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Cost and Return Analysis of Broiler Chickens Fed on Processed Graded Levels of Ginger (*Zingiber officinale*) and Garlic (*Allium Sativum*) Mixture

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Abstract
An experiment to assess the growth performance and organoleptic qualities of broiler chickens fed and raised with varying levels of ginger and garlic mixture was conducted in the Poultry Unit and Meat science and Technology Laboratory of the Department of Animal Science, Ambrose Alli University, Ekpoma, Edo State. A total of 120 day old (Anak 2000) broiler chickens were used for the experiment. Forty chicks were randomly selected to each of the four treatment diets with diet 1 being the control and diet 2 contained 1% ginger and garlic mixture, diet 3 contained 1.5% ginger and garlic mixture while diet 4 contained 2% ginger and garlic mixture. Each treatment group contained three replicate with ten birds per replicate and were assigned to the four treatment diets in a Completely Randomized Design (CRD). At the starter phase, cost of feed consumed and cost of feed per kilogram weight gain were lowest among birds fed the ₦180.00 and ₦133.54 while at finisher phase, least cost of feed consumed and cost of feed per kilogram weight gain of ₦399.01 and ₦349.96 from those fed the control. Total cost of production ₦1,365.24 was highest among those fed diet 4 and lowest ₦1,044.00. Total revenue was highest N3100.00 among broilers that ate 2% ginger and garlic mixture and lowest ₦2, 820.00 from those fed 1% ginger and garlic mixture. However, net profit of ₦1793.00 was realized from the broiler chickens placed on 1.5% ginger and garlic mixture and lowest ₦1666.00 from those on the control. In conclusion, considering the effects of different levels of ginger and garlic mixture on the cost and returns of broiler chickens, it appears that 1.5% GGM gave the best profit margin and should be used for broiler chickens at starter and finisher phase for better returns.

Keywords: Broiler chickens, ginger, garlic, *Zingiber officinale, Allium sativum*

Introduction

The importance of animal protein in the diet of man has necessitated the need to seek for cheap and affordable alternative sources of feed ingredients in developing countries in order to provide meat at a moderate price. Poultry production, especially broiler chicken remains one of the veritable ways of achieving sustainable and rapid production of quality protein to meet the increasing national protein demand (Apata and Ojo, 2000; Akinmutimi and Okwu, 2006). The competition between man and livestock for foods such as cereals is partially responsible for the high cost of feeds with the attendant increase in the price of animal products such as meat, eggs and milk. This challenge has led to research into the use of non-conventional feed ingredients in the feeding of domestic animals. The focus of research in recent times has been the utilization of agro-industrial by-products that are not consumed by man, readily available and cheap.

This research effort has been expanded in recent times to include the evaluation of medicinal plants such as ginger and garlic etc because of associated low cost, availability, affordability, good antimicrobial nature, reduced disease associated risks, lowered blood cholesterol level and diversified functions in improving performance, growth rate, feed conversion rate and weight gain in birds (Lewis *et al*., 2003).Over the years, there has been need for the use of alternative form of Antibiotic and Spices and some leaves has been phytobiotic and various researchers have reported their success stories. Otoikhian *et al.* (2007) reported that ginger can successfully be used as a phytobiotic substance in poultry production. Natural products of plant origin like spices, herbs and many plant extract can be considered as alternative to antibiotics as growth promoters in improving broiler performance Fenelli *et al.* (2008).

Ginger and Garlic are natural plants or species which have gained prominence as phytobiotic to improve performance of broiler chickens. Ginger and Garlic contains some oil extract which makes it spicy and give it a special aromatic flavor. They are known to contain Zingerol and Phenol that stimulate digestive p^H and the activities of digestive enzymes and microbial activities. According to Kamel (2009) these additives inhibit the growth of harmful bacteria including E.coli in the intestinal tract due to the anti-microbial activity. Thus, when the number of harmful bacteria in the intestine is low, it will promote nutrient assimilation and sustains performance in broilers.

This study is therefore embarked upon to evaluate the Cost and return analysis of broiler chickens raised and processed with ginger and garlic.

