International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
www.chemijournal.com
IJCS 2021; SP-9(1): 26-28

Received: 14-11-2020
Accepted: 20-12-2020

Jyotishka Kumar Das
Ph.D., Scholar, Department of Livestock Products Technology, ICAR- Indian Veterinary Research Institute, Izatnagar, Bareilly, Uttar Pradesh, India

Mineswar Hazarika
Professor and Head, Department of Livestock Products Technology, College of Veterinary Science, Assam Agricultural University, Khanapara, Guwahati, Assam, India

Ankur Das
Assistant Professor, Department of Livestock Products Technology, College of Veterinary Science, Assam Agricultural University, Khanapara, Guwahati, Assam, India

Masuk Raquib
Assistant Professor, Department of Livestock Products Technology, College of Veterinary Science, Assam Agricultural University, Khanapara, Guwahati, Assam, India

Dhruba Jyoti Kalita
Professor and Head, Department of Veterinary Biochemistry, College of Veterinary Science, Assam Agricultural University, Khanapara, Guwahati, Assam, India

Naba Nahardeka
Chief Scientist, Goat Research Station, Assam Agricultural University, Burnihat, Assam, India

Corresponding Author:
Dhruba Jyoti Kalita
Professor and Head, Department of Veterinary Biochemistry, College of Veterinary Science, Assam Agricultural University, Khanapara, Guwahati, Assam, India

Visible changes of newly developed duck meat loaf incorporated with winter melon (Benincasa hispida) during its life time

Jyotishka Kumar Das, Mineswar Hazarika, Ankur Das, Masuk Raquib, Dhruba Jyoti Kalita and Naba Nahardeka

DOI: https://doi.org/10.22271/chemi.2021.v9.i1a.11333

Abstract
A study was under taken in the to determine the shelf life of Duck meat loaf incorporated with winter melon (*Benincasa hispida*) by observing its visible changes from the day of its preparation. Almost 10 days passed to get an idea of deterioration that occurred. The first minor physical changes observed in control sample was colour changes of the products which occurred after 4 days of storage at refrigerated temperature. From 5 days onwards of storage there was moderate changes of physical qualities like discoloration, off odour, slime formation etc. On 7 days products became unacceptable. By knowing the above we came to conclude that shelf life of the newly developed product is only 4 days that can be increased by adapting strict hygienic measures.

Keywords: Winter melon, slime, Benincasa hispida, shelf life, hygienic, duck meat loaf

Introduction
Assam situated in the north eastern region (NER) of iIndia has a numerous duck raising capacity which allows a significant number of rural peasants to adopt duck raising as a profitable occupation. Assam has duck population about 4.72 million occupying 2nd position in india whose duck population is 27.43 million [1]. For socio-economic progress amongst the vulnerable sections of masses of villages, duck farming is tremendously helpful as it provides supplementary as well as steady profit apart from providing essential animal protein from duck eggs and meat. There is a huge numbers of water bodies, marshy river sides, wetlands and barren moors in Assam which provides a suitable plate form to adopt duck raising without any reliable problems. Annual duck meat production in Assam is 16.65 tonnes [2] Since ancient Assam, duck meat is considered as a famous food and is eaten traditionally with enthusianism. Generally khaki Campbell, Rajhanh, Nageswari and pati are considered as the 5 distinct popular strains of duck amongst whom the later is the most common [3] among the consumers of the village areas. Consumption of duck meat in Assam is irrespective of caste, creed and religion. Chicken is consumed in a huge amount by the people of assam but the popularity of duck meat is also going on day by day as it has a great nutritional value and contains combined characteristics of red meat and white meat which indicates the presence of more rate of phospholipids, precursors of aromas and high level of monounsaturated fatty acids of which oleic acid and linolenic acid occupies a prominent place [4] occupying percentage of about sixty of total fatty acids. The consumption of white meat is gaining importance as red meat is nowadays considered hazardous due to its high cholesterol content thereby giving rise to cardiovascular diseases. Duck meat can be one of the best white meat in the near future. Duck meat loaves were prepared by incorporating Winter melon (Benincasa hispida) and it's physico-chemical and storage quality characteristics were investigated [5].
Meat processing in the modern world is of utmost importance due to its unique value of producing high quality proteins and essential amino acids in the form of easily available readymade meat products in various cities of the world. The duck meat sector has not attained much importance from the meat processing point of view. Tough duck meat can be processed by meat industries by utilizing valuable ducks in order to achieve smart outcome to the producers.

