# CHEMICAL COMPOSITION AND ORGANOLEPTIC EVALUATION OF MINCED MEAT *(DAMBUN NAMA)* OF SOME POULTRY SPECIES

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## ABSTRACT

The study examined chemical composition, sensory evaluation and microbial loads of minced meat product of poultry species within Bauchi metropolis. Five different minced meat products from guinea fowl, Noiler, Indigenous chicken, Broiler and duck were subjected into sensory evaluation. These products were given to a taste panel which comprises of staffs and student using a 9 – point hedonic scale. The different meat products were subjected to chemical and microbial load analysis. The result showed that in proximate composition of protein ranges from 59.13 – 56.93%, dry matter 83.61 – 81.61%, ether extract 11.29 – 10.19% and Ash 2.03 – 1.83% respectively. The minerals of different minced meat product varied in terms of calcium, from 0.21 – 0.17%, phosphorus 0.20 – 0.15%, sodium 0.06 – 0.04% and likewise potassium 0.003 – 0.001% differ from each other. The microbial counts revealed the total bacteria load of the products varied significantly ($P<0.001$) with indigenous chicken 272.67 x $10^6$cfu/g tends to have highest bacteria load while 109.33 x $10^6$cfu/g the least load of bacteria was in broiler minced meat. Total fungal count was also significant statistically ($P<0.001$) in various product however, indigenous chicken, 121.10 x $10^6$cfu/g differ among the products, statistically and broiler 68.67 x $10^6$cfu/g was the lowest. However sensory evaluation of different minced meat product were significant ($P<0.001$) in terms, of flavour, aroma, acceptability while juiciness, palatability were also significant at ($P<0.001$) and colour tends to be significant ($P<0.05$), tenderness not significant among all products. Guinea fowl and Noiler tends to have higher flavour as compared with the rest of the products though all are similar, aroma is high in Noiler (8.33 x $10^6$cfu/g) followed by guinea fowl (8.30 x $10^6$cfu/g) and low in duck (6.63 x $10^6$cfu/g). Juiciness is high in Noiler (8.17x $10^6$cfu/g) low in duck (6.67x $10^6$cfu/g) respectively. In conclusion Noiler and broiler, meat were most preferred by the taste penalists as well as having the least microbial load. It is safer for short time storage particular for travellers.

**Keywords: poultry, Minced meat**

## INTRODUCTION

Today the world faces the problem of shortage of food supply, which makes malnutrition and its consequences in developing countries a major problem (Sadler *et al.,* 2004). Food of livestock origin such as meat and meat products contain important nutrients like amino acids, vitamins, minerals and fatty acids which are essential for growth and development (World Population Data Sheet, 2010). Further processing of meat offers the opportunity to add value, improve food safety and extend shelf life, resulting in increased household income and improve nutrition. Moreover, a significant number of the world population are deficient in key vitamins and minerals, particularly vitamin A, iodine, iron and zinc. Highly nutritious foods such as meat are required by women, children and HIV AIDS infected people. Bala (2014) showed that meat preservation is more difficult than other forms of food preservation as it may lead to oxidative rancidity, mouldiness, sliminess, discolouration and off flavour. It has been shown that processing of meat produced enhanced handling, packing, distribution and marketing of the products (Omojola *et al.*, 2004). An average Nigerian for instance, consumes only about 10g *per* day of the minimum daily intake of 35g recommended by food and agricultural organization (FAO, 1992). The processing of meat in different forms to avoid spoilage can close the gap of protein shortage (Ani and Okorie 2004). However, in Nigeria there are different types of meat products, specifically dambun nama, as a major contributor of quality nutrients for normal growth and reproduction, less importance is attached to possible effects on health due to product contaminants. Over the last years, there has been a growing interest in meat from different animal species such as duck, guinea fowl, broiler chicken, Noiler chicken, indigenous chicken, rabbit etc (Horbanczuk, 2003). Therefore the objectives of this research was to evaluate the proximate and mineral composition, microbial load and sensory properties of minced meat from duck, guinea fowl, Noiler chicken, broiler chicken and indigenous chicken meat.

## MATERIALS AND METHODS

The study was conducted within Bauchi metropolis. Live broiler chicken, duck fowl, guinea fowl, Noiler chicken, indigenous chicken were bought from various locations within Bauchi metropolis. They were taken to Bauchi abattoir for dressing into carcass and immediately transported for processing into minced meat (Dambun nama) and analyzed so as to determine dry matter, crude protein, ether extract, crude fibre and ash following the procedures of AOAC (1995).

