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Evaluation of Proximate Composition and Sensory Properties of Heed and Feet Meat under Different Preservation Methods

Alhaji SA[1]*, Saratu AA[1], Ribah MI[2] and Jibir M[3]

[1]Department of Animal Health and Production Technology, College of Agriculture and Animal Science Wurno, Nigeria

[2]Department of Animal Science, Kebbi State University of Science and Technology Aleiro

[3]Department of Animal Science, Usmanu Danfodiyo University Sokoto, Nigeria

***Corresponding author:** Sani Anas Alhaji, Department of Animal Health and Production Technology, College of Agriculture and Animal Science Wurno, Nigeria, Tel: 07038459928; Email: shatima2007@gmail.com

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Abstract

Preservation of head and feet involves the action taken to maintain products with the desired properties as much as possible. A laboratory procedure was used to evaluate the proximate, and sensory properties of preserved head and feet using five preservation methods (frying, Banda, animal fat, sun drying and freezing). The processing step for each preservation method was described for future reference. Preservation methods had significantly affected (P< 0.05) all proximate parameters measured. Moisture content was higher for stored samples by animal fat and freezing, with 26.67% and 25.33% respectively. Higher protein contents were recorded for stored samples by frying, sun drying and banda with 57.67%, 54.00% and 52.00% respectively. Result for sensory evaluation of stored head and feet meat shows that, the panelist sensory judgment established significant differences (P<0.05) on flavor, tenderness and acceptability while juiciness shows no significant differences (P>0.05) across the preservation methods. Merit analysis indicated that preservation of head and feet with animal fat performed better among all other methods and ranking 1st followed by frying that ranked 2nd, while freezing, sun drying and banda ranked 3rd, 4th, and 5th respectively. It was concluded that, samples preserved in animal fat performed better among the methods in optimizing proximate and sensory properties of head and feet. It was recommended that similar research should be conducted in other locations so that a comprehensive documentation of head and feet preservation methods can be done.

Keywords: Proximate; Sensory; Preservation; Head and Feet Meat

Introduction

Head and feet also refer to as dark offal are animal products apart from the flesh and organs. This dark offal are common delicacies among Nigerian meat consumers as it is widely consumed to accompany various meals, soups, and stews [1]. Head and feet are a rich source of lipids, proteins, essential amino acids, B-complex vitamins, and minerals. They can be effectively exploited for higher (value-added) Even though these by-products undoubtedly present themselves as rich in nutrients, there remains an unfortunate lack of documented information on the potential use Cordeiro ARRDA, et al. [2]. Small ruminant head and feet are cherished because they are used to form different dishes, for instance, Isi ewu is a traditional Igbo meat delicacy that is made from goat head. This is a delicacy originating from eastern Nigeria and could be found on the food menu when visiting restaurants (Polasky). Despite the nutritional and economic relevance of meat and meat products, it is potentials are limited by spoilage and deterioration which if controlled could add to its value. This control is in term of preservation. The preservation of meat and meat products resulted from

necessity Pegg RB, et al. [3] because surplus meat and meat products is wasted and rendered useless and thus, finding ways to preserve it becomes necessary so that products could be held for extended period for later consumption in times of scarcity.

Objectives

The objective of this study was to evaluate proximate composition and organoleptic properties of some preserved head and feet meat.

Methodology

Laboratory procedure was used to produce head and feet meat as described by Ribah MI, et al. [4].

Treatments

The treatments for the study comprise the five (5) groups of cut pieces of head and feet meat. The experiment consisted of five (5) preservation methods (Banda, Sun drying, Freezing, Animal fat, and Frying). Each method represented a treatment. Each of the earlier grouped of head and feet cuts was randomly allotted to a treatment, each treatment was further divided into three (3) and served as replicates giving a total of fifteen (15) experimental units.

Sample Preparation

The samples for the study were prepared according to the procedure explained by the respondents during field survey.

