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EFFECT OF *OCIMUM GRATISSIMUM* PASTE ON CHEMICAL AND MINERAL COMPOSITION OF *DAMBU NAMA* FROM CAMEL MEAT

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ABSTRACT

The study was carried out to evaluate the chemical and mineral compositions of Dambu Nama (DN) processed from camel meat cured with Ocimum gratissimum (O.G). The study was laid on a 5x3 factorial arrangement in a completely randomized design, with 5 inclusion levels of O. gratissimum paste (0, 5, 10, 15 and 20) and 3 storage period (0, 30, and 60days). The lean meat was cut into pieces of approximately 2cm by 2cm dimension, washed with clean water, and allotted into five treatments. The meat was boiled at 100 ºC for 90 minutes and was pounded into shreds by using mortar and pestle. The ingredients; red pepper, black pepper, Alligator Pepper, clove, ginger, onion, salt, vegetable oil and seasoning cubes were mixed homogenously with the shredded meat before frying. The product was subjected to chemical analysis at each storage period. The proximate and mineral composition of DN cured with Ocimum gratissimum paste varied significantly (P<0.05) across the treatments with moisture values ranging from 12.65-19.03%, protein (32.33-36.83%), ether extract (13.71-15.99%) and ash (2.89-3.61%), iron (5.80-7.20%), calcium (156.11-216.78%) and phosphorus (135.56-190.33%). DN obtained after the storage period showed that the crude protein (33.21-38.05%) , Ether Extract (10.54-18.07%), Ash content (2.79-4.21%), phosphorus (5.60-7.88%), Calcium (158.30-205.67%) and Phosphorus (138.67-166.67%) increased while moisture content (18.09-13.23%) reduced indicating that camel DN has a high nutrient content indicating longer shelf life of the products. Dambu nama from camel meat cured with O.G at 15% inclusion level and 60days storage period enhances its shelf life and nutritional value.

Key words: **Camel, *Dambu nama, Ocimum gratissium*, shelf-life**

INTRODUCTION

Camel (*Camelus dromedarius*) is a good source of meat for human consumption (Kadim *et al.* 2008). Moreover, it contains higher amounts of polyunsaturated fatty acids and similar essential and non-essential amino acids than other meat animals. Camel is one of the most important domestic animals in the arid and semi-arid regions as it is equipped to produce high quality food at comparatively low costs under extremely harsh environments (Kadim *et al.,* 2008). The meat contains less fat as well as less cholesterol and relatively high poly unsaturated fatty acids than other animal meats. *Dambu nama* (meat floss, shredded meat) is a fried shredded processed-meat product that is highly seasoned with spices using lean beef, camel, chicken, Pork, fish etc. It is produced mainly by Hausas and Fulani's in Northern part of Nigeria. *Ocimum gratissimum* (basil leaf), it is called "Effirin" in Yoruba. "Nchawu" in Igbo and "Daidoya" in Hausa. *Ocimum gratissimum, have* been discovered to provide diverse culinary and medicinal properties. These medicinal properties exert bacteriostatic and bacteriocidal effects on some bacteria. These effects have been attributed to the peptides, alkalonoids, essential oils, phenols and flavonols which are major components in these plants (Okeke *et al.,* 2008; Funmilayo *et al.,* 2010).

MATERIALS AND METHODS

This study was carried out at the Animal Products Laboratory, Department of Animal Science, Ahmadu Bello University Zaria, Kaduna State. Zaria is located within the Northern Guinea Savannah Zone on latitude $11^0$9'06'N and Longitude 7^0 38'55" E and at an altitude of 706m above sea-level (IAR, 2019). The mean minimum and maximum temperature ranges between 26-32^{0}c depending on the season while the mean relatively humidity during the dry and wet seasons are 21 and 72% respectively (IAR, 2019).

