

PROXIMATE, SENSORY AND SHELF-LIFE PROPERTIES OF SUYA PRODUCED FROM MUSCLE OF WEST AFRICAN DWARF RAMS FED GARLIC POWDER (*ALLIUM SATIVUM*) SUPPLEMENTED DIETS

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Abstracts

The experiment was conducted to investigate the proximate properties, organoleptic properties and lipid stability of wad rams fed garlic powder supplement at varying levels of 0%, 2%, 4%, 6% and 8% respectively. The rams were randomly allocated to five treatment diets in a completely randomized design. Each dietary treatment was replicated twice comprising of three rams per replicate. At the end of 12 weeks feeding, three rams were selected randomly from treatment group, weighed, slaughtered and dissected into standard cuts. Muscle of the loin was carefully excised from each treatment group and produced into suya products. Proximate composition of suya was determined for moisture, fat, ash and protein. Sensory properties of suya were evaluated by ten member panel rating samples on nine hedonic scales for aroma, flavor, tenderness, juiciness, texture and overall acceptability. It was observed that feeding garlic powder to wad ram did not significantly influenced ($p>0.05$) proximate and organoleptic properties of suya product. TBA was determined for suya produced at 7th, 14th and 21st day storage period respectively. TBA was significantly influenced ($P<0.05$) between treatment diets. Dietary garlic powder can reduce lipid oxidation of suya products at different storage periods.

Keywords: Proximate, thiobarbituric acid, suya, West African Dwarf rams and garlic powder

Introduction

Suya is one of the Intermediate Moisture Meat (IMM) products that are easy to prepare and highly relished (Omojola *et al.*, 2004). Suya is a traditional stick meat product that is commonly produced by the Hausas in West Africa from beef. It is produced from boneless meat hung on stick and spiced (Alonge and Hiko, 1981). Meat is high in nutrients, but very prone to spoilage and to prevent this from occurring, value addition to meat is essential (Anna *et al.*, 2005). This involves processing and preservation of meat so as to prolong its shelf-life and improve its acceptability. (Eyas- Ahmed *et al.*, 2006). Meat used for production of ready to eat products such as suya, can be prevented from quick spoilage by feeding natural antioxidants in

place of synthetic which have been known for its detrimental effects on consumers. One of such is garlic (*Allium sativum*), garlic as a spice can possess antioxidant properties. The study is intended to investigate the effects of feeding dietary antioxidants on nutritional composition, eating quality and lipid stability of suya product derived from West African Dwarf rams.

Materials and methods

Animal management and feeding

Thirty yearling WAD rams were bought from Osogbo, Osun State. The animals were quarantined and allowed to acclimatize for a period of one week. The rams were randomly allocated into five dietary treatments, each

treatment group comprises of six rams. Garlic powder was supplemented at 0%, 2%, 4%, 6% and 8% respectively. Basal diets and fresh water were provided.

Sample collection

At end of twelve weeks feeding period, three WAD rams were randomly selected from treatment group, weighed, immobilized mechanically, slaughtered and carcass divided into two equal parts through the middle. Carcass was chilled over -night at 4°C, thawed and dissected into choice parts. The loin portion was carefully excised, de-boned mechanically; muscles were filleted into thickness of about 0.2 cm and 8cm long.

Preparation of suya

Suya was produced by the method of Omojola (2008) with some modification. The preparation of suya was done by the initial formulation of mixture of ingredients as shown in table(1); filleted muscles threaded unto skewer, rubbed with vegetable oil and placed around open fire to roast into internal temperature of 75°C.

Table1. Composition of ingredients used for suya (g/100 g).

Ingredients	Compositio n(proportio n by weight)
Dry ground pepper	10.00
Red pepper	6.50
Bonnet pepper	5.00
White pepper	2.50
Ginger	3.50
Onions	15.0
Curry powder	3.50
Thyme	3.50
Salt	1.00
Stock cubes	2.50
Vegetable oil	15.00
Alligator pepper	2.50
Groundnut paste	30.00
Total	100.00

Determination of proximate composition

Moisture, fat, protein and ash content were analyzed by procedure of A.O.A.C (2005).