***Processing of Dambun Nama***

(Minced meat) duck, guinea fowl, Noiler, broiler meat (chicken), and indigenous chicken meat were processed to produce various dambun nama. Dambun nama (minced meat was prepared from meat of these livestock using the procedures of Farouk (1995) and Kalla *et al*. (2005). Fresh meat of good grade was cut into pieces of about 4cm by 2.5cm dimension and washed thoroughly with clean water, mixed with spices and ingredients (seasoning, salt, curry, ginger and thyme) boiled for about 90 minutes and pounded into shreds using a mortar and pestle. This was then shallow fried using groundnut oil in stainless steel frying pan to obtain dambun nama, which is usually brownish in colour.

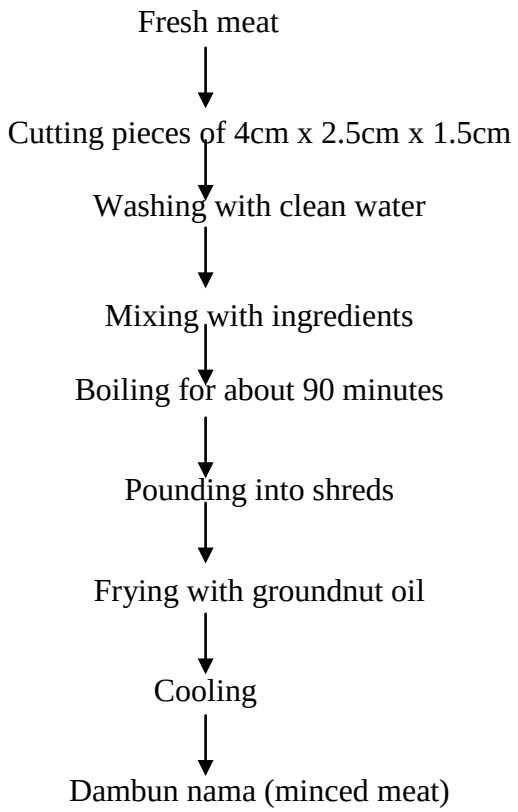



Fig 1: Preparations of Dambun nama: (Bube, 2003)

***Data collection***

The data for the study were collected through the sixty (60) questionnaires using Hedonic scale. The questionnaires were distributed among university staff and students. Five different samples were given to each individual. All the questionnaires distributed were later collected from different respondents.

***Data analysis***

Data from the study were subjected to analyses of variance (SAS, 2002). The means with significant differences were separated using Duncan's Multiple Range Test (DMRT).

## RESULTS AND DISCUSSION

**Table 1: Proximate Composition (%) of Minced Meat (Dambun Nama) of Some Poultry Species**

| | Meat types | | | | | |
|---|---|---|---|---|---|---|
| **Parameters (%)** | **Guinea fowl** | **Noiler** | **Local chicken** | **Broiler** | **Duck** | **Overall mean** |
| Dry matter | 83.61 | 82.31 | 82.94 | 81.61 | 82.50 | 82.59 |
| Protein | 58.13 | 59.13 | 56.93 | 57.64 | 57.59 | 57.88 |
| Ether extract | 10.74 | 10.19 | 10.23 | 11.29 | 10.45 | 10.58 |
| Ash | 1.83 | 2.03 | 2.10 | 1.92 | 1.86 | 1.95 |

The proximate composition of minced meat (Dambun nama) in relation to dry matter, crude protein, ether extract, ash content are shown in Table 1. The values reported were in line with Bube (2003) who reported dry matter contents of 93.8 to 95.9% using monogastric and ruminants dambun nama. This research finding on chemical composition of dambun nama processed from guinea fowl, Noiler, local chicken, broiler chicken meat and duck meat varies among these poultry species. The dry matter was high in guinea fowl followed by local chicken. The trend is in conjunction with the investigation of Bube (2003). Similarly, the protein content of dambun nama was high in Noiler followed by guinea fowl and differ among the others and was in accordance with reports of Bube (2003) and Kalla *et al.* (2005), though parameters such as ether extract and ash tends to followed same trends according to the work of Muhammad *et al.* (2010) who uses local meat products. Ether extract was high in broiler chicken and low in Noiler, ash was high in local chicken and lower on guinea fowl. These could be based on genetic makeup and mode of management in relation to the differences in parameter observed.

The result for mineral composition of minced meat is shown in Table 2. The calcium and phosphorus content is in agreement with the finding of Bube (2003), Kalla *et al.* (2005). Calcium content was high in Noiler, low in local chicken whereas phosphorus was high in Noiler with the least in duck followed by sodium which was high in guinea fowl minced meat and low in broiler minced meat and then potassium was more in local chicken.

