



Physical and sensory evaluation of hams from pigs fed varying levels of ensiled wild sunflower (*Tithonia diversifolia*) leaf meal as protein supplement

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ABSTRACT: Physical and sensory qualities of hams from growing pigs fed varying inclusion levels of ensiled *Tithonia diversifolia* leaf meal (ETDLM) as protein supplement were evaluated. Two months old twenty four male growing pigs at an average initial weight of 13.2 ± 0.2 kg were randomly distributed in a completely randomized designed experiment into four iso-caloric and iso-nitrogenous dietary treatments such that the control diet had no ETDLM while diets 2, 3 and 4 had ETDLM at 10, 20 and 30% inclusion levels, respectively. Lean ham meats from pigs reared for 80-day feeding trial were evaluated. Relevant physical and sensory evaluation parameters were taken after slaughter. On the Hedonic scale, there was a consistent decrease across diets from the control diet to the diet containing the highest level of 30% ETDLM in most of the sensory evaluation parameters such as flavor, juiciness, ease of fragmentation, apparent adhesion, overall acceptability and colour. Only values obtained for residue after chewing had a different trend which seemed to increase as the level of ETDLM increased across the diets. Cooking loss of 54.8% was highest ($P < 0.05$) for hams from pigs on 10% ETDLM diet although similar ($P > 0.05$) to 50.8% in hams obtained from pigs on the control diet without ETDLM. Thermal shortening values in ham samples of pigs placed on diet with 30% ETDLM was the highest though similar ($P > 0.05$) to value obtained for hams from pigs placed on diet containing 20% ETDLM. The least thermal shortening ($P < 0.05$) was obtained for hams from pigs on the control diet without ETDLM. The highest cold shortening value was obtained for hams from pigs on the control diet without ETDLM and lowest for hams from pigs on 30% ETDLM diet. It appeared that hams from pigs on 20% ETDLM diets were generally preferred judging from the overall evaluation of taste panelists for its better physical characteristics as well as sensory evaluation parameters examined.

Keywords: ensiled *Tithonia diversifolia*; leaf meal; growing pigs; meat evaluation.

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INTRODUCTION

Pig production for commercial purposes is a lucrative and reliable one due to certain attributes of pigs and the Nigerian production system. Pigs have a high survival rate and also have the ability to utilize a host of agro-industrial by-products and crop residues e.g. brewery dried grains (TerMeulen Udo and El-

Harith, 1985) with little or no processing and at minimal cost (Tewe, 1985). Pigs are also known to be prolific producers, realizing 20 to 30 pigs from 2 or 2½ litters per year. One of its greatest potentials is its ability under efficient management and balanced ration to reach slaughter weight of about 80 to 90kg in about 7

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to 8 months, thus, making it one of the most efficient feed converters when offered a balanced diet. However, the production of pig is usually constrained by high cost of production in a commercial pig enterprise (Tewe, 1985). Dwindling profit in a pig enterprise is a function of poor quality feeds resulting from unbalanced rations and competition that exists between man and livestock for some of the feed raw materials. Fortunately, studies have shown that some unconventional plants and their by-products can replace some of the ingredients used in the formulation in pig rations. Additionally, the quality of meat depends largely on the quality of the feed being fed to an animal (Ikeme, 1990).

Green leaf has been recognized as cheap and abundant source of protein, and its ability to synthesize amino acids from a wide range of virtually unlimited and readily available primary materials such as water, carbohydrate and atmospheric nitrogen acknowledged. For example, leaves of cassava, *Glyricidia* and *Leucaena* have been reported to be rich in proteins, minerals, vitamins (B₁, B₂, and C) and carotenes, but their high fibre content limit their consumption in sufficient quantity to meet protein needs of monogastric animals (Agbede and Aletor, 2004; Fasuyi and Aletor, 2005).

