight (N)	9.50	9.06	9.44	9.72	9.35	9.24	7.60
Average selling price per kg live weight (N)	21.20	22.00	20.00	20.13	20.70	20.70	22.90
Average profit/kg live weight (N)	11.70	12.94	10.56	10.41	11.35	11.46	15.27

TABLE 3: BODY PARTS AS PERCENTAGE OF EVISCERATED WEIGHT.

PARAMETERS	TREATMENTS						
	A	B	C	D	E	F	G
% Cassava Peels	0	5	10	15	20	25	30
Eviscerated Weight	1.26	1.33 ^a	1.25	1.36 ^a	1.41 ^a	1.23	1.18
% Eviscerated Yield	69.77	70.33	69.29	72.03	70.09	70.05	67.35
Breast	17.26	21.62	21.00	19.30	16.34	22.36	20.97
Wing	11.90	13.16	11.00	10.03	10.64	13.21	11.65
Neck	9.72	9.21	10.00	7.17	7.98	10.37	10.59
Thigh	14.88	15.79	18.00 ^b	15.07	18.50 ^b	15.18	16.95
Drum Stick	13.49	14.10	15.00	12.87	13.30	14.23	16.10
Back	19.84	17.86	19.00	15.44	15.96	20.33	20.13
Giblet	6.94	6.58	7.00	7.17	6.03	8.13	8.47
Head	4.77	5.26	5.00	5.20	5.33	6.50 ^b	6.36 ^b
Shank	6.35	5.64	5.00	6.80	5.32	7.32 ^a	8.47 ^a
Viscera	19.84	22.78	23.00	22.06	19.50	27.44 ^b	23.31
Fat around Cloaca	1.43	2.37	1.39	2.10	2.81	1.95	1.43

a = Significantly at $P < 0.01$

b = Significantly at $P < 0.05$

The total costs of maize grains, cassava peels, groundnut cake and other ingredients were respectively calculated. The average cost of production per fowl as well as cost of production, selling price and profit per kilogramme live weight were also computed for each treatment from the sale of 45 cockerels per treatment.

The parameters of the cockerels and costs computations are presented in Tables 2 and 3.

Statistical Analysis

The experiment was of a completely randomised design (Steel and Torrie, 1960) Duncan Multiple Range Test (Duncan, 1955) at the 1% and 5% levels of significance were used whenever treatment differences were obtained.

RESULTS AND DISCUSSION

Carcass evaluation

The total feed consumed, average feed consumption, body weight, growth rate and feed conversion efficiency per bird varied as the level of cassava peels increase in the rations. The differences were however, not statistically significant. Birds on 20% cassava peels diet responded better in terms of average feed consumption, body weight, growth rate and feed ef

iciency when compared with the other treatments even including maize-based treatment (control). It is observed that beyond 20% cassava peels inclusion in the diets, the average response of the treated birds in terms of average body weight, growth rate and feed efficiency started to decline in values, whereas the feed consumption still remained higher in the 25 and 30% cassava peels rations. In fact, the 30% cassava peels diet resulted in the least body weight (97.01% of control, slowest growth rate (4.17% slower than control) and poorest feed conversion efficiency (9.12% poorer than the control) in the cockerels.

In Table 3, the percentage eviscerated yield (as percent of average live weight) varied in all the treatments. The least percentage eviscerated yield was exhibited by the fowls fed 30% cassava peels ration, followed by the 10% cassava peel ration and the control (69.29 and 69.77%, respectively). The highest percentage eviscerated yield was obtained with the fowls fed 20% cassava peels diet. This was followed by 15% and 5% cassava peels based rations, respectively. The range of percentage eviscerated yields obtained in this study fall perfectly within the range observed by Jaap *et al* (1950), Essary *et al* (1951) and Hathaway *et al* (1953) who reported eviscerated yields ranging from 65-

75% of liveweight. In addition, statistically significant differences ($P < 0.05$) were observed in eviscerated weight, weights of thigh, head, shank and viscera while the differences were significant in the average weights of breast, wing, neck, drumstick, back, giblet and fat around cloaca (Table 3). The cockerels on 5, 15 and 20% cassava based rations performed significantly ($P < 0.01$) better in terms of eviscerated weight than the rest including control. This observation is similar to that reported in broilers by Ayorinde (1982) who observed that the eviscerated weight of the broilers fed dried unpeeled sweet potato rations differed significantly from that of the control. It appears that the 20% cassava peels ration contained the optimum nutrients for maximum production of edible meat in the cockerels while the development of shank head and viscera were more favoured by 25 to 30% cassava peels based rations. In addition, the proportions of giblet appeared to decrease as the eviscerated weight increase which supports the finding of Harshaw (1943). The range of yields of breast, thighs, wings back and giblet as percentage of eviscerated yield in this study is similar to the observation of Hayse and Marion (1973).

Economy of production

The average cost of production per kilogramme body weight was computed from the costs of the chicks, feed components, drugs and transportation. It appears that the variations in the cost are brought about by the variations in the cost of maize, cassava peels and groundnut cake (GNC) components of the rations, while the cost of other ingredients plus milling was constant (Table 2). It is observed that the higher the level of cassava peels in the rations, the lower the cost of feed while, on the average, the higher the feed consumed the higher the cost of production.