**Table 2: Mineral composition (%) of minced meat (Dambun nama) of some poultry species**

| | Meat types | | | | | |
|---|---|---|---|---|---|---|
| **Parameters (%)** | **Guinea fowl** | **Noiler** | **Local chicken** | **Broiler** | **Duck** | **Overall mean** |
| Calcium | 0.19 | 0.21 | 0.17 | 0.18 | 0.19 | 0.19 |
| Phosphorus | 0.17 | 0.20 | 0.15 | 0.17 | 0.16 | 0.17 |
| Sodium | 0.06 | 0.04 | 0.04 | 0.03 | 0.05 | 0.04 |
| Potassium | 0.001 | 0.002 | 0.003 | 0.001 | 0.001 | 0.002 |

**Table 3: Sensory evaluation of minced meat *(Dambun Nama)* of some poultry species**

| | Meat types | | | | | |
|---|---|---|---|---|---|---|
| **Parameters** | **Guinea Fowl** | **Noiler** | **Local Chicken** | **Broiler** | **Duck** | **LOS** |
| Flavour | 8.43$^{a}$ | 8.43$^{a}$ | 7.90$^{ab}$ | 7.60$^{b}$ | 6.90$^{c}$ | *** |
| Aroma | 8.30$^{ab}$ | 8.33$^{a}$ | 7.43$^{bc}$ | 7.67$^{ab}$ | 6.63$^{c}$ | *** |
| Juiciness | 7.70$^{a}$ | 8.17$^{a}$ | 7.87$^{a}$ | 7.40$^{ab}$ | 6.67$^{c}$ | *** |
| Palatability | 8.20$^{ab}$ | 8.53$^{a}$ | 7.53$^{b}$ | 7.90$^{ab}$ | 7.50$^{b}$ | ** |
| Tenderness | 7.50 | 8.10 | 7.20 | 7.67 | 7.10 | NS |
| Colour | 8.10$^{ab}$ | 8.10$^{a}$ | 7.57$^{ab}$ | 7.67$^{ab}$ | 7.17$^{b}$ | * |
| Acceptability | 7.83$^{a}$ | 8.53$^{a}$ | 7.90$^{a}$ | 7.80$^{a}$ | 6.97$^{b}$ | *** |

**abc means within row having different superscripts differ significantly at (* =p<0.05, **p<0.01, ***p<0.001, NS = not significant)**

Table 3 shows the results for sensory evaluation of minced meat of some poultry species. The most superior flavour was obtained from guinea fowl and Noiler chicken which were closely followed by broiler chicken. Noiler chicken was observed to give the best aroma, guinea fowl Noiler chicken and local chiken were the juiciest while Noiler chicken was the most palatable. All the meat was observed to be tender as there was no significant difference among them. Noiler chicken was observed to posses the best colour. Acceptability is an important quality of meat and from the result it was

deduced that duck meat was the least acceptable while guinea fowl, Noiler chicken, local chicken and broiler chicken were the most acceptable.

Table 4 shows the microbial load of minced meat of some poultry species stored for seven days. The bacterial load of various meat products were significant (P<0.001). Local chicken has the highest bacteria count (272.67 x $10^6$cfu/g) followed by the least bacterial count in broiler chicken (109.33 x $10^6$cfu/g) which is the most preferred to consumers as reported by Rouger *et al.* (2017) Therefore, ensuring the microbial safety of poultry meat products is an important factor in the context of increasing consumption and production.

Among the products, it was observed that broiler chicken has the lowest fungal load (68.67 x $10^6$cfu/g) while local chicken possessed the highest fungal load (121.00 x $10^6$cfu/g) which deter its consumption as compared to the broiler which seems to be the most preferred in terms of quality to consumers.

**Table 4: Microbial loads of minced meat *(Dambun Nama)* of some poultry species stored for seven days**

| | Meat types | | | | | |
|---|---|---|---|---|---|---|
| **Parameters** | **Guinea Fowl** | **Noiler Chicken** | **Local Chicken** | **Broiler** | **Duck** | **LOS** |
| Bacterial Load(2.2 X$10^6$ cfu/g) | 212.00$^b$ | 175.67$^d$ | 272.67$^a$ | 109.33$^e$ | 181.33$^c$ | *** |
| Fungal Load(1.08X$10^6$ cfu/g) | 108.33$^b$ | 87.00$^d$ | 121.00$^a$ | 68.67$^e$ | 91.67$^c$*** | |

**abcde mean different superscripts with the row differ significantly (***=p<0.001)**

## CONCLUSION

It was concluded that Noiler and broiler birds were most preferred by consumers. Processing poultry meat into minced meat (*Dambun Nama*) significantly increased shelf life and acceptability of the product by the consumers. It is therefore recommended that standard method of processing and production of minced meat be enforced so as to reduce the level of microbial load and increase shelf life.

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