- Banda the processing method of banda is described in the flow chart (Figures 1 & 2)
- Frying the processing method of frying is described in the flow chart (Figures 3 & 4)
- Animal fat the processing method of animal fat is described in the flow chart (Figures 5 & 6)
- Sun drying the processing method of sun drying is described in the flow chart (Figures 7 & 8)
- Freezing the processing method of freezing is described in the flow chart (Figures 9 & 10)

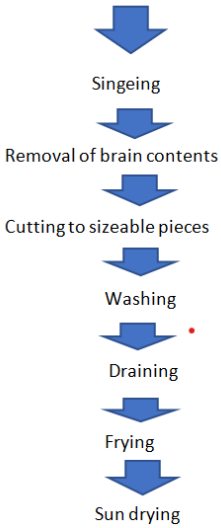

Figure 1: Flow chart of frying method (*Soye*) of head and feet meat preservation.

Plate (1): Raw head & feet meat Plate (2): Frying of head & feet Plate (3): Fried head & feet

Figure 2: Fresh head and feet meat from (cattle, goat, sheep, camel etc).

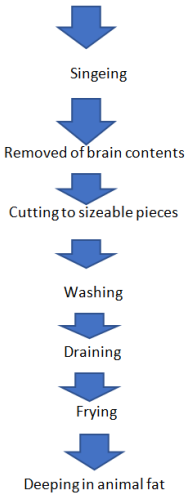

Figure 3: Flow chart of Animal fat (Daskare) method of head and feet meat preservation.

Plate 4: Fried head & feet meat immersed in animal fat

Plate 5: Head and feet cuts preserved in animal fat

Figure 4: Fresh Head and feet meat from (cattle, goat, sheep, camel etc).

Figure 5: Flow chart of freezing method (Kankarewa) of head and feet meat preservation.

Plate 6: Fresh head & feet parts

Plate 7: Freeze head & feet parts

Figure 6: Fresh head and feet meat from (cattle, goat, sheep, camel etc).

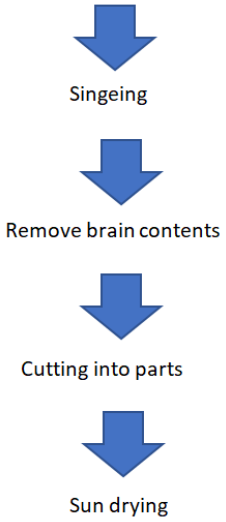

Figure 7: Flow chart of Sun-dried method (Busarwa) of head and feet meat preservation.

Plate 8: Fresh head & feet parts

Plate 9: Sundried head & feet parts

Figure 8: Fresh meat from (cattle, goat, sheep, camel etc).

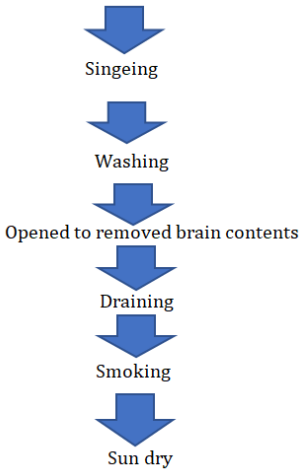

Figure 9: Freezing the processing method of freezing is described in the flow chart.

Plate 10: Fresh head & feet parts

Plate 11: Banda of head & feet parts

Figure 10: Fresh meat from (cattle, goat, sheep, camel etc).

Determination of Proximate Composition

150g of head and feet meat was taken from each treatment replicate (50g each). The 150g each for freeze sample and stored in animal fat were independently blended for homogenization. Similarly, 150g each for Sun dried, Banda, and fried samples were independently ground and sieved with a 2mm wire mesh. The prepared samples were used for proximate and sensory analysis.

Data Analyses

Preservation methods were compered for the proximate composition using General Linear Model (GLM) multivariate procedure. Significant means were separated using Turkey test at 5%.

Results and Discussion

Table 1 shows the results of Proximate Composition of preserved head and feet of small ruminants using different preservation methods. Results indicated that preservation methods had significant effect (P< 0.05) on all proximate parameters measured.

