PROXIMATE COMPOSITION AND SENSORY EVALUATION OF COCKEREL FINISHER RAISED AND PROCESSED WITH GINGER, GARLIC AND ITS MIXTURE

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Abstract
The study was conducted to assess the proximate composition and sensory evaluation of cockerel finisher raised and processed with ginger, garlic and ginger and garlic mixture .The Carcass (Breast muscles) obtained from the feeding trial were washed before dry curing. Birds fed T_1 were cured with salt which served as the control, birds on T_2 were cure with (2g GRP+ salt), birds on T_3 were cured with (2g GBP+ salt) and birds on T_4 were cured with (2g GGP+ salt) respectively. Twenty-four (24) breast muscles were used for the experiment with six (6) breast muscles per treatment then replicated three times in a completely randomized design (CRD). The breast muscles were oven dried for about 45 minutes and were turned at interval for even drying. For proximate composition three samples each were randomly taken from the breast muscles processed using the various spices to the laboratory for proximate analysis. For sensory evaluation the differently processed breast muscles were assessed using 9 point hedonic scale and later subjected to analysis of variance (ANOVA). Result on the proximate composition showed significant ($P<0.05$) variation in all the parameters assayed except for dry matter. The result on the sensory evaluation showed significant ($P<0.05$) variation among the various treatments except for tenderness score. However, breast muscles processed using 2g ginger and garlic mixture was also the most preferred. It is therefore concluded that breast muscles processed with 2g ginger and garlics mixture had better nutritional value.

Keywords: Breast muscles, Cockerel, Ginger, Garlic, Proximate, Sensory, GRP (Ginger Root Powder)

Introduction

Spices and medicinal plants as a natural foodstuffs appeal to all who question safety of synthetic food additives and demand high-quality products that at the same time are safe and stable (Hedayati *et al*. 2013). Quality and healthfulness were reported to be some of the most important factors influencing consumer choice of food. Interest in plants, plant extracts and derived phytochemicals as dietary additives for poultry has increased during the past decades (Khan *et al*. 2012; Puvaca *et al*. 2013). Moreover, spice herbs and aromatic plants possess many antioxidants that are effective in preventing oxidative changes and, thus, can minimize off-odour production in meat (Najafi and Torki 2010). The use of nutritional strategies in improving the proximate meat quality is a relatively new approach that has emerged at the interface of animal and food science from the fact that antibiotics as synthetic growth promoters have been banded for use. Nutritional approaches are often more effective than is direct addition of the additive to meat since the compound is preferably deposited where it is most needed (Govaris *et al*. 2004). Ginger, Garlic and its mixture are considered for this study. Garlic and ginger as natural growth promoters can be a potential alternatives for common artificial growth promoters like antibiotics (Demir et al., 2003). Nutritional value concerns the chemical composition of the meat and its suitability for human consumption. Although, many factors can influence meat quality, this research work is only concerned with the nutritional and eating qualities of meat, particularly cockerel chickens raised with local spices. The objective of this study is therefore to evaluate the proximate composition and sensory qualities of cockerel chickens raised and processed with selected meat spices.

Materials and Methods

The experiment was conducted at the Meat Science laboratory of Ambrose Alli University Ekpoma Edo State for the period of 16 weeks. 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 for proximate analysis which was determined using the method described by AOAC (1990). The result is presented in Table 1.

Sensory evaluation of oven dried cockerel chickens (Breast muscles) processed with ginger, garlic mixture and its mixture.

The Carcass (Breast muscles) obtained from the feeding trial were washed before dry curing. Birds fed T_1 were cured with (salt) which serve as the control, birds on T_2 were cure with (2g GRP + salt), birds on T_3 were cured with (2g GRP + salt) and birds on T_4 were cured with (2g GGP + salt) respectively. The salt and spices were rubbed

manually to give uniform blend to the breasts muscles from the cockerel chickens and were allowed to cure before placing in the oven. Twelve selected panelists among the academic, non academic staff and students of the Department of Animal science, Ambrose Alli University, Ekpoma, were used for the sensory evaluation. A nine point hedonic scale (1= dislike extremely to 9=liked extremely) as described by Larmond (1977) were used for the sensory evaluation.

Statistical Analysis

All data were subjected to analysis of variance (ANOVA) and differences between treatments and means were 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.

Result

Proximate composition

The proximate composition of the processed breast muscle of cockerel chicken is depicted in table1 revealed a significant (P<0.05) in all the proximate parameters assayed in this study. Percentage dry matter content was significantly higher (44.82%) in those raised and processed with 2g ginger and garlic mixture (GGP), followed by 46.33% from those placed on 2g ginger root powder (GRP), 43.63% in those placed on the control while lowest value of 43.13% was recorded among those on 2g garlic bulb Powder (GBP). Percentage crude protein was significantly higher among those raised and processed with 2g ginger and garlic powder (GGP) with mean value of 54.25% , followed by 50.09% from those placed on the control, 48.12% in those placed on 2g garlic bulb Powder (GRM) while least value of 43.74% was recorded among those on 2g ginger root powder (GRP). Percentage crude fibre showed significant (P<0.05) variation with highest value of 6.01% on the control, followed by 5.52% from those placed on 2g ginger and garlic mixture (GGM) while lowest value of 5.01% was recorded among those on 2 ginger root powder (GRP). Ether extract was significantly higher (18.01%) in those raised and processed with 2% ginger and garlic powder (GGP), followed by 17.01% from those placed on 2% ginger root Powder (GRP) while lowest value of 14.00% was recorded among those on the control. Percentage crude Ash was higher (10.52%) among those placed on 2% ginger and garlic powder, followed by (8.51%) from those placed on 2% garlic bulb powder (GBP), 8.02% in those placed on control while least mean value of 7.01% was recorded among those on 2% ginger root powder (GRP). Nitrogen free extract also showed significant difference with higher mean value (33.82%) in those raised and processed with 2% ginger and garlic mixture (GGM), followed by 28.75% from those placed on the control while lowest value of 19.12% was recorded among those on 2% ginger root powder (GRP).

