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Research article

Effect of freezing and storage on chemical composition and sensory attributes of beef tripe prepared by Sudanese traditional methods

Wisal Babiker Zeinalabdeen[1], Ahmed Mukhtar ELtrefi[1], Selma Ahmed Fadlamola[2] and Abdelrahim Abubakr[1]

[1]College of Animal production, University of Bahri, Khartoum, Sudan
[2]College of Veterinary Medicine, University of Elbutana, Tamboul, Sudan

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Abstract

The objectives of the present study were to evaluate the effects of the freezing and storage period on chemical and sensory attributes of beef tripe prepared by Sudanese traditional method. About 60 kg of beef tripe was obtained from Livestock Research Center abattoir and subjected to one of the following treatments: samples were washed with running tab water (A), samples were immersed in hot water for few seconds, scalded by a sharp knife until be white in color (B); samples were immersed in brine solution (C). About 30 g in each treatment in three replicates were examined for their chemical composition and sensory attributes at zero, two, four and six weeks of storage at -4°C. Results showed an increase in moisture content, decrease in ash contents with time. However, protein content remained constant and fat content decrease drastically after 4th wk. on the other hand, juiciness and tenderness resulted in acceptable conditions in treatment C compared with those of A and B.

Keywords: Beef tripe; traditional preparation; chemical composition and sensory evaluation

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Introduction

Tripe is edible offal obtained from the first two chambers of farm animal stomach; the rumen and the reticulum. Most tripe is from cattle as described by Reddy et al. (1998). It is a common and inexpensive product of high nutritional value with a distinguished taste (Ndeddy and Babalola, 2011). Some attempts have been made to utilize tripe as partial substitute for lean meat in the preparation of comminuted meat products (Anjaneyulu and Kondaiah, 1990). Offal has become a common food item among Sudanese community as a result of the rising of meat prices. Tripe production generally involves four main steps which include disembowelment in which the stomach of a slaughtered cow is excised and its contents emptied; selected portions of the stomach wall are washed with water and may be treated with chemicals (for example, diactolate) to get rid of the odour and characteristic greenish colour. The cleaned stomach is then scalded and trimmed into several pieces which are rinsed and packaged (Bensink et al., 2002).

Many scientific studies indicated that the most valuable components of meat from nutritional and processing point of view are water, fat, protein and minerals (FAO, 2004; Adam et al., 2010). However, values of chemical composition from fresh and freezing meat are not the same but this was not true in case of

***Corresponding author:** Dr. Abdelrahim Abubakr, College of Animal production, University of Bahri, Khartoum, Sudan; E-mail: abdelrahim22@yahoo.com

beef tripe. These days, consumers need to know the nutrient quality of the food they consume because they became more conscious of their health and they are increasingly focusing on their feeding habits (Sainsburry, 1990).

Consumers often tend to evaluate meat quality on the basis of organoleptic evaluation parameters such as, tenderness, juiciness, flavour, palatability, colour, and neatness (Beriain, 2000) until now there was a limited data about the chemical composition and sensory attributes under freezing storage and optimum shelf life for beef tripe.

The objective of this study was to evaluate the effect of the freezing and storage period on chemical composition and sensory attributes of beef tripe prepared by Sudanese traditional method.

Materials and Methods

This experiment was conducted during the period from 8th October to 22th December 2015. The preparation, storage and sensory evaluation of tribe samples was done at the laboratory of the college of animal production, University of Bahri, while the proximate analysis was carried out at the laboratory of the college of animal production university of Khartoum.

Beef tripe sample preparation and chemical analysis

Sixty kg of beef tripe was obtained from Livestock Research Center abattoir and immediately transported to the laboratory of the college of animal production, University of Bahri. The tripe was subjected to three treatments: Treatment A, beef tripe sample was washed only with abundant quantity of tab water; Treatment B: beef tripe sample was washed by tab water and then immersed in hot water for a few seconds and then scalded using sharp knife until be white in colour; Treatment C: beef tripe sample was washed by tab water then immersed in hot water and scalded by sharp knife and then immersed in saline solution (salted).

Thirty grams of beef tripe samples of each treatment was packaged in perforated plastic bag and transported to the laboratory and examined fresh (zero storage),while The rest of the samples were examined frozen at -4ºC for two, four and six weeks. Three replicates were used for each sample. Parameter of chemical composition investigated were protein, moisture, dry matter, fat, fiber and ash (AOAC, 2000).

Evaluation of sensory attributes

Sensory evaluation parameters included colour, tenderness, juiciness, flavour, and overall acceptability. Each beef tripe samples of the three treatments were randomly selected and packaged in perforated plastic bag and stored in freezer (-4°C). For zero storage period, samples were cooked immediately in a pan for 5 minutes and then distributed to 13 untrained panellists. Panellists evaluated the beef tripe samples for colour, tenderness, flavour, juiciness and overall acceptability using an 8- point scale score (hedonic scale) card as described by Cross et al. (1978) , in which the highest score of 8 being extremely desirable and 1 being extremely undesirable.

Statistical analysis

Data was statistically analyzed by analysis of variance, and the means were tested for significance using Duncan multiple range test (Steel and Torrie, 1980).

