SHORT COMMUNICATION

EVALUATION OF THE ORGANOLEPTIC PROPERTIES OF 'SUYA' PRODUCED FROM VARIOUS SOURCES OF MEAT

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ABSTRACT

This research was undertaken to evaluate the potential of different meat sources in producing acceptable suya when compared with the traditional beef suya in Nigeria. Five meat types viz: pork, beef, chicken, rabbit and chevon were used for this experiment. The sensory evaluation was conducted on the suya samples by a 20-man panel of judges using a 9-point hedonic scale to assess the colour, flavour, texture and overall acceptability of the samples. The results showed that beef, goat and chicken suya significantly maintained a better acceptance (P<0.01) than the pork suya. There was a significantly (P<0.01) positive response to the flavour of chicken and beef suya than the rest of the other samples. Texture wise, beef and goat suya were significantly (P<0.01) more acceptable than the rest. In overall acceptability, the beef and chicken suya showed no significant difference (P<0.01) from each other and were both rated the best among the samples. It is apparent from the overall results that both goat and chicken could successfully substitute for beef in the production of acceptable suya. The quality characteristics generally showed that both meat samples were comparable to the beef sample.

Keywords: 'Suya', organoleptic properties, various meat sources

INTRODUCTION

Meat is one of the most nutritious foods used for human consumption. It is an excellent source of high quality protein and it also contains large amounts of minerals and essential vitamins, as well as fats. Meat is usually an expensive item in the Nigerian diets, however, a small quantity of meat can greatly improve a meal as the protein will supplement the vegetable protein and a balanced meal will thus be provided.

In spite of the importance of meat as a source of protein with a high biological value, preferential consumption is glaringly noticed among the Nigerian populace. This may be due to a combination of a number of factors bordering on religious belief, culture, adaptability, food habits, age, sex, socio-economic factor and individual variation in Nigeria. For instance, as a result of religious belief, pork is unpopuplar in the predominantly Moslem northern part of Nigeria (Ikeme, 1990), chevon or goat meat is most popular among the Ibos in the South-East (Obanu, 1975), while cow meat and chicken appear to predominate all over Nigeria. Sheep and goat are also widely accepted while rabbit is presently gaining popularity too.

Meat supply in Nigeria is presently undergoing tremendous change; super market system is presently organizing the supplies of pre-packed meat cuts in standard qualities especially for the elites in the society. The peasants and the have-nots on the other hand are also finding ways of solving their own

problems. For instance, chicken and pork meats are fried and sold as cut-up-parts at evening markets along major streets and beer parlours in most capital cities now especially in the Western part of Nigeria. Goat head and meat are prepared as "Isiewu" (pepper soup) in most canteen/restaurants in most cities in the eastern part of Nigeria while beef meat is prepared as 'suya' delicacy in virtually every part of this country. Most hotels in this country today now have what they call 'suya spot'. This is an indication that Nigerians have a taste for varieties in their meat consumption. Consumers are becoming increasingly prepared to pay for improved and better quality products from the meat industry. 'Suya', the ready-to-eat indigenous Nigerian meat snacks is enjoying tremendous growth, which must be encouraged.

It is on this premise that this study was carried out with the possibility of sourcing for other meat types that can be used for 'Suya' production with the ultimate aim of increasing animal protein consumption of the Nigerian populace.

MATERIALS AND METHODS

Five meat types; viz: pork, beef, chicken, rabbit and chevon were used for this trial. 500g of each of the meat type was sliced and inserted into prepared sticks like any 'Suya' man would do. All the sticks were properly labeled. Condiments such as ground dry pepper, mixed with salt, curry and ginger were rubbed on the meat while groundnut oil was sprayed on the meat. All the suya sticks were then placed inside a gas oven for about one hour, fifteen minutes. At this time all the 'suya' was tasted and agreed to be well cooked by five respondents. After which all the suya sticks were brought out and allowed to cool for about 10 minutes. Suya produced from each of the meat sources was cut or sliced into small pieces and placed in five different labeled plates.

The sensory evaluation was conducted on the suya samples using a 20-man panel of judges. A 9-point hedonic scale was used to assess the colour, flavour, texture and overall acceptability of the samples. In the hedonic scale, 9 represents extremely desirable or extremely liked, while 1 represents extremely undesirable or extremely disliked for colour, texture, and overall acceptability.

Statistical Analysis

All data were subjected to analysis of variance according to procedures described by Steel and Torrie (1980). Duncan's multiple range test (Gomez and Gomez, 1985), was employed to compare treatment means found to be statistically significant.