The study was laid on a 5x3 factorial arrangement in a completely randomized design (CRD), where (5) represented the inclusion level of *O. gratissimum paste* (0, 5, 10, 15 and 20%) and (3) represented the storage period (0, 30 and 60days). Five kilograms (5000g) of fresh camel meat of high grade from semi membranous muscle was purchased from the Zango abattoir, Zaria for this study. The samples were preserved under cold storage of 20^{0C} and immediately transported to the meat laboratory for the production of *Dambu nama.* The meat was trimmed off of all visible fats and weighed. The lean meat was cut into pieces of approximately 2cm by 2cm dimension, washed with clean water and allotted into different five treatments comprising of *O. gratissimum* at five inclusion levels (0, 5, 10, 15 and 20 %) and other ingredients such as red pepper, black pepper, Alligator Pepper, clove, ginger, basil leaf paste, onion, salt,vegetable oil and seasoning cube. The meat was boiled at 100 ºC for 90 minutes and was pounded into shreds by using mortar and pestle. The measured ingredients were mixed homogenously with the shredded meat before frying Chemical and mineral composition were conducted on *Dambu nama* using AOAC (2005) method at T and D Analytical Laboratories and Consultancy Service, Ibadan. Data collected were subjected to Analysis of Variance (ANOVA) of SAS (2008) while the comparison of the mean was done using Duncan Multiple Range Test (DMRT) (Duncan, 1995).

RESULTS AND DISCUSSION

Effect of *Ocimum gratissimum* inclusion level on proximate and minerals composition of *Dambu Nama* produced from camel meat

The effect of *Ocimum gratissimum* inclusion level on proximate and minerals composition of *Dambu Nama* (DN) produced from camel meat is shown in Table 1. The inclusion of *O. gratissimum* at different levels influenced (P<0.05) moisture content (MC), crude protein (CP), ether extract (EE) and ash contents. The CP of DN having 0% *O. gratissimum* were significantly lower (P<0.05) than those with 5, 10, 15 and 20%. However, the EE of DN at 10% and 15% were significantly higher (P<0.05) than 0,5 and 20% with *O. gratissimum.* The ash content of *DN* meat with 10% *O. gratissimum* included was higher (P<0.05) than the 20% but similar to those with *O. gratissimum* included at other levels. The mineral contents of *DN* produced from camel meat were influenced positively (P<0.05) by including *O. gratissimum.* The values of iron in DN with 15% *O. gratissimum* and the 20% were similar (P>0.05) but were higher (P<0.05) than the other treatment in the group, the control (0%) as the highest (P<0.05) calcium and phosphorus content and least with 20% content among the treatment group.

Table 1: Effect of *Ocimum gratissimum* inclusion levels on proximate and mineral composition of *Dambu nama* produced from camel meat

Parameters (%)	*Ocimum gratissimum* inclusion level (%)					SEM	LOS
	0	5	10	15	20		
Moisture content	17.32^{ab}	14.15^{bc}	19.03^{a}	17.98^{a}	12.65^{c}	1.134	*
Crude protein	32.33^{b}	35.72^{a}	35.30^{a}	36.83^{a}	36.83^{a}	0.931	*
Ether extract	14.79^{bc}	14.28^{cd}	15.99^{a}	15.58^{ab}	13.71^{d}	0.311	*
Ash	3.58^{a}	3.26^{ab}	3.61^{a}	3.41^{ab}	2.89^{b}	0.178	*
Fe (mg/kg)	5.80^{c}	5.66^{c}	6.49^{b}	7.24^{a}	7.20^{a}	0.117	*

Ca (mg/kg)	216.78[a]	175.00[c]	171.67[c]	181.11[b]	156.11[d]	2.023	*
P (mg/kg)	190.33[a]	140.00[cd]	145.00[bc]	146.67[b]	135.56[d]	2.188	*

[abcd] Means with different superscripts along the row differs significantly (P<0.05), Fe = Iron, Ca = Calcium, P = Phosphorus, SEM = standard error of the mean, LOS = Least of significant, * = significant