Results and Discussion

Effects of storage time on chemical composition of beef tripe prepared by three different treatments are presented in Table 1. The results indicated that 6wk of storage time significantly increased moisture content and decreased ash content however; protein content remained statistically similar during the different period of storage in the three treatments. This result is in agreement with Huda et al. (2010) who reported that the amount of salt usually added to meat product is 2 % (Na Cl) to preserve and extract myofibrillar protein which will assist in linking ground meat to keep the product shape after cooking and flavouring. The table also indicated that, fat value of the different three treatments significantly increased until the 4th week of storage and decrease significantly during the 6th week of storage time. This result is well matched with the findings of Huda et al. (2010) who found that the fat value of meat ball decrease with increase in time of storage.

The loss of moisture probably associated with increased dry matter, the same trend was also observed by Konieczny et al. (2007) who reported that dry matter content increased during frozen storage. The increase in dry matter due to loss of moisture of beef meatball with advance of storage time during freezing observed under this study is consistent with the findings of Huda et al. (2010) where authors found that the Malaysian commercial beef meatball contains 33.48% dry matter.

Table 1 also showed that ash content decreased with the increase of storage time. Ash value increased with advancement of salt concentration in case of refrigerated temperature but decreased with advancement of salt concentration in case of frozen temperature. This result agrees with the findings of Huda et al. (2010) who reported that the Malaysian commercial beef meat ball contains 1.76% ash.

Effect of storage time on sensory attributes of beef tripe prepared by different treatments is showed in Table 2. The table showed that the increase in time of storage significantly increased the juiciness tenderness

Table 1: interaction effect of treatments and proximate composition of beef tripe stored in different freezing period

Treatment	Storage time/Week	Dry matter %	Protein%	Fat%	Ash%
A	0day	17.31[a]	18.71 [a]	2.34 [a]	11.55 [a]
	2	17.33[a]	18.78[a]	2.32 [a]	11.54 [a]
	4	16.78[b]	18.57 [a]	2.38[b]	11.54 [a]
	6	15.76[c]	18.25 [a]	2.20[c]	11.34[b]
B	0day	24.48[a]	18.39 [a]	4.37 [a]	12.67 [a]
	2	24.56[a]	18.56 [a]	4.33 [a]	12.71 [a]
	4	24.24[b]	18.28 [a]	4.41 [a]	12.73 [a]
	6	19.36[c]	18.38 [a]	4.12[b]	12.68[b]
C	0day	19.75[a]	15.30 [a]	2.39[a]	13.41 [a]
	2	19.72[b]	15.01 [a]	2.410[b]	13.47 [a]
	4	19.75[c]	15.51 [a]	2.418[c]	13.49[b]
	6	18.75[d]	14.97 [a]	2.342[d]	13.46[c]
SE		0.17	0.20	0.06	0.06

A, sample was washed by tab water only. B, sample was washed with tab water, scalded and then immersed in hot water. C, sample was washed with tab water, scalded, immersed in hot water and then immersed in brine solution (salted). ES, standard error. [a,b,c,d], means with same superscripts in the same column are statistically differ.

Table 2: Interaction effect of storage time on sensory attribute of beef tripe cleaned by tab water

Treatment	Storage time/day	Color	Flavor	Tenderness	juiciness	General acceptability
A	0	3.23 [a]	3.92 [a]	3.85[b]	3.92[b]	3.46[d]
	15	4.85 [a]	5.31 [a]	5.23[a]	5.23[a]	5.23[b]
	30	4.75 [a]	5.13 [a]	5.81[a]	4.00[a]	5.06[c]
	45	5.0 [a]	5.19 [a]	5.19[a]	5.14[a]	5.33[a]
B	0	6.31 [a]	5.00 [a]	4.62[b]	4.93[a]	4.85 [b]
	15	6.62 [a]	6.39 [a]	5.54[a]	6.23[a]	6.00[a]
	30	6.69 [a]	5.75 [a]	5.63[a]	5.56[a]	5.88[a]
	45	6.05 [a]	5.81 [a]	5.38[a]	5.33[a]	5.67[a]
C	0	6.92 [a]	6.31 [a]	6.31[a]	5.69[a]	6.08[b]
	15	5.39 [a]	5.23 [a]	5.08[b]	5.54[a]	5.39[b]
	30	6.50 [a]	6.13 [a]	6.31[a]	6.63[a]	6.75[a]
	45	6.24 [a]	6.19 [a]	5.43[b]	6.14[a]	6.43[a]
SE		.48	.47	.55	.38	.49

A, sample was washed by tab water only. B, sample was washed with tab water, scalded and then immersed in hot water. C, sample was washed with tab water, scalded, immersed in hot water and then immersed in brine solution (salted). ES, standard error. [a,b,c,d], means with same superscripts in the same column are statistically differ.

and general acceptability of beef tripe. The panellists attributed the lowest average of general acceptability of beef tripe for treatments A and B to a more salty quality in treatment C.

Conclusion

Based on the results it can be concluded that the freezing of beef tripe for different periods increased moisture content, decreased ash content, but did not affect the protein value. Fat value increased until 4 weeks of storage then decreased. The study also concluded that increased time of storage improves sensory attributes of beef tripe.

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