Table 1: Proximate composition of Ginger, Garlic and its Mixture

Parameters (%)	*Control*	*2%GRP*	*2% GBP*	*2%GGP*
Dry matter	43.63±0.15	43.33±0.08	43.13±0.02	44.82±0.02
Crude protein	50.09^{b}±0.15	43.74^{d}±0.02	48.12^{c}±0.04	54.25^{a}± 0.01
Crude fibre	6.01^{a}±0.08	5.01^{c}±0.06	5.02^{c}±0.11	5.52^{b}±0.08
Ether extract	18.01^{a}± 0.01	17.01^{b}±0.06	15.01^{c}±0.06	14.00^{d}±0.08
Crude ash	8.02^{b}±0.08	7.01^{d}±0.09	8.51^{b}±0.06	10.52^{a}±0.11
NFE	28.75^{b}±0.54	19.12^{d}±0.06	22.76^{C}±0.02	33.82^{a}±0.02

abc: means in the same row with varying super script differ significantly (P>0.05),

Sensory evaluation of cockerel chicken (Breast muscles) processed with ginger, garlic and its mixture

The sensory parameters of the processed breast muscle of cockerel chicken as showed in table 2 revealed a significant (P<0.05) in juiciness and general acceptability while tenderness score was not significantly (P>0.05) as influenced by the treatments. Sensory score for juiciness was significantly (P<0.05) higher among the breast muscles processed with 2g ginger and garlic mixture with the highest value of 8.53% and lowest values of 7.56% were recorded from those on the control. General acceptance was significantly (P<0.05) higher for the breast muscles processed with 2g ginger and garlic powder and lowest values of 7.50% were recorded from those processed with 2g garlic bulb powder.

Table 2: Sensory evaluation of ginger, garlic and its mixture

Parameters (%)	*Control*	*2%GRM*	*2% GBM*	*2%GGM*
Tenderness	7.75±0.14	7.67±0.08	7.50±0.14	7.58± 0.17
Juiciness	7.56^{c}±0.43	7.25^{bc}±0.25	7.60^{b}±0.14	8.63^{a}±0.12
Flavour	7.41^{c}± 0.36	7.56^{b}±0.25	7.48^{c}±0.14	9.52^{a}±0.1
General acceptability	7.67^{c}±0.22	7.85^{b}±0.25	7.50^{b}±0.24	8.02^{a}±0.11

abc: means in the same row with varying super script differ significantly (P>0.05),

Discussion

Proximate composition

The significant difference observed for crude protein with highest value in those fed and processed with ginger and garlic powder could be due to the combination effect of the two spice which led to significant improvement in the protein quality of the cockerel chicken (breast muscles). In a previous study by Puvaca *et al*.(2014a), addition of garlic powder to chicken diet at a concentration of 2.0g/100g resulted in improved protein content (22.9 g/100 g) in breast meat compared with un-supplemented diet (21.8 g/100 g). Significantly higher crude fibre observed in those on control is a pointer to the nature of the meat compare to other treatments and it also goes to say that the various spices reduces the toughness of the meat compare to control. This finding negates the report of shogunle *et al.*,(2008). The higher ether extract value recorded from those on control could be due to the accumulation of fat by those birds on control as organic compound like Alicin and other aromatic compound in ginger and garlic are known to reduce fat (Gu and Zhu, 2011) so the reduction in the ether extract value was not a surprise. The highest crude ash content recorded in treatment 4 indicated high mineral content compare to those on other treatment and this finding is in conformity with the report of Marcincáková *et al*.(2011) investigated the influence of dietary supplementation of *Melissa officinale* and combination of *Achillea millefolium* and *Crataegus oxyacantha* in chicken ration on meat quality. The highest nitrogen free extract recorded in those 2% ginger and garlic powder is traceable to the highest crude protein content recorded in diet 4.

Sensory evaluation

The similarity in the tenderness score is a pointer to the fact that the ginger and garlic possess the organic compounds capable of tenderizing the meat products. Gardzielewska *et al*.(2003) reported that broiler chicken feed supplementation with echinacea,garlic and ginger resulted in no effect on the tenderness of the meat. The significant variation in the juiciness value of the cockerel chicken meat with highest value recorded from those processed with 2g ginger and garlic mixture could be as a result of the combined effect of the spice in softing the meat which could have increased its juiciness. This is in agreement with the report of Martin *et al.*, (2014) who reported a significant difference in the juiciness score of cobb 500 chicken meat after application of different additives in their nutrition. Ginger and garlic contains some aromatic compound that impact attractive smell or flavour. Therefore, the highest flavour score could be as a result of the aroamtic compound in ginger and garlic powder that enhances the flavour of the finished product. It is also in agreements with the finding of Martin *et al.*, (2014) who also reported a significant difference in the juiciness score of cobb 500 chicken meat after application of different additives in their nutrition. General acceptance score was also significantly (P<0.05) influenced among the cockerel chicken (breast muscles) under the varying treatments with highest value from those on 2g ginger and garlic powder.. This could be due to the highest value recorded for juiciness and flavour score which are major sensory factors in determining the quality of the processed meat could have influenced the general acceptability of the processed chicken meat by the various panelist.

Conclusion

It is therefore concluded that cockerel chickens (breast muscles) processed with 2g ginger and garlic powder had better nutritional value.

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