Moisture Content of DN samples ranged from (12.65-19.03) fell within the values of 17-69.59% reported by Omojola *et al.* (2014) but was above the report of Huda *et al.* (2012). This could be attributed to the level of cooking and frying of the *Dambu nama.* Crude Potein content of the (DN) samples ranged from 32.33-36.83% which was similar to the report of Fillon and Henry (1998). who indicated that losses in the moisture content resulted in higher crude protein. The ether extract content of DN samples fell within 3.20-31.14% obtained by Huda (2012) for different shredded meat and the increase in ash content observed in DN in this study could be related to the incorporation of *O. gratissimum* during preparation of DN. The result of iron, calcium and phosphorus content of this study were both high than the findings of Eke *et al*. (2013) in evaluation of beef based Dambu Nama. The variation in this result could be attributed to inclusion of *O. gratissimum* and ingredients used in the processing of camel Dambu Nama.

Effect of Storage Duration on Proximate and Mineral Composition of *Kilishi* Produced from Camel Meat

The effect of storage duration on the proximate and mineral composition of Dambu Nama (DN) produced from camel meat is presented in Table 2. All the parameters measured were significantly (P<0.05) affected by the duration. The moisture content of *Dambu Nama* stored for 0day was significantly (P<0.05) higher than 30 and 60 days. The crude protein content in DN stored for 60 day was significantly (P<0.05) higher than 30 and 0days. The ether extract and ash contents at 60 days were significantly (P<0.05) higher than at 0 and 30days of storage. The iron, calcium and phosphorus contents of DN meat stored for 0 day was significantly (P<0.05) higher than for 30 and 60 days respectively. The result of Moisture content at 0day (18.09) was significantly higher than (P<0.05) 30 and 60days but was higher than the findings of Ogunsola and Omojola (2008). This indicates that the meat was well fried and was stored properly.

The result of protein content obtained from this study at 0day (32.21%) was similar to 30days (34.84) but significantly lower than 60days (38.05). This could be attributed to a decrease in the moisture content of the meat due to the storage period. The high ash and ether content of this study at 60days could have been contributed by *O. gratissimum* paste added to the ingredients, the results of this study fell within the range of 3.20-31.14% obtained by Huda (2012) for different shredded meat. The result of iron, calcium, and phosphorus from this study was higher than the report of Eke *et al,* (2013). The differences observed in this study compared to the results of other authors could be as a result of ingredients, meat types and processing method.

Table 4.14: Effect of Storage Duration on the Proximate Composition of *Dambu nama* Produced from Camel Meat

	Duration (days)				
Parameters (%)	0	30	60	SEM	LOS
Moisture content	18.09[a]	17.38[a]	13.23[b]	0.878	*
Crude protein	33.21[b]	34.84[b]	38.05[a]	0.721	*
Ether extract	10.54[c]	15.99[b]	18.07[a]	0.241	*
Ash	2.79[b]	3.04[b]	4.21[a]	0.138	*
Fe (mg/kg)	7.88[a]	5.95[b]	5.60[c]	0.091	*

Ca (mg/kg)	205.67[a]	176.40[b]	158.30[c]	1.567	*
P (mg/kg)	166.67[a]	149.20[b]	138.67[c]	1.695	*

[abc] Means with different superscripts along the same rows differs significantly (P<0.05); Fe = Iron, Ca = Calcium, P= Phosphorus, SEM = Standard error of the mean, LOS = Least of significant, * = significant

CONCLUSION

The results of this study show that *O. gratissimum* is a strong antioxidant that has positively affected the proximate and mineral composition of camel *Dambu Nama* as well increased the shelf life

RECOMMENDATION

The inclusion of *O. gratissimum* paste at 15% and stored for 60 days can be used for curing of meat because it has a significant effect on proximate and mineral composition of camel *Dambu Nama* as well increased the shelf life

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