MATERIALS AND METHODS

Location and preparation of the test ingredients (sun-dried ensiled *Tithonia diversifolia* leaf meal, ETDLM)

The experiment was carried out in the Teaching and Research Farm of Ekiti State University. Leaves of *T. diversifolia* were harvested fresh from maturing *T. diversifolia* plants with sharp knives from the top to the middle of the plant when the first inflorescence had opened in 60-80% of *Tithonia* plants. Harvesting of the leaves was done in Ekiti State University, within Ado-Ekiti, a town in the Southwest Nigeria in the rain

Tithonia diversifolia which is also known as Mexican sunflower or wild sunflower, is a leguminous herb that has been found to be high in crude protein and also sufficient for feeding livestock (Olayeni *et al.*, 2006), thus having the tendency of protein supplementation in livestock feeds. *Tithonia diversifolia* from various studies were analysed to contain 28.5% crude protein (Katto and Salazar, 1995), 18.9% CP, 13.2% ash, 5.5% ether extract, 11.0% CF and 51.4% NFE (Olayeniet *al.*, 2006), 22.15% CP (Wambui *et al.*, 2005). The CP content of 28.5% in *Tithonia diversifolia* leaf meal is higher compared to other leaf meals like Colliandra (18.9% CP), Alfalfa leaf meal (20.0% CP) and sweet potato leaf meal (14.0% CP) (Katto and Salazar, 1995).

Physical characteristics (which include cooking loss, cold shortening and thermal shortening) and sensory or organoleptic properties of meat (flavour, juiciness, tenderness, acceptability and colour) are measures used to determine the quality of processed meat (Ikeme, 1990; FAO, 1995).

The aim of this study is therefore to investigate the physical and sensory characteristics of the meat samples (ham) from grown pigs fed varying levels of *Tithonia diversifolia* leaves bio-fermented with molasses.

forest zone on latitude 7° 40' North of the equator and longitude 5° 15' East of the Greenwich Meridian with ambient temperature, 25-37°C; relative humidity, 70%; wind, SSW at 11mph (18km/h); barometric pressure, 29.68' Hg(F). They were chopped with a sharp kitchen knife into small pieces of about 2-3cm before ensiling. The chopped leaves were ensiled with 4% molasses of the total weight of *T. diversifolia* leaves. The ensiled material was kept in an airtight plastic for a period of 21 days for proper fermentation (Fasuyi *et al.*, 2010). At the end of 21 days,

moisture content and pH of the silage were recorded and the silage formed was sundried. Sun-drying was carried out to facilitate a further elimination of inherent anti-nutrients and to ensure a proper mix of ETDLM with other feed components. Sun-drying was done for 4 days to achieve an even drying to 12-13% moisture content. The silage formed was taken then milled. Samples of ETDLM were analysed for proximate and chemical composition before the inclusion of the dried samples into the diets.

Experimental animals, experimental design and animal management

A total of twenty four (24) male growing pigs (about 2½ months old) of crosses of Large

White breed with a mean body weight of 13.3±0.5 kg were used for this study. The experimental pigs were given adequate veterinary attention and antibiotics to prevent carry-over ailments from the original source. Experimental animals were randomly allocated to individual pens. The completely randomized experimental design was adopted.

Feeding trial

The feeding trial proper was carried out at the Piggery Unit of the Teaching and Research Farm of Ekiti State University, Ado-Ekiti for a period of 80 days. The growing pigs were individually fed a standard growing diet (18.6% CP; 12.55MJ kg⁻¹ DE; 6.9% CF; 4.8% fat) for a 10-day pre-trial

Table 1: Gross composition (%) of the experimental diets

Ingredients	Diets (% inclusion levels of ETDLM)			
	Diet 1 (Control) 0% ETDLM	Diet 2 10% ETDLM	Diet 3 20% ETDLM	Diet 4 30% ETDLM
Maize	35.00	30.00	25.00	20.00
SBM	15.00	10.00	10.00	5.00
PKC	10.00	20.00	15.00	15.00
BDG	12.50	12.50	12.50	12.50
Wheat offals	20.00	10.00	10.00	10.00
Fish meal	2.00	2.00	2.00	2.00
*ETDLM	0.00	10.00	20.00	30.00
Bone meal	4.00	4.00	4.00	4.00
Oyster shell	1.00	1.00	1.00	1.00
** Premix	0.25	0.25	0.25	0.25
Salt (NaCl)	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00
Analysed Composition (%)				
CP	18.62	18.89	18.91	18.88
CF	6.97	7.84	9.31	12.45
EE	4.77	5.27	4.98	5.26
Ash	7.06	13.95	12.72	12.74
MC	8.33	9.74	12.55	9.92
CHO	54.27	45.30	42.55	43.47

SBM-soybean meal; PKC-palm kernel cake; BDG-brewery dried grains; CF-crude fibre; CP-crude protein; EE-ether extract; MC-moisture content; CHO-carbohydrate; *ETDLM, sun-dried ensiled *Tithonia diversifolia* leaf meal