Sensory evaluation

The sensory evaluation was performed by ten panelists. Panelists were instructed to cleanse their palates between samples using water. The aroma, flavor, tenderness, juiciness, texture and overall acceptability of the samples were evaluated using a 9-point descriptive scale, rating 1 = extremely undesirable, 9 = extremely desirable.

Determination of TBA value

The determination of thiobarbituric acid (TBA) of suya samples was done by the methods of Adesokan *et al*, (2008).

Statistical analysis

All data were subjected to One-way analysis of variance and difference between mean values was compared by Tukey's pairwise using the statistical software Minitab 16 version, (2007).

Result and discussions

The result of the proximate composition is shown in (table 2). The result showed that there was no significant difference ($p>0.05$) between the proximate composition of suya derived from WAD rams fed garlic powder supplement and the control. Protein ranged from 30.15 ± 0.90 (diet 1) to $33.62\pm1.39\%$ (diet 2). The least fat content was found in diet 5 produced suya while the highest was found in diet 1 (control). Ash content was similar between diets 4 and 5 suya samples. Diet 5 produced suya had the highest moisture content of $43.93\pm0.80\%$. The values obtained for protein in the study were slightly lower than the values reported by Apata *et al*, (2013) for suya and 58.10 to 66.79% reported by Fakolade and Omojola (2008) for kundi. The protein values obtained for suya samples in the study agreed with Omojola *et al*, (2003) that meat used for suya absorbed more ingredients which could have contributed to increase in protein content of the meat due to presence of protein constituents of the ingredients mixture.

The high fat and ash contents observed from suya in the study might be the contributing effect of ingredients mixture used during suya preparation. The high moisture content can influence good eating quality such as flavor, juiciness and texture this support the nature of the product (suya) as intermediate moisture meat product, but could enhance microbial development which could lead to storage loss.

The results of the mean sensory properties of suya samples are presented in (Table 3). The study revealed that there were no significant ($P > 0.05$) differences between suya samples but values varied numerically among treatment group in sensory properties evaluated by panelist. It was observed in the study that all sensorial properties such as aroma, flavor, tenderness, and juiciness and texture scores were slightly higher in test diets than control (diet1). The overall acceptability showed that suya derived from diet 1, 2, 3 and 4 respectively were preferred by panelist to that of diet 5. The high acceptability of suya derived from test diets might result from the effects of garlic powder on meat quality, prior to its conversion to ready to eat products. Also, the pungency of garlic flavor did not impose any treat on suya products rather added more value to its aroma and flavor. The flavor, juiciness and tenderness properties

influence the eating preference of meat and meat products (Aberle et al., 2001) while Chulayo and Muchenje, (2013), reported that tenderness and juiciness are part of the measures of overall eating quality.

Table 4 showed the mean lipid oxidation of suya samples. The values of TBA in the treatment groups were significantly lower ($p < 0.05$) than control group, as the storage period advanced as observed in the study (figure1). The TBA values obtained in the study were similar to those reported by Apata et al., (2013) for suya, but lower than those reported by Adesokan et al., (2008) in suya made from chicken. The TBA value of suya samples as obtained in the study followed the trend of Zepata et al., (1990) for dry salted lamb. Lipid oxidation value was extremely lowered in diet 5 as storage days advanced when compared with other test diets. This may be the fact that feeding garlic powder at higher level triggered its antioxidant potentials such that autoxidation was delayed or hindered in suya samples during storage. The reducing effects of garlic powder on MDA levels of suya at interval of day's corroborates with Valesco and Williams (2011) reported, that plant extracts have a positive effect on lipid oxidation by reducing TBA on different types of meats during refrigeration.

Table 2: Proximate composition of suya derived from WAD rams fed garlic powder supplemented diets (%)

Items	Diet 1(0%)	Diet 2(2%)	Diet 3(4%)	Diet 4(6%)	Diet5 (8%)
Protein (%)	30.15±0.90	33.62±1.39	31.85±0.93	32.00±0.49	30.59±0.94
Fat (%)	11.88±0.01	10.88±0.51	10.96±0.66	10.93±0.17	10.72±0.29
Ash (%)	4.27±1.88	4.15±1.86	4.30±1.90	4.25±1.91	4.25±1.95
Moisture content (%)	42.93±0.45	40.75±0.25	42.60±0.76	42.13±0.21	43.93±0.80

*No significant difference in the treatment means ($P > 0.05$).

