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EFFECT OF SOAKED AND DRIED FALSE YAM (*Icacina Oliviformis*) SEED MEAL ON CARCASS AND SENSORY CHARACTERISTICS OF BROILER CHICKEN

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ABSTRACT: *This study was conducted to determine the effect of soaked and dried false yam seed meal (SFYSM) on the carcass and sensory characteristics of broiler chicken. A total of 48 chickens (12 birds in each treatment) were randomly selected from 120 birds fed diets containing 0% (T1, control), 5% (T2), 7.5% (T3) and 10% (T4) SFYSM. The birds were weighed and slaughtered after a 24 hours feed withdrawal. Carcass and visceral weights were taken, after which the thigh and breast muscles were bagged separately for laboratory and sensory analyses respectively. The breast muscles were thawed, grilled in an oven to a core temperature of 70°C for sensory analysis, whiles the thigh muscles were used for moisture, fat, crude protein and lipid per-oxidation analyses. The results indicated that the use of SFYSM had no significant effect on carcass and sensory characteristics of the birds. In addition, there was no significant difference in moisture and lipid per-oxidation of the products. However, the crude protein contents of the carcasses significantly (P<0.05) increased with an increasing SFYSM inclusion rates. Feeding of SFYSM to broiler birds up to 10% inclusion on weight basis has no effect on carcass, sensory and storability of the carcasses.*

Keywords: *False yam seeds, carcass, sensory quality, broiler chicken*

ORIGINAL ARTICLE

INTRODUCTION

Animal production is characterized by high input costs mainly resulting from feeding and housing. This cost in terms of feeding ruminants is generally lower than for poultry, which duel mainly on grains and legumes; important staple for humans (Ensminger, 1983). Bell and Weaver (2002) reported that 85% of the world's chicken energy is derived from maize. This brings about a competition between animals and humans for the staple, making its supply limited and expensive when available (Kekeocha, 1984). Consequently, the cost of poultry and poultry products escalates and is unaffordable to the average household.

The poultry industry supplements the protein and income of a typical Ghanaian family, as these have relatively shorter maturity period compared with ruminants (Sonaiya and Swan, 2004; Obeng-Asamoah, 1989). This short maturity period makes chicken the world's largest supplier of meat for consumption (Gopalakrishnan and Moley, 1985). In addition, the meat is of high quality, containing an average protein content of 20% and high levels of unsaturated fatty acid as well as a good source of vitamins (Niacin) compared with ruminants (Van Eekeren et al., 1990 and Oluyemi and Robert, 1979).

In order to combat the problem of high feed costs and make poultry and poultry products affordable to the average consumer, scientists are exploring the potentials of non-conventional feed ingredients which are cheaper than grains and legumes, but have potentials for use as animal feed. One of these materials is false yam seeds (*Icacina oliviformis).*

In Ghana, false yam has been identified as a new feed ingredient with potentials to substitute maize in poultry rations (Michael, 1993). The plant however, is believed to contain a bitter toxic principle called gum resin, which has a potential of adversely affecting the carcass yield and eating qualities of poultry (Okine et al., 2009). Current research is

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employing soaking of the seeds, as a means of reducing the concentration of the gum resin in the seeds. According to Teye et al. (2006) the carcass quality of livestock is affected by the type of feed given and the inclusion levels of the various feed ingredients.

This research was therefore aimed at determining the effect of soaked and dried false yam seed meal on carcass and sensory characteristics of broiler chicken.

MATERIALS AND METHODS

The experiment was conducted at the Meat Processing Unit and Laboratories of the University for Development Studies, Tamale.

Experimental birds

A total of forty-eight (48) broilers (Cobb-500) of eight weeks old with a sex ratio of 1:1 were selected from 120 birds. Twelve birds were selected randomly from four groups of birds raised on rations in which maize was substituted with soaked false yam seed meal (SFYSM) at levels of 0% (T1), 5% (T2), 7.5% (T3) and 10% (T4) inclusions.