Materials and Methods

The experiment was conducted at the Poultry Unit and Meat Science and Technology laboratory of Ambrose Alli University, Ekpoma Edo State, for the period of 10 weeks.Ginger and Garlic for the feeding trial and processing of the chicken

meat were purchased from local market within Ekpoma, Esan West Local Government Area of Edo State. It was sundried for about 7 to 14 days to reduce the moisture content to about 10%. The ginger and garlic were milled separately into powder form. They were then stored in an air tight container till they were used for the feeding trial and processing of the chicken meat. Aliquot were taken from the milled ginger and garlic and will be taken to the laboratory for proximate analysis (Table 1).

Table 1: Proximate composition of (%DM) ginger and garlic

Parameters	GRM	GBM	GGM
Dry matter	91.00	86.40	89.20
Crude protein	10.10	7.50	8.96
Crude fat	3.20	3.50	3.42
Crude fibre	18.30	12.40	16.02
Ether extract	4.90	5.20	5.60
NFE	54.50	57.80	55.20

Commercially formulated diet was used for the experiment and the ginger and garlic mixture powder were added to basal diets at the levels (0, 1, 1.5 and 2%) resulting in four experimental diets (1, 2, 3 and 4) respectively. T_1 that serve as control contained (0% GGM), T_2 contained (1% GGM), T_3 contained (1.5% GGM) and T_4 contained (2% GGM). All the experimental diets were formulated to meet the nutrient requirements of broiler chicks according to NRC (1994) which was formulated from the local feed ingredients commonly used for poultry feeding in the Nigeria.

A total of 120 day old (Anak 2000) broiler chickens were used for the experiment. Forty chicks were randomly selected based on their average initial weight to each of the four treatment diets. Each treatment group contained three replicate with ten birds per replicate and they were assigned to the four treatment diet in a completely randomized design (CRD). The chicks were fed commercial starter diet for 2 weeks acclimatization period and then were also fed commercial diet (with the inclusion of ginger and garlic) for four weeks starter phase period and 4 weeks finisher phase period respectively. The birds had free access to the treatment diets and water *ad-libitum* throughout the duration of the experiment.The prevailing market price of ginger, garlic and feed used in formulating the various dietary rations with the prevailing live market value of broiler chickens were used to estimate the cost and returns.

All data were subjected to analysis of variance (ANOVA) and differences between treatments and means was determined using Duncan's Multiple Range Test at 5% level of probability. All statistical procedures were according to Steel and Torrie, (1990) using SAS (1999) package

Results andDiscussion

Table 2 reflects the cost and return analysis of broiler chickens fed and processed with varying levels of ginger and garlic mixture at both starter and finisher phase. At starter phase, Cost of day old chicks were ₦180.00, Cost of feed per kilogram was ₦144.00 in birds on all the treatment diets. Cost of feed consumed (₦/bird) was highest from birds on 2% ginger and garlic mixture(GGM) with an average cost of (₦287.98)while least cost of ₦180.00 was recorded in control. Cost of feed per kilogram weight gain (₦/bird) was highest from birds on 2% ginger and garlic mixture(GGM) with an average cost of (₦376.36) while least cost of ₦133.54 was recorded in control. At finisher phase, cost of feed per kilogram was ₦168.33. Cost of feed consumed (₦/bird) was highest from birds fed 2% GGM with a mean cost of (₦611.26), whilelowest cost of ₦399.01was recorded in control. Cost of feed per kilogram weight gain (₦/bird) was highest from birds on 2% GGM with an average cost of (₦518.02) and least cost of feed per kilogram weight gain N346.96 was recorded in control diet.

Total cost of production (₦/bird) was highest from birds on 2% GGM with an average cost of (₦1365.24) and least cost of N1, 044.00 was recorded in control diet. Revenue from fresh carcass minus thigh muscles (₦/bird) was highest from birds on 2% GGM with an average cost of (₦2450.00) and least cost of₦2220.00 was recorded from those that ate 1% GGM. Revenue from processed thigh muscles (₦/bird) was highest from birds on 2% GGM with an average cost of (₦650.00) and least cost of₦600.00 was recorded from those that ate 1% GGM. Total revenue (₦/bird) was also highest from birds on 2% GGM with an average cost of (₦3100.00) while least cost of ₦2820.00 was recorded from those that ate 1% GGM. Highest net profit (₦/bird) was highest from birds on 1.5% GGM with an average profit of (₦1793.00)while least net profit of ₦1643.73 was recorded in broiler chicken placed on 1% Ginger and garlic mixture.

