

EFFECT OF ONION EXTRACT ON MICROBIAL AND SENSORY EVALUATION OF FRIED BROILER MEAT DURING REFRIGERATED STORAGE

* A. K. Tella, O.O. Olusola and D.O. Oshibanjo

Meat Science Laboratory, Department of Animal Science, University of Ibadan, Ibadan, Nigeria
tellaakehinde96@gmail.com

Abstract

The flavor and health benefits of onion have been strongly associated to its high content of sulphur compounds and flavonoids acting as, antioxidants and antibiotics. The Microbial and sensory parameters of fried broiler meat marinated in onion extract were evaluated during refrigerated storage. Twenty fresh purple medium sized onion bulbs were purchased, peeled, washed, chopped and oven dried at 40°C until constant weight was reached. 500ml of 80% Methanol was used to soak 100 grams of the oven dried onion for 24 hrs. Twelve broiler chickens (1.5±0.2 kg) live weight of 56 days age were obtained. 800g of the breast meat was marinated in brine solution and onion extract. The marinade consisted of 16ml of onion extracts and 14grams of table salt added to 4 litres of water. Marinade solution was stored to reach 4°C before breast meats were immersed. Marinated meat was pan fried to an internal temperature of 77°C ± 3°C for 15 minutes after 11 hrs of marination and committed to completely randomized design. No growth are recorded for Mould and Yeast. Bacteria were not recorded on the first day but increased progressively from day 2 to 6. Day 6 had the highest coliform and total plate count content of 3.63 MPN/100g and 3.62 logCFU/g respectively. Aroma, flavour, juiciness and overall acceptability reduced progressively while there was no significant difference in colour of fried meat. These results revealed onion extract could inhibit microbial load, improve meat acceptability and shelflife up to 4 days of refrigerated storage.

Keywords: onion extract, broiler breast meat, sensory properties, microbial load

Introduction

Consumers are more aware of health benefits of onions which increase the rate of its consumption. Onion bulb is also used because of the flavour it adds to food. Onions (*Allium cepa*) are among the important and common allium family, there is growing awareness of their health enhancing properties by consumers. Onions are used as food and for medicinal application as they have been proven to convey many benefits to human due to their long storage and portability. One of the advantages of onion is that they could be dried and preserved for several months. According to Benkeblia (2005), *Allium* species are well-regarded to possess anti-bacterial and anti-fungal activities, and they contain the powerful antioxidants, sulphur and other numerous phenolic compounds which have aroused great interests for food industries. These beneficial properties seem to strongly relate to the high content of sulphur compounds and flavonoids, because of their activity as antioxidants and anti-carcinogens, their effects on lipid metabolism and the cardiovascular system, and their antibiotic effects (Griffiths *et. al.*, 2002).

Materials And Methods

Preparation of onion extract

Fresh 20 average sized onion bulbs were obtained from Bodija market in Ibadan. They were peeled,

washed, chopped and oven dried at 40°C until constant weight was reached. 500ml of 80% Methanol was used to soak 100grams of the oven dried onion for 24 hrs. The methanol extracts was decanted and placed in rotary evaporator to concentrate the extract. The extract was concentrated to 70 ml.

Meat samples

12 broiler chickens (1.5±0.2 kg) live weight of 56 days age were obtained from the Poultry Unit of the University of Ibadan, Teaching and Research Farm. The chickens were slaughtered and breast portions were removed. The breast meats were deboned before storage at 4°C±1°C.

Marinade

The marinade consisted of 16mls of onion extracts and 14 grams of table salt added to 4 litre of water. Marinade solution was stored at 4°C±1°C before breast meats were immersed.

Marination process

800 grams of breast meat was immersed in the marinade for 11hrs. The meat was marinated in enclosed plastic bucket and stored in a refrigerator at 4°C±1°C before cooking process.

Cooking of Breast Meat

Marinated samples were deep pan fried to an internal temperature of 77°C ± 3°C. Soya oil was used to deep fry meat samples for 15 minutes. After frying, meat samples were randomly allotted to 4 groups (0, 2, 4, and 6 days) of 6 replicates

Table 1: Microbial evaluation of fried meat as affected by refrigerated storage

Parameter/days	Treatments				SEM
	0	2	4	6	
Coliform (MPN/100g)	-	3.56	3.49	3.63	0.57
Total Plate Count (logCFU/g)	-	3.41	3.45	3.62	0.59

a, b, c, d Means with different superscript along the row are significantly different ($P < 0.05$)

Table 2: Sensory Properties of fried meat as affected by refrigerated storage

Parameters	treatments				SEM
	0	2	4	6	
Aroma	7.70 ^a	7.50 ^a	5.70 ^b	3.60 ^c	0.50
Flavour	6.90 ^a	6.70 ^a	5.60 ^b	3.00 ^c	0.47
Colour	4.30	4.40	4.40	4.20	0.55
Tenderness	2.60 ^d	5.10 ^b	3.80 ^c	6.50 ^a	0.44
Texture	2.50 ^d	5.00 ^b	3.70 ^c	6.40 ^a	0.44
Juiciness	6.90 ^a	6.70 ^a	5.60 ^b	3.00 ^c	0.47
Overall Acceptability	7.70 ^a	7.50 ^a	6.30 ^b	4.40 ^c	0.39

a, b, c, d Means with different superscript along the row are significantly different ($P < 0.05$)

each, samples were stored at $4 \pm 1^\circ\text{C}$ and parameters were measured for all the storage days.