RESULTS AND DISCUSSION

The overall performance of the difference meat sources employed in the suya preparation is shown in Table 1. From the table, some meat sources showed remarkable good rating when compared with the traditional beef suya. In colour (Table 1) beef suya was rated the best, closely followed by goat suya, then rabbit suya. The least scored samples were those of pork and chicken suya. Indeed, the beef, goat and rabbit suya significantly ($P<0.01$) maintained a better colour acceptance than the pork suya while only the beef suya showed a significant ($P<0.01$) difference in colour compared with the chicken suya. The trend of result in colour can be attributed to the fact that the beef and goat meat are in the same class of red meat, while the least performed sample-rabbit, pork and chicken are less red pigmented meat (Ikeme, 1990). Consumers being already accustomed to the red meat colour of suya would basically appreciate the red meat suya more than the pale coloured suya. The panelist reacted more positively ($P<0.01$) to the flavour of chicken and beef suya than the rest of the other samples. Rabbit suya was least accepted showing a significant difference ($P<0.01$) from the rest of the samples except the pork suya. One would have

TABLE 1: SENSORY EVALUATION OF SUYA MADE WITH PORK, BEEF, CHICKEN AND GOAT MEAT*

Sample	Colour	Flavour	Texture	Overall Acceptability
Pork suya	6.35^{c}	6.60^{bc}	5.51^{c}	6.40^{cd}
Beef suya	8.00^{a}	7.65^{a}	7.65^{a}	7.90^{a}
Chicken suya	6.75^{bc}	8.00^{a}	3.05^{d}	7.55^{ab}
Rabbit suya	7.20^{b}	6.10^{c}	3.60^{d}	6.00^{d}
Goat suya	7.30^{ab}	6.75^{b}	6.60^{b}	7.00^{bc}

*Means within the same column with different superscripts vary significantly ($P<0.01$).

expected the goat meat with its peculiar strong flavour to out-score the rest of the samples, but this was not the case. Probably the more familiar beef and chicken flavour the panelists are familiar with had a better impression on them. On texture, it is apparent that the stronger and firmer meat samples were more acceptable (Table 1) than the softer ones. Thus the beef and goat suya were more acceptable ($P<0.01$) than the rest. Chicken and rabbit suya were least rated in terms of texture. In overall acceptability, the beef and chicken suya showed no significant difference ($P<0.01$) from each other and were both best among the samples. They were closely followed by goat suya. The least accepted sample was the rabbit suya, followed by the pork meat, both of which were not significantly different ($P>0.01$) from each other.

In conclusion, it is apparent from the overall results that both goat meat and chicken could successfully substitute for beef in the production of acceptable suya. The quality characteristics as indicated by colour, flavour, and texture clearly show that both meat samples were rated as high as beef samples

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EFFECT OF COMMERCIAL DIETS ON EGG QUALITY CHARACTERISTICS

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ABSTRACT

The effect of four commercial feeds in Niger State Nigeria on egg quality characteristics was studied. The feed designated diets 1, 2, 3 and 4 were fed to Rhode Island Red (RIR) hens and their eggs were collected as from 38 weeks of age for 4 weeks. A total of 384 eggs were analysed for both external and internal egg quality traits. Diet1 was found to be superior in terms of better levels of inclusion of crude protein, ether extract, energy and iodine. Consequently the hens fed diet 1 produced heavier eggs with greater circumference, egg shape index, yolk height and albumen weight than hens on diet 4. Diets 2 and 3 were similar in their effect on the egg quality traits. All the feeds had lower crude protein, energy and micro-nutrient than the recommended levels for laying hens in the tropical region. The feed millers are advised to look into these deficiency areas in order to improve egg quality and hen productivity and this encourage poultry farmers to remain in business.

Keywords: Egg quality, commercial diets.

INTRODUCTION

Good quality egg depends on many factors (Cooks and Briggs, 1977) and Awosanya *et al.* (1998) identified breed, strain and age of hens as some of the factors. Consumers usually judge eggs by different criteria and they differ in their preference for egg quality. In an attempt to solve egg quality problem an area of great interest is that of nutrition as the quality of the egg is primarily a function of the nutrition of the laying hen (Offiong, 1982). Egg quality could be measured either externally or internally. One of the variables most commonly used to measure the internal quality of egg is Haugh unit (Haugh, 1937) but Kline, *et al.* (1965) and Hill *et al.* (1980) demonstrated the variability of Haugh unit with age of the layers. Other internal measurable traits of egg quality include yolk height, diameter, index and albumen height. External egg quality could be judged in terms of colour, shape, size, texture, length, circumference and structure.