**Premix contained: vitamins A (10,000,000iu);D (2,000,000iu); E(35,000iu); K (1900mg); B12 (19mg); Riboflavin (7,000mg); Pyridoxine (3800mg); Thiamine(2,200mg); D Pantothenic acid(11,000mg); Nicotinic acid (45,000mg); Folic acid(1400mg); Biotin (113mg); and Trace elements as Cu(8000mg);Mn (64,000mg); Zn (40,000mg); Fe(32,000mg); Se(160mg); I2 (800mg) and other items as Co(400mg); Choline (475,000mg); Methionine (50,000mg); BHT (5,000mg) and Spiramycine (5,000mg) per 2.5kg.

Table 2: Proximate/Chemical characteristics of *Tithonia diversifolia* leaf meal (TDLM) and ensiled TDLM (ETDLM)

	TDLM*	ETDLM
Dry matter, %	11.0	13.0
% of DM		
Crude protein	20.6	21.3
Crude fibre	18.9	15.3
Ether extracts	4.0	5.2
Carbohydrate	42.5	57.1
Ash	14.0	14.7
pH	6.35	3.76
Antinutrients (mg/100g)		
Phytin	79.1	51.1
Tannin	0.39	0.21
Oxalate	1.76	0.33
Saponin	2.36	NA
Alkaloid	1.23	0.75
Flavonoid	0.87	0.74

Means are for duplicate determination

NA, not available

*Source: Fasuyi *et al* (2010); Fasuyi and Ibitayo (2011).

acclimatization period. Four diets (D1, D2, D3 and D4) were formulated to contain about 19.0% crude protein and 12.55MJ kg⁻¹ digestible energy (Table 1).

The control diet (D1) was a standard growing diet for pigs without ensiled *T. diversifolia*. The other three diets were compounded such that sun-dried ensiled *T. diversifolia* leaf meal (ETDLM) partially replaced maize and palm kernel cake and also replaced soybeans at 10, 20 and 30% inclusion levels in D2, D3 and D4, respectively. Daily feeding rate was 3.30% of the pigs' live weight (Chhay and Preston, 2005). Water was given to the pigs *ad libitum* throughout the period of the experiment.

Phytochemical Screening of ETDLM

The extraction and precipitation of phytin in the fresh and dried leaves was done by the method of Wheeler and Ferrel (1971), while iron in the precipitate was determined as described by Makower (1970). Phytin was determined by

using a 4:6 Fe/P ratio to calculate phytin phosphorous and multiplying the phytin phosphorous by 3.55 as suggested by Young and Greaves (1940). Oxalate content was determined by the titrimetric method of Moir (1953) as modified by Ranjhan and Krishna (1980). Where extracts were intensely coloured, they were decolourised with activated charcoal (Balogun and Fetuga, 1980). The polyphenols (tannic acid) was determined by extracting the dried and finely blended TDLM (250 mg in 10 ml of 70% aqueous acetone) for 2 hrs at 30 oC using Gallenkamp orbital shaker (Survey, UK). Pigments and fats were first removed from the leaves by extracting with di-ethyl ether containing 1% acetic acid. Thereafter, the total polyphenols (as tannic equivalent) were determined in 0.05, 0.2 or 0.5 ml aliquot using Folin Ciocalteu (Sigma) and standard tannic acid (0.5 mg/ml) as described by Makkar and Goodchild (1996). Alkaloid determination was done using the method of Harbone (1973) while

flavonoid determination was by the method described by Boham and Kocipai-Abyazan (1974). Saponin content was assayed by the techniques of Rodriguez *et al.* (1986).

Slaughter Process

After the 80-day feeding trial, the pigs were slaughtered. About eighteen hours prior to slaughtering of pigs, the animals were put on starvation. The slaughtering process involved stunning and immobilization of the animals using a sledge hammer followed by bleeding which was done by cutting the jugular vein using a sharp knife. Singeing, washing, evisceration and cutting of carcass into primal cuts were thereafter done.

Meat Evaluation of the Slaughtered Pigs

Meat samples used were *semi-membranous* muscles obtained from the left ham muscles of pigs selected from each dietary treatment. The meat samples were trimmed free of external fat before they were cut into various sizes. These samples were labeled for physical and sensory evaluations.