Value added meat products which are of high economic viability containing nutritional qualities and organoleptic characteristics can be processed by making use of the available ducks in the form of meat. Many tribal communities have been preparing a number of products from duck meat fortifying with different herbs [6] elsewhere in the north eastern region(ner) in Assam generally in the month of January (festive season also known as magh bihu), there is a practice inherited traditionally of making culinary products like duck meat with winter melon (benincasa hispida) and that is consumed by people happily as a symbol of satisfaction and enjoyment. Winter melon (Benincasa hispida) is also called kumura, ash gourd. white pumpkin, wax gourd or Chinese water melon is owned by cucurbitaceae family and is acidic in nature [7]. Japan and java is the native land of ash gourd. however it is cultivated more or less throughout the warm countries like india. Asian communities are fond of this vegetable because of its popularity in having beneficial effects both for its nutritional and medicinal purposes as well as its delicacy. It can be prepared by cooking directly, boiling with meat or mixing in a lot of dishes.

Keeping in mind, duck meat loaf was prepared using winter melon (Benincasa hispida) and evaluate the visual changes to determine the shelf life from first day onwards to the day of deterioration of the newly developed meat product by observing colour, consistency, odour and slime formation.

Materials and Method

Ethical approval: Ethical approval for slaughtering of ducks was obtained from Institutional Animals Ethics Committee (IAEC), Assam Agricultural University, Khanapara, Guwahati, Assam.

Collection of ducks

Local Pati ducks of age group 9 – 12 months irrespective of their sex was procured from the Goat research station, Burnihat. These live ducks were transported to the laboratory of the Department of Livestock Products Technology, College of Veterinary science, Khanapara, Guwahati-22 under strict hygienic condition. They were then scientifically slaughtered in the semi- mechanized poultry dressing unit of the Livestock Products Technology Department.

Collection of winter melon (*Benincasa hispida*)

Young and tender winter melon (*Benincasa hispida*) was purchased from the local market (Ganeshguri), washed with clean water then peeled, cut into small pieces and finely minced with the help of a mixer grinder.

Slaughtering

Ducks were slaughtered in the semi-mechanized poultry dressing unit of the Department of Livesock Products Technolgy.

Deboning

The deboning of the dressed carcasses were performed within 3 hrs of slaughter. The liver, heart, gizzard, skin and visceral fat were removed and packed separately in polythene bags before storing at freezing temperature (−18 ^{0}C) until used. Similarly, the deboned meat was also packed in polythene bags and stored at freezing temperature (−18 ^{0}C) until used.

Mincing

The deboned meat was cut into small cubes of 2 cm size and thereafter ground in a mincer through 4mm (pore size) plate. The fat portion was also minced separately and simultenously and stored at a refrigeration temperature (4±1 ^{0}C) under strict hygienic condition.

Curing

Salt (1.5%) and sodium nitrite (0.02%) were added to the minced meat. Ingredients were then thoroughly mixed and stored at 4±1 ^{0}C for next 12 hrs to facilitate proper curing.