However, inspite of many years of research, egg quality problems such as egg size and shell thickness still remain and these are quite pronounced in Niger State. These problems are thought to be associated with the nutritional quality of available layer's feeds in this environment. In several instances, the performance level claimed by the feed millers are rarely obtained by the farmers. This creates obvious need for proper investigation of the effect of available commercial layer's feed in the state on the egg quality trait. This work was therefore designed to evaluate the effect of 4 different commercial layers feed, prevalent in Niger State, Nigeria on egg quality characteristics with a view to proffering solutions, through useful advice, to egg quality problem in the area and in the country at large.

MATERIALS AND METHOD

A total of 384 eggs were collected from 4 groups of layers on 4 different types of commercial diet. The age of hen at first collection was 38 weeks. Twenty table eggs were collected weekly from each experimental groups of layers in duplicate. Egg collection was carried out for 4 weeks. The analysis of the eggs was done immediately they were collected from the pens. The breed of hens

used for this work was Rhode Island Red (RIR) (Isa Brown). The diets were designated 1, 2, 3 and 4. The external egg traits measured included egg weight, egg circumference and length and egg shell thickness. For egg weight measurement, eggs were weighed individually to the nearest 0.01g using a triple beam balance. Egg circumference and length were determined with vernier sliding calipers and the results were used to compute the shape index, that is, egg width over egg length.

Each egg was broken on a clean flat surface. The egg shell was collected and air dried for 1 hour after which the shell thickness was measured with micrometer screw gauge. The measurements were taken from the top (pointed part), bottom (round part) and the middle of the eggs. The internal quality of the eggs measured included egg albumen and yolk height using the tripod micrometer. The yolk diameter was taken as the maximum cross sectional diameter of the yolk using a pair of divider, which was read on a ruler in millimeters. Yolk weight was obtained by carefully separating the yolk from the albumen by hand. The yolk was then rolled on a damp paper to remove any adhering albumen prior to weighing. Yolk index was calculated as the proportion of yolk height to yolk diameter in millimeters.

The different feeds were subjected to proximate analysis according to (A.O.A.C, 1990) methods. The absorbance of copper, iron, manganese, magnesium, zinc, cobalt and selenium was measured by Atomic Absorption Spectrophotometer (AAS). Iodine was analysed using Elinslie – Caldwell methods as described by AOAC (1990).

The data collected were subjected to statistical analysis (Gomez and Gomez, 1984) and mean separation was done according to Duncan (1955) methods.

RESULTS AN DISCUSSION

The proximate composition of the diets (Table 1) showed significant differences ($P<0.05$) in percentage crude protein (CP), ether extracts (EE) and metabolisable energy (ME). No statistically significant ($P>0.05$) differences were observed in dry matter (DM), crude fibre (CF), calcium (Ca) and phosphorous (P) contents of the feeds. The proximate analysis indicates that diet1 is superior to other diets in terms of crude protein, ether extract and energy contents. Diet 1 had significantly ($P<0.05$) higher crude protein, ether extracts and metabolisable energy (Kcal/kg) than any other feed tested.

TABLE 1: ENERGY AND PROXIMATE COMPOSITION OF THE DIETS

	DIFFERENT DIETS				
Measurements (%)	1	2	3	4	SEM
Dry matter (DM)	81.50	82.50	82.25	82.50	5.74
Crude protein (CP)	13.14^{a}	9.52^{b}	8.98^{bc}	8.71^{c}	2.33
Ether extract (EE)	11.55^{a}	4.52^{b}	2.21^{b}	7.61^{ab}	3.21
Crude fibre (CF)	4.53	5.58	4.40	4.74	3.40
Ash	10.10	8.20	11.86	9.60	2.23
Calcium (Ca)	1.20	1.06	1.04	1.28	1.88
Phosphorous (P)	0.56	0.73	0.55	0.68	0.04
Ca: P ratio	2.14	1.43	1.89	1.88	0.08
Metabolisable energy, ME (Kcal/kg)	1.480^{a}	930^{b}	918^{b}	952^{b}	6.30

abc: Means denoted by different superscripts in the same row are significantly ($P<0.05$) different.