Physical Evaluation of Meat Samples

Cooking loss

This was expressed as a percentage. This is the difference in the weights of a primal sample chops before and after cooking. The ham muscles cut into pieces from individual animals were weighed, replicated thrice and the values noted for initial weight (W_i). These samples were put individually in heat resistance polythene bags with separate means of identification and were boiled in a moist heat at 100°C to an internal temperature of 70°C for 20 minutes using a stove. They were cooled to room temperature, blotted dry and weighted. The percentage cooking losses were then calculated (Mahendraker *et al.*, 1988).

Cold shortening

Cold shortening was the difference between the lengths of a primal sample chops before (L_i) and after (L_f) refrigerating expressed as a percentage. Samples of the ham muscle from individual pigs were cut into various lengths and the values were noted for initial length. The samples were frozen at temperature less than -4°C for 24 hours. The samples were removed and then measured again to get the final length (L_f). Then the percentage cold shortening were calculated (Mahendraker *et al.*, 1988).

Thermal shortening

After calculating the values of cold shortening, meat samples were defrosted and put into a perforated foil paper and boiled in an oven at 175°C for 30 minutes. The lengths from these meat samples was measured again after cooling to get the value of thermal shortening (Mahendraker *et al.*, 1988).

Sensory Evaluation of meat samples

A total of forty trained individuals or panelists aged between 25 to 32 years (twenty males and twenty females) were used for this evaluation. The panelists were randomly allocated to four treatments. The panelists were made to rate each of the three replicates of the meat samples. Equal bite size from each treatment were cooked and served to the panelists. Each sample was evaluated independent of the other. The panelists rated the samples on a nine point Hedonic scale for flavour, juiciness, texture, tenderness, residue after chewing, colour and overall acceptability with maximum score of nine to extremely high condition while the lowest score of 1 was assigned to the poorest condition (Mahendraker *et al.*, 1988).

Statistical analysis

The data collected in the completely randomized experimental design were subjected to statistical

analysis using the Minitab Computer Software package (2005 version). The means were compared using the Duncan's Multiple Range Test (DMRT).

Data obtained from the physical characteristics (cooking loss, cold shortening, and thermal

shortening) of meat samples were subjected to descriptive analysis.

RESULTS

Sensory evaluation

Sensory evaluation parameters are shown in Table 3. The Hedonic score for flavour of ham samples from experimental pigs decreased (although not significant; $P>0.05$) across the dietary treatments with the highest value of 6.90 ± 0.77 for the control diet without ETDLM and the lowest value of 5.00 ± 0.49 for samples from pigs on diet containing 30% ETDLM.

The values obtained for juiciness revealed that meat samples of pigs placed on control diet 1 (without ETDLM inclusion) at 6.80 was not significantly different ($P>0.05$) from ham samples of pigs on diets 2 and 3 (10% and 20% ETDLM inclusion, respectively) at 5.70 and 6.80 score on the Hedonic scale, respectively. However, the lowest juiciness value of 4.20 ± 0.59 was recorded for ham samples from pigs on diet with 30% ETDLM.

The lowest significant ($P<0.05$) ease of fragmentation value of 4.30 ± 0.47 on the Hedonic scale was obtained for ham samples from pig on 30% ETDLM. Other ease of fragmentation values were higher and similar ($P>0.05$) at 6.40 ± 0.40 , 5.90 ± 0.43 and 6.80 ± 0.20 for hams from pigs fed diets 1, 2 and 3, respectively. Apparent adhesion followed the same pattern for ease of fragmentation with the lowest significant ($P<0.05$) Hedonic value of 3.40 ± 0.27 obtained for ham samples from pigs on the 30% ETDLM diet. Other apparent adhesion values were higher and similar ($P>0.05$) at 6.00 ± 0.68 , 5.10 ± 0.46 and 5.80 ± 0.44 for ham samples from pigs on diets 1, 2 and 3, respectively.