Preparation of meat emulsion:

Meat emulsions were prepared by mixing thoroughly minced duck meat with duck fat and Kumura (*Benincasa hispida*) at 4 different levels as shown below

Table 1: Show the Ingredients and control

Ingredients	Control (c) (%)	T1 (%)	T2 (%)	T3 (%)
Minced duck meat	78	73	70.5	68
Duck fat	10	0	10	10
Kumura	0	5	7.5	10
Spices/Condiments	4	4	4	4
Egg white	1.18	1.18	1.18	1.18
Ice cubes	5	5	5	5
Salt	1.5	1.5	1.5	1.5
Sodium nitrite	0.02	0.02	0.02	0.02
Wheat flour	0.3	0.3	0.3	0.3

During mixing of duck lean, fat and Kumura (*Benincasa hispida)* necessary seasonings (spices/ condiments) were also added. Then the meat emulsions were stuffed in rectangular stainless-steel boxes(moulds) covered with aluminium foil under strict hygienic condition. The meat emulsions inside the stainless-steel boxes were cooked in hot water at 85 ^{0}C (72 ^{0}C- core temperature) for 45 mins in a suitable sauce pan. After cooking the stainless steel moulds were taken out and then cooled down with chilled water and kept overnight at refrigeration temperature (4+1 ^{0}C) for chilling. Next day chilled cooked blocks along with aluminium foil were taken out from the moulds and meat blocks were sliced manually into suitable shape and size and randomly packaged into high density food grade polythene bags (HDPE). They were then stored under refrigeration temperature (4±1 ^{0}C) and subjected to quality evaluation traits on first, fifth and tenth day of storage. Also visual as well as olfactory changes were observed every day from 1st day onwards continuosly upto the 10th day and observations were recorded accordingly as follows

Table 2: Visible Changes of Quality of Kumura Incorporated Duck Meat Loaves During Storage At 4±1 ^{0}c

Storage days	Colour				consistency				Odour				Slime formation			
	Samples				samples				samples				samples			
	c	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3
1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
5	+	+	+	+	–	–	–	–	–	–		–	–	–	–	–
6	++	+	+	+	+	+	+	+	+	+	+	+	–	–	–	–
7	++	++	++	++	++	++	++	++	++	++	++	++	–	–	–	–
8	++	++	++	++	++	++	++	++	++	++	++	++	–	–	–	–
9	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+	+	+	+
10	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	++	++	++	++

C = control

T1= 5% incorporation of kumura

T2=7.5% incorporation of kumura

T3= 10% incorporation of kumura
(−) = No changes
(+) = Minor changes
(++) = Moderate changes
(+++) = Major changes

Results

Physical changes in external qualities

The physical changes in external qualities of both the control and treated duck meat loaves are presented in table above. The visual physical changes observed during the study period are tabulated and presented accordingly. The first minor physical changes observed in control sample was colour changes of the products which occurred after 4 days of storage at refrigerated temperature. From 5 days onwards of storage there was moderate changes of physical qualities like discoloration, off odour, slime formation etc. Gradually from 7 days onwards major changes in all the qualities were observed and products became unacceptable.

Discussion

The study revealed that the Kumura incorporated duck meat loaves have a shelf life below 5 days as there was higher microbial load, TBA values and visible physical changes in external qualities (*viz* colour, odour, consistency and slime formation) in all the products from the 5th day onwards upto 10th day. The reason might be due to proteolysis, lipid oxidation, formation of alkaline metabolites as well as growth and multiplication of bacteria from 5th day onwards. The relatively lower bacterial count recorded in treatment groups in comparison to the control which may be due to the acidic nature i.e lower pH and presence of certain antimicrobial property in Kumura. The present findings corroborated well with the report of Reddy *et al.* [10] who also reported a significant (p<0.05) decreased bacterial counts in the TVMBC in tomato paste incorporated chicken meat patties as compared to the control formulation.

The study revealed an decreasing trend in TBA values of kumura incorporated duck meat loaves in the treated formulation. The TBA values were lower in all the treated samples than the control product. However TBA values showed an increasing trend along with the increase in the storage periods irrespective of the control and treated formulations. Such decreasing trend in TBA values of the products might be due to the presence of ascorbic acid and other phytochemicals present in Kumura.