From Table 2, the incorporation of 5, 10, 15, 20, 25 and 30% cassava peels in the finisher rations of cockerels reduced the cost of maize needed by 2.17%, 4.11%, 5.32%, 8.09%, 10.10% and 12.02%, respectively. The least cost of production per kilogramme live weight was obtained with 30% cassava peels diet. The cockerels on this ration were the most profitable and cheapest to produce because the cost was minimised. It can be stated that the incorporation of cassava peels in the rations of cockerels has kept the cost of production low (Philips, 1974). However, the average selling price per kilogramme live weight arrived at in this study (N21.38) is much higher than the report of a survey by Idemudia (1988) although he did not state

the time of costing and the average cost of production, but observed that while one kilogramme broiler was sold for N6.50, that of full grown cockerel was sold for N8.00 per kilogramme on the average in Lagos, Benin and Onitsha. The large difference in the selling price could be due to, among other factors, an increasing inflationary trend in the country, different years the experiments were carried out, price fluctuations and seasonal demands especially during festive occasions.

It appears that the low cost of production per fowl over-compensated for the drop in liveweight gain exhibited by the 25 and 30% cassava peels fed birds. Since the utilization of cassava peels has not got competition from other sectors like human or industrial, it can reasonably be concluded that its inclusion in poultry feeds will reduce the cost of production.

In conclusion, it appears that up to 20% cassava peels can be included in the ration of cockerels for maximum development of eviscerated weight which is the major product of interest to poultry meat consumers.

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REFERENCES

- AHMED, I. M. 1973. Potential fodder and tuber yields of two varieties of tapioca, Malay Agric. J. 5: 33
- AYORINDE, K. L. 1982. Replacement of maize with graded levels of sundried unpeeled raw sweet potato (*Ipomea batatas* Poir) in the diets of broiler. M.Sc. Thesis. Animal Science Dept. University of Ibadan. pg. 22 - 32.
- BROWN, P. B. and BEAN, H. W. 1952. The yield of edible meat from different market classes of chickens. *Poult Sci.* 31: 232 - 234.
- CREWELL, D. C. 1978. Cassava (*Manihot esculenta* Crantz) as feed for pigs and poultry - A review. *Trop. Agric. (Trinidad)* 55(3) 273 - 281.

- DEVENDRA, C. and FULLER, M. F. 1979. Pig production in the tropics. Oxford University Press. pgs 114: 128 - 130.
- DUNCAN, D. B. 1955. Multiple Range and Multiple F - tests. *Biometrics*. 11: 1 - 42.
- ENRIQUEZ, F. Q. and ROSS, E. 1967. Value of cassava root meal for chicks. *Poult Sci*. 46: 621 - 626.
- ESSARY, F. O, MOUNTNEY, S. J. and GOFF, O. E. 1951. Conformation and performance in standard breed and crossbred broilers. *Poult. Sci*. 30: 552 - 557.
- FETUGA, B. L. and TEWE, O. O. 1985. Potentials of Agro-industrial by-products and crop residues as animal feeds. *Nigerian Journal* 3: 136 - 141.
- FOX, S. and FELTWELL, R. 1985. Practical Poultry Feeding. Faber and Faber New York, pg 239 - 283.
- HARSHAW, H. M. 1943. Weights of parts and percentage edible meat obtained from cut-up chickens. *U.S. Egg Poult. Mag*. 49: 405 - 407.
- HATHAWAY, H. E., CHAMPAGNE, W. B., WATTS, A. B. and UPP, C. W. 1953. Meat yield of broilers of different breeds strains and crosses. *Poult Sci*. 32: 968 - 977.
- HAYSE, P. L. and MARION, W. M. 1973. Eviscerated yield, component parts and meat, skin and bone ratios in the chicken broilers. *Poult. Sci*. 52: 718 - 722.
- IDEMUDIA, I. A. 1988. Protein utilization in cockerels fed cassava peel-based rations. B.Sc. Thesis. Animal Science Dept., University of Ibadan pg. 12 - 13.
- JAAP, R. G. RENARD, M. M. and BUCKINGHAM, R. B. 1950. Dressed and eviscerated meat yields from chickens at 12 weeks of age. *Poult. Sci*. 29: 874 - 880.
- McNALLY, E. H. and SPICKNALL, N. H. 1948. Meat yield from live, dressed and eviscerated RIR males of broilers, fryers and light roaster. *Poult. Sci*. 28: 562 - 567.
- OLSON, D. W., SUNDE, M. L. and BIRD, H. R. 1969. The metabolizable energy content and feeding value of mandioca meal in diets for chicks. *Poult. Sci*. 48: 145 - 1452.
- OLUYEMI, J. A. and ROBERTS, F. A. 1979. *Poultry production in warm wet climates*. 1st Ed. The Macmillan Press Ltd. London pg. 75 - 99, 135 - 139 and 162 - 166.
- OYENUGA, V. A. 1968. *Nigeria's Feeds and Feeding Stuffs - Their chemistry and Nutritive value*. Ibadan University Press pg. 20 - 27.
- PHILIPS, T. A. 1974. Cassava utilization and potential market. *Int. Devpt. Res. Centre*. Canada. pg. 20 - 22.
- STEEL, R. D. and TORRIE, J. H. 1960. *Principles and Procedures of Statistice*. 1st Ed. McGraw Hill, New York.