The residue after chewing score of 6.80 ± 0.70 obtained for ham samples from pigs on 30% ETDLM was highest but similar ($P>0.05$) to scores obtained for meat samples from pigs on control diet 1 (without ETDLM) and diet 3(20%

Table 3: Sensory evaluation of meat samples (ham) of pigs fed varying levels of ensiled *Tithonia diversifolia* leaf meal (ETDLM)

Sensory evaluation Parameters	Diets			
	1	2	3	4
	% inclusion levels of ETDLM			
	0	10	20	30
Flavour	6.90 ± 0.77	6.20 ± 0.53	5.50 ± 0.52	5.00 ± 0.49
Juiciness	6.80 ± 0.59^a	5.70 ± 0.42^{ab}	6.40 ± 0.52^a	4.20 ± 0.59^b
Ease of fragmentation	6.40 ± 0.40^a	5.90 ± 0.43^a	6.80 ± 0.20^a	4.30 ± 0.47^b
Apparent adhesion	6.00 ± 0.68^a	5.10 ± 0.46^a	5.80 ± 0.44^a	3.40 ± 0.27^b
Residue after chewing	6.20 ± 0.70^{ab}	4.90 ± 0.60^b	6.00 ± 0.39^{ab}	6.80 ± 0.70^a
Overall acceptability	7.60 ± 0.22^a	6.80 ± 0.39^{ab}	6.10 ± 0.35^b	4.40 ± 0.65^c
Colour	7.30 ± 0.21^a	6.80 ± 0.25^a	5.80 ± 0.20^b	4.20 ± 0.51^c

Means with the same superscripts on the same row are not significantly different ($P>0.05$). Values are expressed in Mean \pm standard deviation.

ETDLM inclusion) at 6.20 and 6.00 score on the Hedonic scale, respectively.

The acceptability score was highest at 7.60 ± 0.22 in ham samples from pigs placed on control diet 1 that did not contain ETDLM but similar ($P > 0.05$) to 6.80 ± 0.40 obtained for ham samples from pig on 10% ETDLM. Acceptability scores decreased ($P < 0.05$) with increased dietary level of ETDLM.

There was a downward slide of redness colouration of pork samples from pigs placed on the control diet 1 (without ETDLM) to the ham samples of pigs placed on diet 4 (30% ETDLM inclusion). The 4.20 ± 0.51 score obtained for ham samples from pigs on diet containing 30% ETDLM was significantly lower ($P < 0.05$) than scores obtained for ham samples from pigs on other diets. The redness colouration on the Hedonic scale score sheet had the highest score of 7.30 ± 0.21 for ham samples from pig on the control diet without ETDLM albeit similar ($P > 0.05$) to 6.80 obtained for ham samples from pig on diet 2 (10% ETDLM inclusion).

Physical characteristics of ham samples from experimental pigs

Physical characteristics of ham samples from the experimental pigs are illustrated by charts in Figures 1, 2 and 3.

Pork samples from diet 2 (10% ETDLM inclusion) had the highest value of $54.8 \pm 0.12\%$ cooking loss although similar ($P < 0.05$) to $50.8 \pm 1.02\%$ obtained for ham samples from pig on the control diet that had no ETDLM. The least value of $25.0 \pm 0.32\%$ cooking loss was obtained for ham samples from pigs on the diet containing the highest ETDLM of $30 \pm 0.41\%$. The highest thermal shortening value of $34.9 \pm 1.12\%$ was obtained for ham samples from pigs on 30% ETDLM diet although similar ($P > 0.05$) to $34.8 \pm 0.58\%$ obtained for ham samples from pigs on 20% ETDLM diet. The lowest thermal shortening value of $17.3 \pm 1.13\%$ was obtained for ham samples from pigs on the control diet with no ETDLM. There appeared to be progression in values of thermal shortening from the control diet (without ETDLM inclusion) at

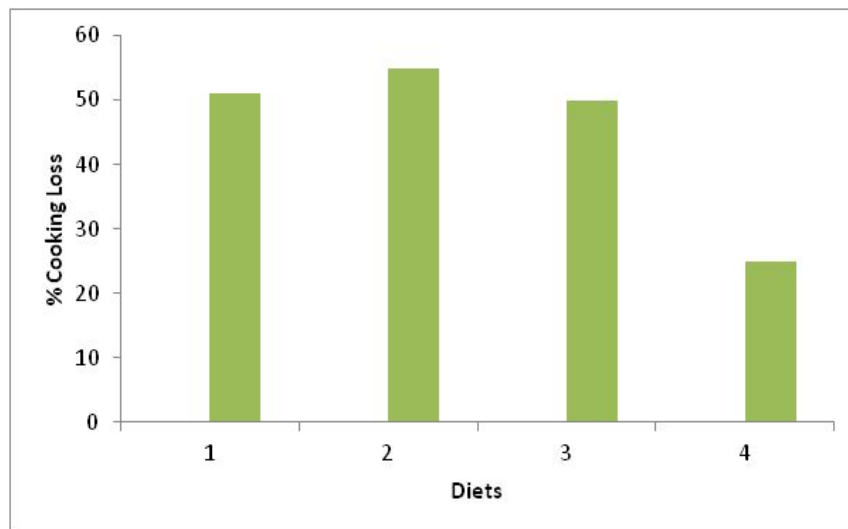


Figure 1: Cooking loss (%) of ham samples of experimental pigs fed varying levels of ensiled *Tithonia diversifolia* leaf meal

17.3±0.34% to the diet containing the highest 30% inclusion of ETDLM at 34.9±0.78%.