It was reported that pumpkin incorporated chicken sausages could be successfully stored for a period of 14 days at refrigeration temperature (4±1 ^{0}C) without any significant loss in quality [11].

However in the present study shelf lives found to be very less for all the products. It is therefore essential that initial bacterial load can be reduced by adopting better hygienic measures particularly HACCP in the production of similar type of vegetable fortified meat product in the coming generation.

Conclusion

On the basis of the above findings, it can be concluded that winter melon (*Benincasa hispida*) which is also known as kumura is a valuable, nutrient enriched, medicinal vegetable which can be used to develop a meat product by combining it with duck meat by considering its availability in most parts of Assam. The shelf life of the product can be increased to use it for a long time which is only possible by following better hygenic measures and preventing bacterial, yeast and mould load.

Acknowledgement

The writers are immensely oblized to the Deprtment of Livestocks Products Technology, All India Co-ordinated Research Project on Post Harvest Engineering and Technology, College of Veterinary Science, AAU, Khanapara, Goat Research Station, AAU, Burnihat and last not the least the Institutional Animals Ethics Committee (IAEC), Assam Agricultural University, Khanapara, Guwahati, Assam.

References

1. Al-Snafi AE. The pharmacological importance of Benincasa hispida. A Riview, International Journal of Pharmacological Sciences and research 2013;4(12):165-170.
2. Das J, Hazarika M, Das M, Raquib M, Kalita D, Nahardeka N, *et al*. Effect of Ash Gourd (Benincasa hispida) on textural characteristics, colour profile and cost of production of duck meat loaves, International Journal of Livestock Research 2020;10(8):98-103.
3. Das JK, Hazarika M, Das A, Gogoi P, Hussain P, Kalita DJ, *et al*. Effect of Kumura(Benincasa hispida) on the physico-chemical and storage Quality characteristics of Duck meat loaves, International Journal of current microbiology and applied Science 2019;8(02):2772-2783
4. Department of Animal Husbandry, Dairy and Fisheries. (2012). 19th Livestock Census. All India Report. Ministry of Agriculture, department of Animal Husbandry, Dairy and Fisheries. Krishi Bhavan, New Delhi.
5. Economic Survey of Assam. Directorate of economics and Statistics, Assam Planning and development department, Govt of Assam 2014, 97.
6. Fatariah Z, Tengku Zulkhairuazha TY, Wan Rosli WL, *et al*. Ascorbic acid quantification in Benincasa hispida fruit extracted using different solvents, International Food research Journal 2015;22(1):208-212.
7. George TG, Nayar R, Cyria S, *et al*. Comparison of meat quality characteristics of Vigova Super M and Kuttanad ducks, International Journal of Science and Research 2014;3(7):15-17.
8. Hazarika M, Laskar SK, Das A, *et al*. Scope, challenges and stretegies for development of meat industry in north eastern region of India. In: 6th Conference of Indian Meat Science Association and National Symposium on sustainable meat production for nutritional security and consumer well being: Challenges and strategies held at DUVASU, Mathura (UP) from 28th to 30th Nov.
9. Mahanta JD, Sapkota D, Mili DC, Chakravarty A, *et al*. A survey on duck farming in Lakhimpur and Dhemaji district of Assam Indian Veterinary Journal 2001;78(6):531-532.
10. Reddy BO, Eswara B, Rao E, Nagamallika T, Reddy GV, Bhaskara, *et al*. Efficacy of curry leaf powder and tomato paste on storage stability of chicken meat patties, Journal of meat science 2015;11(1):43-49.
11. Zargar FA, Kumar S, Bhat ZF, Kumar P, *et al*. Effect of pumpkin on the quality characteristics and storage quality of aerobically packaged chicken sausages, Springer 2014;3:39.F