Slaughtering of birds

Each bird was weighed (live weight) with an electronic scale (Sartorius, CP 245S) after a 24-hour feed withdrawal, and tagged to differentiate them. The birds were then stuck with a sharp knife to cut the jugular veins and allowed to bleed for approximately 60 seconds, after which they were scalded in warm water (60°C). The feathers were plucked manually and head and shanks removed. An incision was then made around the vent to remove the viscera. The hot carcass weight was then taken.

Carcass yield

The viscera were separated into intestines, gizzard, liver and spleen. The dressed carcass was chilled for 24 hours and cold weight taken. Primal cuttings were made from the chilled carcass and weighed. The breast and thigh muscles were bagged, stored and used for sensory and laboratory analyses respectively.

Sensory analysis

A total of fifteen (15) panelists, comprising staff and students were randomly selected and trained according to the British Standard Institution (BSI, 1993) guidelines to evaluate the products. Sensory evaluation was carried out on the 1, 7 and 14 days of freezer storage. The breast muscles were thawed and grilled to a core temperature of 70°C in an electric oven (Turbofan, Blue seal, UK). The products were sliced into uniform sizes (about 2cm) and wrapped with coded aluminum foils and presented to the panelists. Each panelist was provided with water and pieces of bread to serve as neutralizers between the products.

A five-point category scale was used to evaluate the sensory characteristics of the products as follows:

Color: very light (1), light (2), intermediate (3), Dark (4), very Dark (5)
Off-odor: very weak (1), weak (2), intermediate (3), strong (4), very strong (5)
Juiciness: very juicy (1), juicy (2), intermediate (3), dry (4), very dry (5)
Tenderness: very tender (1), tender (2), intermediate (3), tough (4), very tough (5)
Chicken flavor: very weak (1), weak (2), moderate (3), strong (4), very strong (5)
Flavor-liking: like very much (1), like (2), intermediate (3), dislike (4), dislike very much (5)

Proximate and Peroxide values (POV) of the meats

Thigh muscles were used to determine the nutritional composition and lipid per-oxidation according to the methods of the AOAC (1999).

Statistical Analysis

Data obtained were analyzed using the General Linear Model (GLM) of Analysis of Variance (ANOVA) of the Minitab Statistical Package, version 15 (MINITAB, 2007).

RESULTS AND DISCUSSION

Carcass characteristics of birds

The weights of the carcass and primal cuttings of the birds are presented in Table 1. The results showed no significant difference in carcass characteristics of the birds. The dressing percentage ranged between 75.64 and 77.10 percent. This result is not different from the findings of Taylor and Field (1998), who reported a dressing percentage of

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78% in commercial broilers. The weights of the drumstick, thigh, wings and breast muscles did not vary between treatments (Table 1).

Anti-nutritive factors in feedstuffs are poorly digestible, inhibit protein digestion, depress growth and are capable of increasing the incidence of skeletal disorders in birds (Saif, 2003). According to Cooke and Maduagwu (1985), soaking enables the movement of soluble cyanide into solution in cassava roots. Coffie (2011) reported a reduction in weights of carcass parameters, when raw false ram seed meal was used in broiler rations. It therefore implies that most of the soluble toxins in the false yam seeds were removed by the soaking method of processing.

Table 1 - Effect of SFYSM on carcass characteristics and primal cuttings of broiler chicken

Parameter	T1	T2	T3	T4	SED	Sig.
Dressing %	77.00	77.10	75.97	75.64	6.81	ns
Cold weight	1737	1792	1661	1642	185.45	ns
Drum stick	231	249	229.3	232.8	30.44	ns
Wings	196.2	203.0	187.0	185.3	19.93	ns
Thigh	495.2	534.3	479.5	472.0	56.89	ns
Breast	713.3	739.2	645.0	659.0	93.23	ns
Shank	45.32	47.91	43.91	42.82	9.30	ns
Head	52.81	57.23	54.99	55.62	6.14	ns
Whole intestine	83.53	82.63	83.88	82.05	5.62	ns
Whole gizzard	51.88	57.31	55.75	56.23	7.42	ns
Empty gizzard	37.79	40.25	38.28	40.93	5.16	ns
Spleen	1.89	2.74	2.16	1.90	0.53	ns
Liver	30.31	33.52	3.53	31.94	5.21	ns