Microbial Evaluation

Serial dilution

1gram of the meat samples was soaked and mixed with 9ml of distilled water. Serial 5-fold dilutions were performed in serial dilution tubes containing 9ml of distilled water. 0.1ml from 10^{-3} and 10^{-5} were plated for the microbial load evaluation.

Media and Incubation

Potato Dextrose Agar was used to propagate mold and yeast. 82.2g of the agar was suspended in 1 litre of distilled water and brought to boil to dissolve completely; it was autoclaved for 15 minutes at 121°C . The cultured plates were incubated at $35-37^\circ\text{C}$ for 72 hours after which the colonies formed were counted.

Plate Count Agar was used to assess and monitor viable bacteria growth of the meat samples. 82.2g of the agar was suspended in 1 litre of distilled water and brought to boil to dissolve completely; it was autoclaved for 15 minutes at 121°C . The cultured plates were incubated at $35-37^\circ\text{C}$ for 24 hours after which the colonies formed were counted.

Eosin Methylene Blue was used to select gram negative bacteria growth of the meat samples. 82.2g of the agar was suspended in 1 litre of distilled water and brought to boil to dissolve completely; it was autoclaved for 15 minutes at 121°C . The cultured plates were incubated at $35-37^\circ\text{C}$ for 24 hours after which the colonies formed were counted.

Sensory evaluation

A total of 10 trained individuals aged between 20 and 40 years were used to assess fried meat samples. The samples were rated on a nine point

hedonic scale with maximum score of extremely high condition while the lowest score of 1 was assigned to the poorest condition (Mahendraker *et al.*, 1988). Equal bite size from the four treatments was coded and served. Each sample was evaluated independently of the other.

Result And Discussion

Microbial evaluation of fried meat as affected by refrigerated storage (table 1) showed no significant difference despite the increase in coliform and total plate count with storage days. Yeast and Mould were absent throughout the days of storage.

There were no bacteria found on day 0 in all treatments. There was linear increase in total plate count across the days as expected. The endogenous enzyme in meat hydrolyses the complex molecules into simpler compounds that are then utilized as nutrient sources for supporting microbial growth and activity.

Sensory properties during the days of storage (table 2) showed significant higher mean value in aroma and flavour on the first day which was expected. Colour of the fried meat was not significantly different in all the treatments. Tenderness followed the same trend with texture with day 6 giving the highest mean values. Flavour is the result of interaction of taste, odour and aroma as perceive by Olfactory lobe, the mouth feel through the sensory cells of the tongue making it a composite of desirable taste and aroma and sensory cell after consumption of food which in turn is due to compounds responsible for taste, odour and aroma. Flavour decreased with increasing days of storage. This loss of flavour during storage could be due to increased fat oxidation (Devatkal *et al.*, 2003., Salgado *et al.*,

2006) as well as higher microbial load (Anjaneyulu & Biswas, 2006). Flavour on day 6 of all the treatments was significantly lower than others..

Conclusion

The microbial evaluation indicated that microbes were highly inhibited in fried breast meat stored up to 4 days. However, marinated broiler meat in onion extract before frying was acceptable and palatable within 4 days of storage.

References

- Anjaneyulu, A. S. R., Das, A. K. and Biswas, S. (2006).** Effect of carnosine preblending on the quality of ground buffalo meat. *Food Chem.*, 97, 531–538.
- Benkeblia, N. (2005).** Free-radical scavenging capacity and antioxidant properties of some selected onions (*Allium cepa* L.) and garlic (*Allium sativum* L.) extracts. *Brazilian Archives of Biology and Technology*, 48, 753-759.

Devatkal, S., Mendiratta S. K., and Anjaneyulu A. S. R (2003). Effect of calcium lactate on the quality and shelf life of restructured pork rolls. *Journal of Meat Science*, 1: 1-6.

Griffiths, G., Trueman, L., Crowther, T., Thomas, B. and Smith, B. (2002). Onions global benefit to health. *Phytother.* 16, 603-615.

Mahendraker N.S., Khabade V.S. and Dani NP (1988). Studies on the effect of fattening on carcass characteristics and quality of meat from Bannu-lamb. *J. Food Sci. Technol.* 25: 228-230

Salgado, A., García-Fontán, M.C., Franco, I., López, M., and Carballo, J. (2006). Effect of type of manufacture (homemade or industrial) on biochemical characteristics of Chorizo de cebolla (a Spanish tradicional sausage). *Food Control*, 17:213-221.