Table 3: Sensory evaluation suya of WAD ram fed garlic powder supplemented diets

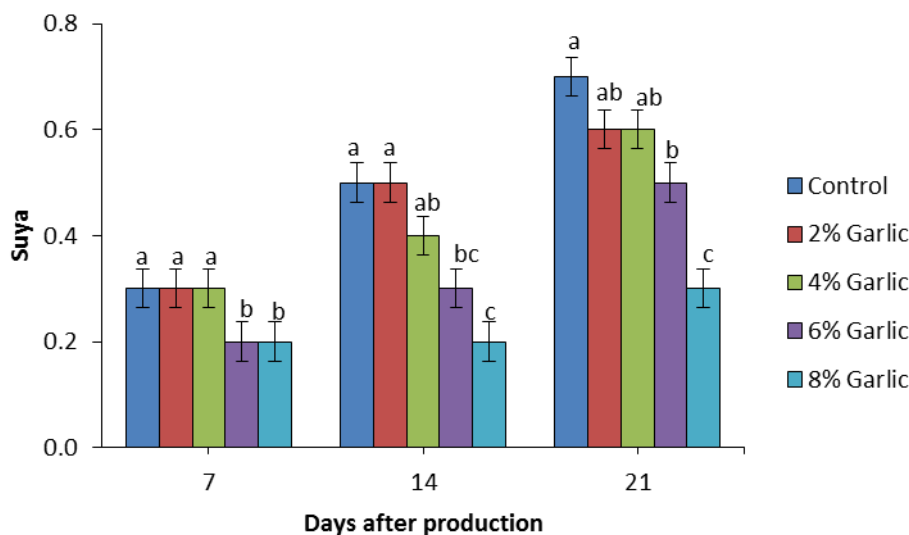
Items	Diet 1(0%)	Diet 2(2%)	Diet3(4%)	Diet 4(6%)	Diet 5(8%)
Aroma	6.40±0.55	6.60±0.55	7.40±0.55	7.20±0.84	7.20±0.10
Flavour	6.60±0.34	7.00±0.02	6.60±0.34	7.00±0.01	7.40±0.52
Tenderness	6.00±0.23	6.40±0.52	7.00±0.01	7.60±0.89	7.80±0.84
Juiciness	6.20±0.84	7.60±0.14	6.80±0.84	7.60±0.14	6.60±0.14
Texture	6.00±0.84	7.20±0.10	6.00±0.23	6.60±0.55	6.80±0.30
Overall acceptability	7.00±0.23	7.40±0.89	7.40±0.89	7.60±0.89	6.80±0.64

*No significant difference in the treatment means ($P > 0.05$).

Table 4: Oxidative stability of *suya* of WAD ram fed garlic powder supplemented diets, TBA(mg MDA/Kg meat)

Items	Diet 1	Diet 2	Diet3	Diet 4	Diet 5
Level of garlic inclusion	0%	2%	4%	6%	8%
Day 7	0.30±0.10 ^a	0.30±0.00 ^a	0.30±0.10 ^a	0.20±0.00 ^b	0.20±0.00 ^b
Day 14	0.50±0.10 ^a	0.50±0.00 ^a	0.40±0.00 ^{ab}	0.30±0.10 ^{bc}	0.20±0.00 ^c
Day 21	0.70±0.10 ^a	0.60±0.00 ^{ab}	0.60±0.10 ^{ab}	0.50±0.10 ^b	0.30±0.00 ^c

a,b, c means of different superscripts on same row are significantly (P<0.05) different.

**Fig. 1.** TBA(mg MDA/Kg meat) of processed meat *suya* derived from cut-parts of WAD ram fed experimental diets at different storage days

Conclusion

The study revealed that feeding dietary garlic powder supplementation of up to 8% in wad ram's diets can improve the nutritional and eating qualities of *suya* derived from its muscle. It can delay autoxidation in *suya* at interval of days. The eating *suya* produced from muscles of animals fed dietary antioxidants is safer and serves as means of dietary (natural) antioxidant to man in place of synthetic. However, the aspect of microbial loads during storage and the impact of storage materials can be further investigated.

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