Sig= significance; ns= no significance; SED= standard error of difference

Sensory characteristics of the chicken

The meat was offered to the panelists for sensory evaluation, and the results are presented in Table 2. The SFYSM had no significant effect ($P > 0.05$) on the eating qualities of the experimental chicken (Table 2).

Sensory characteristics of meat are very important factors consumers consider when buying meat and meat products. Color is a major indicator of quality of meat, as the appearance influences consumer acceptance (Van Oeckel et al., 1999; Bell and Weaver, 2002). Odor and flavor are other important parameters consumers consider when buying meat (Omojola and Adesehinwa, 2007). When these qualities appear different from those of the traditional chicken, the products are likely to be rejected by the consumers.

Since the SFYSM-fed chicken had similar sensory characteristics as those fed the traditional chicken diet, means consumers would not detect differences in the sensory parameters, hence readily accept such meats.

Proximate composition of the meat

The moisture, crude protein and fat contents of the carcasses are presented in Table 3. The moisture content of the chicken was not affected by the diets (Table 3). The crude protein contents of the meats were however, significantly increased ($P<0.05$) in birds fed the SFYSM diet, compared with the control birds. The crude protein contents of the carcasses increased with increasing SFYSM inclusion (Table 3).

Higher crude protein in diets is advantageous to the consumer. This is because proteins are required in higher levels in growing children and also for productive functions such as pregnancy and lactation, because of increased output of proteins in the products of conception and in milk (Pond et al., 1995). Therefore, with higher crude protein levels in the chicken, a small quantity would be required by consumers to meet their nutrient requirement, hence reduce expenditure on meat, as well as satisfy health concerns associated with excessive meat consumption.

The fat content in the chicken ranged between 5.31 and 10.08% of the fresh chicken with T2 being the least and significantly different from the rest of the treatments. These however, fall within the range of 6.9 - 12% reported by Panda (1995) in chicken. Consumption of high levels of saturated fats has been associated with high incidence of coronary heart diseases in humans (Mike and Floyd, 1999). Several health organizations including the World Health Organization (WHO, 1990) therefore recommend a reduced dietary fat intake. Since the use of SFYSM did not cause a significant increase in the fat content of the meat, it is an indication that the consumption of such meats will not pose health threats to consumers.

Peroxide value of products

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Lipid per-oxidation in the products was determined on the 15th day of storage to determine the effect SFYSM on lipid per-oxidation in the products. The results are presented in Figure 1. The peroxide values of the products ranged between 1.45 and 1.78 mill equivalent of oxygen per kg product. These values are significantly lower than 25millequivalent of active O_2/kg, which is considered as the limit of acceptability in fatty foods (Narasimhan et al., 1986).