Data on the Cost and return analysis of broiler chickens on the ginger and garlic mixture at starter phase revealed that production of broiler chicken base on the control gave the least cost of feed consumed and cost of feed per kilogram weight gain. The reduction in the cost from those on control diet could be as a result of the inclusion of ginger and garlic mixture in other treatment diet that tend to inflate the price in other treatments apart from control. This finding negate the report of Augustine *et al.* (2010) who recorded highest cost of feed consumed and cost of feed per kilogram weight gain among birds fed the control diet compare to those on *Cassia obtusifolia* seed meal. At the finisher phase cost of feed consumed and cost of feed per kilogram weight gain was also lowest among birds fed the control.

Table 2: cost and return analysis of broiler chickens fed and raised with ginger and garlic mixture

Parameters	0% GGM 1	1% GGM 2	1.5% GGM 3	2%GGM 4
Starter Phase				
Cost of day old chicks (₦/bird)	180.00	180.00	180.00	180.00
Cost of feed/kg (₦)	144.00	144.00	144.00	144.00
Cost of GGM (₦)	0.00	47.00	70.50	94.00
Cost of feed consumed (₦/bird)	180.00	217.74	214.50	287.98
Cost of feed/kg weight gain (₦/bird)	133.54	250.27	238.33	376.36
Finisher phase				
Cost of feed/kg (₦)	168.36	168.36	168.36	168.36
Cost of GGM (₦)	0.00	47.00	70.50	94.00
Cost of feed consumed (₦/bird)	399.01	495.52	523.10	611.26
Cost of feed/kg weight gain (₦/bird)	346.96	476.46	462.92	518.02
Cost of processing (₦/bird)	35.00	35.00	35.00	35.00
Total cost of production (₦/bird)	1,044.00	1,176.26	1,202.00	1,365.24
Revenue from fresh carcass-thighs(₦/bird)	2,250.00	2,220.00	2,345.00	2,450.00
Revenue from processed thighs (₦/bird)	630.00	600.00	650.00	650.00
Total revenue (₦/bird)	2,910.00	2,820.00	2,995.00	3,100.00
Net profit (₦/bird)	2,910.00	1,643.74	1,793.00	1,735.00

The reduction in the cost among those on control diet at the finisher phase could also be as a result of the uniformity in the price of the feed offered to the birds being a commercial diet and the inclusion of the cost of ginger and garlic mixture in other treatments aside from the control. This finding is accordance with the findings of Yisa *et al.* (2009) who reported highest price of feed consumed and cost of feed per kilogram weight gain among birds fed the control diet compare to those on graded levels of boiled pigeon pea seed meal. This also agrees with the report of Karangiya *et al.* (2016) who reported a least cost in the cost of feed consumed among broiler chickens fed the control diet compare to those fed with ginger, garlic or its mixture. The highest revenue from fresh carcass minus thigh muscles and from processed thigh muscles recorded from those fed 2% ginger and garlic mixture comparable to those on 1.5% GGM could be as a result weight of the carcass and the highest quality of the thigh muscles processed with the mixture at the inclusion level compare to other treatment diets.

The highest net profit recorded among birds placed on 1.5% GGMis traceable to the effectiveness of the cost incurred on birds on the treatment diet that led to highest profit margin.This agrees with the report of Karangiya *et al.* (2016) who reported a highest profit margin among broiler chickens fed ginger root meal compare to other treatment diets. Zahari and Alimon (2006) had earlier reported improvement in the feed efficiency through the accelerated use of local feed stuff in other to reduce high production cost thereby increasing profit.

Conclusion

In conclusion, considering the effects of different levels of ginger and garlic mixture on the cost and returns of broiler chickens, it appears that 1.5% GGM gave the best profit margin and should be used for broiler chickens at starter and finisher phase for better returns.

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