The cold shortening value of 13.0±0.14% obtained for meat samples from pigs on the control diet 1 (0% ETDLM) was the highest but similar to 10.0±0.47% obtained for ham samples

from pigs on diet with 10% ETDLM inclusion. The cold shortening value of 4.3±0.23% obtained for ham samples from pigs on 30% was the lowest but also similar ($P>0.05$) to 4.4±0.34% obtained for ham samples from pigs on diet 3 (20% ETDLM).

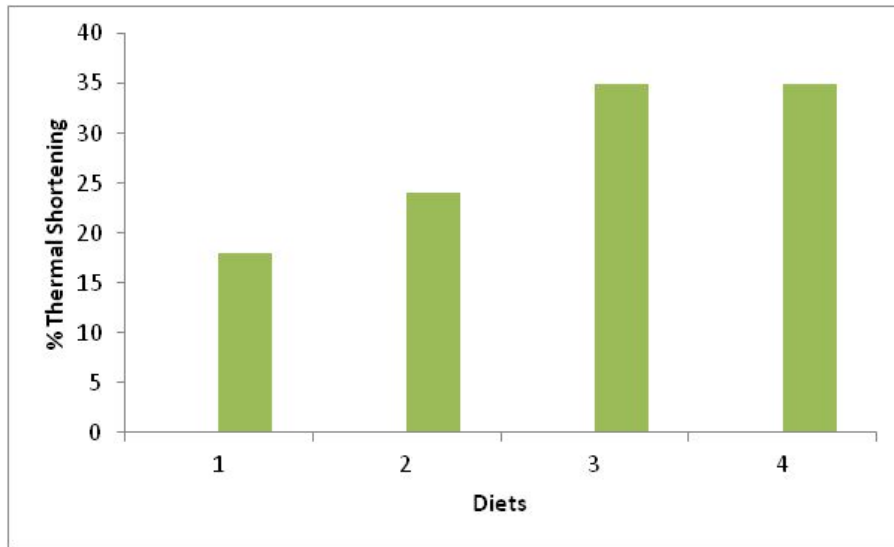


Figure 2: Thermal shortening (%) of ham samples of experimental pigs fed varying levels of ensiled *Tithonia diversifolia* leaf meal

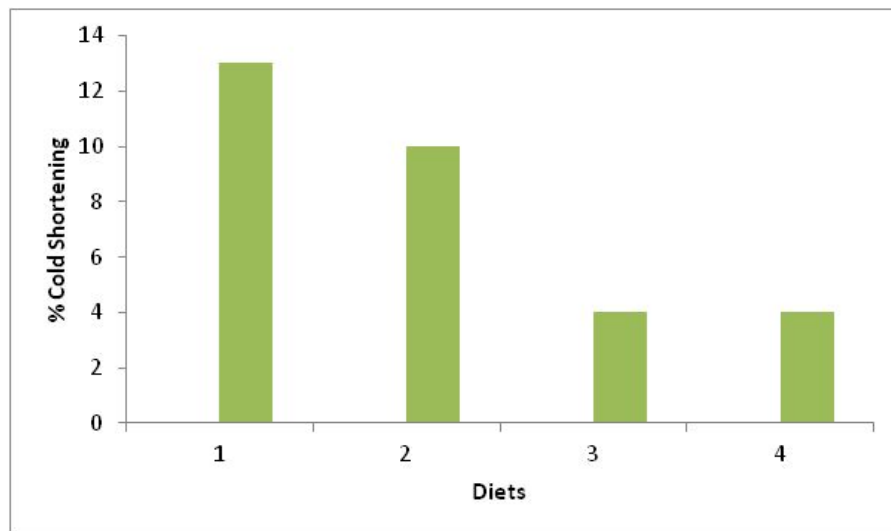


Figure 3: Cold shortening (%) of ham samples of experimental pigs fed varying levels of ensiled *Tithonia diversifolia* leaf meal

DISCUSSION

Sensory Evaluation

The similar scores obtained for flavour evaluation in this study indicates that increase in the inclusion levels of ETDLM in the diets had no effect on the flavor of the meat samples. The values in this study was similar to values obtained for flavor observed in sensory evaluation of pigs placed on *Tithonia diversifolia* leaf meal (TDLM) based diets (Ibitayo, 2010) but higher than values obtained for cooked Gudali meat (Ezekwe *et al.*, 1997).