Table 2 - Sensory characteristics of broilers fed SFYSM

Storage period (days)	Parameter	T 1	T 2	T 3	T 4	SED	Sig.
1	Color	2.07	1.80	1.53	1.80	0.51	ns
	Off-odor	2.47	2.53	2.40	2.40	0.79	ns
	Juiciness	3.13	3.07	2.93	3.00	0.63	ns
	Tenderness	3.33	3.13	2.87	2.73	0.69	ns
	Chicken flavor intensity	2.60	2.73	2.67	2.73	0.55	ns
	Flavor liking	2.47	2.40	2.07	2.33	0.53	ns
7	Color	2.53	2.33	2.40	2.73	0.61	ns
	Off-odor	2.40	2.53	2.53	2.53	0.93	ns
	Juiciness	2.60	2.87	2.57	3.13	0.58	ns
	Tenderness	2.80	2.47	2.67	2.60	0.62	ns
	Chicken flavor intensity	2.47	2.87	2.53	3.00	0.84	ns
	Flavor liking	2.40	2.07	2.33	2.33	0.68	ns
14	Color	2.33	2.33	2.07	2.13	0.56	ns
	Off-odor	2.40	2.53	2.53	2.67	0.90	ns
	Juiciness	2.53	2.40	2.13	2.07	0.51	ns
	Tenderness	3.07	2.87	2.60	2.67	0.44	ns
	Chicken flavor intensity	2.93	3.07	2.80	2.80	0.70	ns
	Flavor liking	2.27	2.20	2.13	2.27	0.63	ns

SED= standard error of difference; ns= not significant; sig= significance

Table 3 - Proximate composition of the meat

Parameter	T1	T2	T3	T4	SED	Sig.
Moisture	75.36	72.72	74.51	74.84	6.66	ns
Crude protein	16.08_b	17.33_{ab}	17.94_{ab}	18.27_a	0.44	*
Fat (ether extract)	8.02_{ab}	5.31_b	10.08_a	8.63_a	0.67	**

SED= standard error of difference; sig.= significance; ns= not significant; *= significant (P<0.05), **= significant (P<0.01)

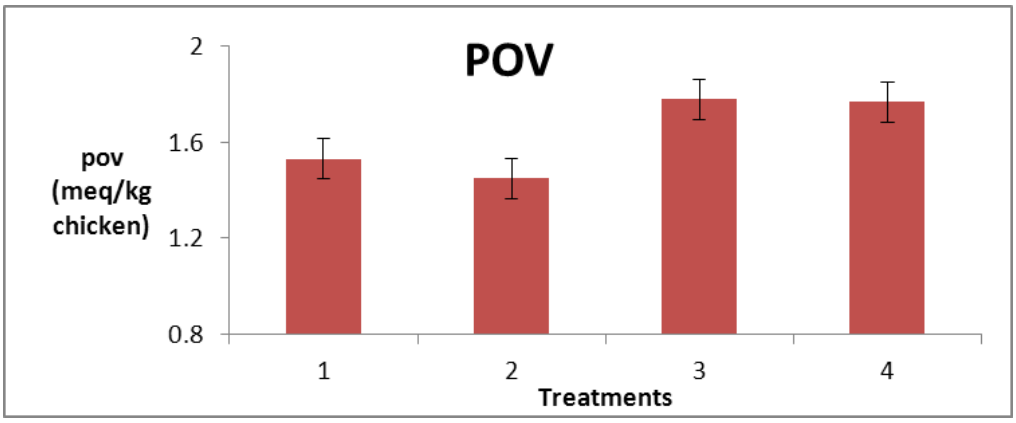

Fig. 1 - Peroxide value of experimental chicken, POV= peroxide value

According to Warriss (2010), lipid per-oxidation progresses at faster rates in fats rich in unsaturated fatty acids, than those high in saturated fatty acids. The unsaturated and polyunsaturated fatty acids present in these, react with oxygen to form fatty acid hydro peroxides. Hydro peroxides are unstable, and breakdown into various compounds which can produce off-flavours; leading to a rather stale, rancid flavor in food products (Kerler and Grosch, 1996).

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The values were not significantly different among the treatments, and acceptability was also not adversely affected; an indication that the use of SFYSM in poultry rations has no detrimental effect on product storability.

CONCLUSIONS

The use of soaked and dried false yam seed meal to substitute maize up to 10% in broiler rations has no effect on carcass and sensory characteristics of the meat. Meanwhile, the crude protein contents of the carcasses increased. In addition, there was no significant difference in lipid per-oxidation of the carcasses, indicating that feeding SFYSM is not detrimental to product storability. Soaked false yam seed meal can be used in poultry rations up to 10% inclusion rate on weight basis.

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