Preservation methods	Parameters (%)			
	Moisture	Ash	Lipid	Protein
Animal fat	26.67^{a}	7.67^{b}	21.33^{a}	33.00^{d}
Banda	8.00^{b}	15.33^{a}	12.33^{c}	52.00^{c}
Freezing	25.33^{a}	8.00^{b}	15.33^{b}	25.33^{e}
Frying	6.00^{c}	15.67^{a}	16.67^{b}	57.67^{a}
Sun drying	6.00^{c}	16.00^{a}	20.00^{a}	54.00^{b}
SE	0.33	0.29	0.47	0.21

Table 1: Proximate Composition of Stored Head and Feet meat from different Preservation Methods.
a-e= means with different superscripts along columns differ significantly (p<0.05)

Animal fat method had the highest moisture 26.67% followed by freezing with 25.33%, while banda had 8.00%, frying and sun drying which had the same value of 6.00%. The higher moisture content of animal fat and freezing methods was found to be nearly similar to other intermediate moisture meat reported by previous research. For instance, 30.06% was recorded by Muhammad BF, et al. [5] for soye, 31.88% reported by Fakolade PO [6] for kundi. Whereas the moisture content of animal fat method recorded in the current research is lower than 62.27% for balangu as reported by Muhammad BF, et al. [5]. 62.15% for beef sausage was also recorded by Khairi et al., Omotayo et al. reported 20.63% for fried meat which is contrary to the results reported by the current research for fried head and feet meat. The remaining moisture content products in the current study were obviously found to be lower values. This could be attributed to the nature of the products that they are dried and were intended for storage for later use.

Ash content was highest in sun drying method 16.00% followed by frying and Banda with 15.67% and 15.33% respectively, while freezing and animal fat had the least values of 8.00% and 7.67% respectively. This results however, shows higher ash contents when compared with the previous research works on different intermediate moisture and dried meat products. For instance, Muhammad BF, et al. [5], Idowu et al., Fakolade PO [6], Adeyeye, Omotayo et al., Balarabe S, et al. [7], Okerie, Jegede OB, et al. [8], Khairi et al. and Ndife J, et al. [9] and. All reported ash content values range between 1.58%-7.67% for intermediate moisture and dried meat products in their work. However, ash contents values recorded for the current research was up to 16.67%. This could be attributed to the degree of dryness of the products and as well the type of meat used to prepare the products.

As regard to lipid, animal fat had 21.33% followed by sun drying 20.00%, while frying, freezing and Banda had the least with the following values 16.67%,15.33%, 12.33% respectively. These results were found to be similar to other intermediate moisture meat and dried meat products reported by the previous research. For instance, Idowu et al. recorded 18.00% for kilishi, Fakolade PO [6] recorded 6.91 for kundi. Similarly, Adeyeye recorded 11.44% for kundi, Jegede OB, et al. [8] recorded 15.15%, 10.85%, and 23.42% for Suya, Asun and Kundi respectively. Balarabe S, et al. [7] recorded 23.5% for Dambun nama, Omotayo et al. recorded 25.56% for fried meat and Khairi et al. recorded 15.63% for beef sausage.

Protein content was highest in frying method 57.67% followed by sun drying and Banda 54.00% and 52.00% respectively. Animal fat had 33.00% and freezing had 25.33%. The reason why Banda, frying and Sun drying had the higher protein could be due the fact that they are dried products while animal fat and freezing were intermediate moisture meat products. Mediani A, et al. [10] reported that the concentration of protein will be more in dry meat than intermediate moisture meat products. Similarly, values of higher protein content for dried meat products were reported in the previous research such as Idowu et al. recorded 57.02% for kilishi, Adeyeye recorded 61.47% for kundi, Fakolade PO [6] recorded 56.85% for kundi, 70.66% was recorded by Jegede OB, et al. [8] for kundi. On contrary lower values were reported for crude protein in dried meat samples such as Ndife J, et al. [9] reported 22.13% for kilishi. 20.17% reported by Jegede OB, et al. [8] for Asun. However, protein contents of animal fat method were found to be similar to other intermediate moisture meat products reported by the previous research. For instance, Balarabe S, et al. [7] recorded 50.80% for Dambunnama.