Juiciness scores obtained for ham samples from pigs fed similar levels of un-fermented *Tithonia diversifolia* leaf meal were consistently higher (Ibitayo, 2010) compared with ETDLM in the present study. There was the likelihood of interactions favouring meat juiciness in the presence of certain levels of antinutrients in un-fermented *T. diversifolia* leaf meal.

Juiciness of meat depends on the raw meat quality and cooking method (Margit *et al.*, 2003). Juiciness of meat is also directly related to the intramuscular lipid and moisture content of the meat (Cross *et al.*, 1986). Meat juices play a vital role in conveying the overall impression of palatability to the consumers. It therefore suffices that pork samples of pigs placed on 20% ETDLM inclusion in this study which had similar value with pork samples from the control diet may have had relatively high intramuscular lipid and moisture content which was released during chewing to convey the overall impression of palatability.

Ease of fragmentation (EoF), apparent adhesion (AA) and residue after chewing (RAC) are all indices of tenderness of meat. The values obtained for these parameters compared favourably with values obtained for tenderness of local hen cooked at 100°C for 20minutes (Ogungbamigbe, 2007) and also similar to the range of scores of 3.40 to 7.00 for tenderness of

pork of pigs placed on diets containing varying inclusion levels of *Tithonia diversifolia* leaf meal (Ibitayo, 2010). Tenderness could be described as the ease with which the teeth sink into the meat when chewed. It is regarded as the most important sensory attribute affecting meat acceptability (Cross *et al.*, 1986; Quali, 1990 and Warkup *et al.*, 1995). It can also be surmised that pork samples of pigs placed on 20% inclusion of ETDLM had better tenderness quality than other values obtained for hams of pigs on other diets. The acceptability values of ham samples in this study even at the highest ETDLM inclusion of 30% was in agreement with the scores obtained for cured pork (Solomon *et al.*, 1994). The high acceptability scores particularly for ham samples from pigs on 10% and 20% ETDLM were remarkable enough to indicate that inclusion levels of ETDLM even at 20% did not adversely affect the acceptability rating.

The colour score obtained for ham samples from pigs on ETDLM diets were in conformity with previous study on mechanically deboned chicken meat (Perlo *et al.*, 2006). Colour is the first criterion consumers use to judge meat quality and acceptability (Conforth and Cole, 1994).

The Hedonic scale score of 6.80 obtained for pork from pigs on 10% ETDLM inclusion was the highest score among other ETDLM diets suggesting that increased ETDLM in diets did not favour colour acceptability.

Physical Characteristics

The highest values of cooking loss obtained for meat samples of pigs fed 10% ETDLM inclusion based diets at 54.78% could be due to a greater degree of shrinkage of muscle fibres and protein coagulation (Ashgar and Pearson, 1980).

Cooking loss depends on raw meat quality and it is a combination of liquid and soluble matter

which is lost from the meat during cooking. At increasing temperatures the water content of the meat decreases, while fat and protein contents increases indicating that the main part of cooking loss in meat is water due to evaporation of liquid (Heymann *et al.*, 1990).

The increment of the thermal shortening values as ETDLM inclusion increased indicates that there was an increasing contraction on the pork samples due to heat. The decreasing cold shortening values as ETDLM levels in diets increased also indicates a decreasing contraction to cold.

CONCLUSION

All investigated sensory and physical characteristics of meat samples obtained in this study indicated favourable disposition of panelists with better ratings than meat obtained from pigs placed on the control diet in which ETDLM was not included and compared favourably with acceptable standards. Sensory evaluation parameters for hams on 20% ETDLM

diets compared favourably (and higher in few cases) than values obtained for hams on the control diet. Results generally indicated that meat samples of pigs on diets with ETDLM inclusions of 10% and 20% were favoured for flavor, juiciness, ease of fragmentation, overall acceptability and apparent adhesion parameters by the taste panelists.

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