TABLE 2: MEAN MICRO – NUTRIENT CONCENTRATIONS IN THE DIETS (ppm)

	EXPERIMENTAL DIETS				
Nutrients	1	2	3	4	NRC*
Copper (Cu)	0.011	0.109	0.027	0.019	3.50
Iron (Fe)	0.100	0.175	0.152	0.103	80.00
Manganese (Mn)	0.105	0.092	0.093	0.092	25-100
Magnesium (Mg)	59.37	59.87	94.45	59.38	300
Zinc (Zn)	0.267	0.297	0.273	0.264	50
Iodine (Io)	47.90	13.50	13.40	13.50	40
Selenium (Se)	0.00	0.00	0.00	0.00	0.00
Cobalt (Co)	0.00	0.00	0.00	0.00	0.00

*NRC requirement: Source, Payne (1990).

Table 2 shows the mean micronutrient composition of the commercial feeds used. From Table 2 it is clear that micro-nutrient supplies of the feeds were below the National Research Council (NRC) minimum requirements. Although the level of inclusion of Magnesium in diet 3 appears higher than those of other feeds, it is quite low compared with NRC recommendation of 300 ppm. Only diet 1 met the iodine requirement for the layers.

Table 3 shows that the different diets affect the egg quality characteristics differently. Diet 1 significantly promoted the greatest egg weight (59.5g) while diet 4 gave the least egg weight (49.4g). Egg circumference values followed a similar trend as the egg weight values. Yolk height, yolk weight, egg shape index and albumen weight were reduced by diet 4 compared with the other diets. Shell thickness, yolk index and Haugh unit were not significantly ($P>0.05$) affected by the different diets. The small size of eggs of layers fed diet 4 together with poor yolk height and weight, albumen weight and egg shape index were attributed to the nutrient imbalance of diet 4, while the superior weight, yolk height and weight, albumen weight and egg shape index of layers fed diet 1 were attributed to the better nutrient balance of the diet. Diet 1 had higher

TABLE 3: EFFECT OF DIFFERENT DIETS ON EGG QUALITY TRAITS

	EXPERIMENTAL DIETS				
TRAITS	1	2	3	4	SEM
Egg weight (g)	59.54^{a}	51.62^{ab}	53.16^{b}	49.37^{c}	2.18
Shell thickness (mm)	0.25	0.22	0.23	0.22	0.15
Egg circumference (mm)	4.34^{c}	4.22^{ab}	4.19^{b}	4.01^{a}	0.07
Yolk height (cm)	1.26^{b}	1.16^{c}	1.17^{c}	0.80^{a}	0.01
Egg shape index	0.72^{a}	0.71^{a}	0.71^{a}	0.69^{b}	0.002
Yolk weight (g)	16.42^{a}	12.22^{ab}	16.40^{a}	11.96^{b}	0.03
Yolk index	0.355	0.354	0.356	0.350	0.002
Albumen weight (g)	36.01^{c}	34.00^{b}	35.28^{b}	31.53^{a}	0.03
Haugh unit	85.40	85.60	85.68	85.92	1.35

abc: Means denoted by different superscripts in the same row are significantly ($P<0.05$) different.

protein content than diet 4. Questerhout (1981) in agreement with Babatunde and Fetuga (1976) reported that egg weight increases as the dietary protein level increases and vice-versa. Diet 1 also had higher energy content than other diets tested which might have enhanced greater egg weight in agreement with Bergs and Bearse (1957), Singsen *et al.* (1959) and Combs (1960). The shell thickness in all the eggs tested were not statistically ($P>0.05$) different. This could be attributed to the similar levels of calcium and phosphorous in all the 4 diets. This work is in support of the works of Anderson *et al.* (1978) and Fletcher *et al.* (1983) that eggs of increasing weight have additional proportion of albumen at the expense of yolk and shell. Similarly, Gardener and Young (1972) attributed the increase in yolk, protein and lipid per egg, usually associated with increased dietary protein and energy to egg size. This is particularly true, more so that the internal quality of eggs were not adversely affected in this work as indicated by the value of the Haugh unit and yolk index.

Diets 2 and 3 are very similar considering their effect on the egg quality traits which is attributed to the similarities in the nutrients they furnish to the hens as indicated by the proximate and micro-nutrient composition of the two diets (Tables 1 and 2).

In conclusion diet 1 was found to be the best in terms of nutrient balance and superior quality of egg traits measured. Diet 4 was found to be the poorest based on the same criteria of assessment. Diets 2 and 3 were found to have identical nutrient composition and similar effect on the egg quality traits measured. Feed millers are advised to identify deficient nutrients and make appropriate adjustments.

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