Table 2, shows the sensory properties of stored head and feet meat from different preservation methods in Sokoto metropolis. Result indicated that, the panelist sensory judgment established that preservation methods had exerted significant effect ($P<0.05$) on flavor, tenderness and acceptability while juiciness was not significantly affected ($P>0.05$). The acceptability of the products shows that samples stored in animal fat were more acceptable to the panelist followed by freezing, sun drying, frying, and banda.

Preservation methods	Sensory parameters (cm)			
	Flavor	Tenderness	Juiciness	Acceptability
Banda	5.47^{c}	7.78^{b}	8.21	8.18^{b}
Animal fat	11.33^{a}	11.81^{a}	10.59	12.80^{a}
Freezing	10.57^{ab}	11.64^{a}	10.32	12.41^{ab}
Frying	8.75^{abc}	6.35^{b}	9.14	9.71^{ab}
Sun drying	6.73^{bc}	6.39^{b}	10.65	10.96^{ab}
SE	1.03	0.58	1.08	1.09

Table 2: Sensory Properties of Stored Head and Feet Meat from Different Preservation Methods.
abc= means with different superscripts along columns differ significantly ($p<0.05$)

From Table 2, it could be observed that, samples preserved in animal fat and freezing methods had the highest scores in all the quality parameters evaluated, followed by sample preserved by frying and sun drying methods. Meanwhile banda had the least score. In tenderness samples stored in animal fat and freezing methods had higher score and statistically similar values (11.81 and 11.64 respectively.), these could be attributed to the products being wet samples. The current research is nearly similar with the previous research reported by Muhammad BF, et al. [5] who recorded 7.4 for kilishi, Balarabe S, et al. [7] recorded 7.13 for Danbunnama. Muhammad BF, et al. [5] who recorded 7.1 for Balangu, and Bahago MK, et al. [4] recorded 7.7 and 7.4 for Danbutari and Gade respectively. Similarly, in terms of juiciness, though not significantly affected, samples preserved in animal fat and freezing methods had the highest scores with values 10.59 and 10.52, respectively. This could be as a result of moisture and fat contents presents, since juiciness is the amount of water retain by the products Animal fat and freezing methods had the higher moisture content than other products. The result for the current research were found to similar to the previous research works. For instance, in juiciness Bahago MK, et al. [4] recorded 8.0 for Danbutari, Muhammad BF, et al. [5] 6.8 for kilishi, Abubakar S, et al. [11] recorded 8.7 for processed nonruminant meat, Balarabe S, et al. [7] recorded 7.43 for Danbunnama. However, as regard to flavor animal fat, freezed and fried samples had highest score and statistically similar values (11.33, 10.57 and 8.75 respectively), followed by sun dried and banda samples with 6.73 and 5.47 respectively. The current result was found to be nearly similar with Muhammad BF, et al. [5] who recorded 7.9 for soye, Abubakar S, et al. [11] recorded 7.50 for fried beef and Abubakar et al. (2010) recorded 8.5 for processed non-ruminant meat, Balarabe S, et al. [7] recorded 7.74 for Danbunnama. Bahago MK, et al. [4] recorded 8.7 for Danbutari. As regard to acceptability, sample stored in animal fat had the highest score followed by freeze, sun dried and fried samples with values (12.80, 12.41, 10.96, 9.71 and 8.18, respectively) the current research is nearly similar to the previous researches reported by Balarabe S, et al. [7] where 7.57 for Danbunnama was recorded, Muhammad BF, et al. [5] who recorded 8.0 for soye and Bahago MK, et al. [4] who recorded 8.1 for Danbutari.

Suggestion

Given the nutritional and eaten qualities in the studied preserved head and feet meat, the utilization head and feet preservation methods should be encouraged and harnessed owing to their optimal nutritive and eaten qualities. So also, Animal fat method should be adopted and begin mass utilization by household and processors and Similar research should be conducted in other locations so that a comprehensive documentation of head and feet preservation methods can be done.

Conclusion

In conclusion, It was found that the preserved products have high nutritive value with products recording crude protein of 27 - 57%. Animal fat method should be adopted and begin mass utilization by household and processors and Similar research should be conducted in other locations so that a comprehensive documentation of head and feet preservation methods can be done.

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