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Preparation of Spent Duck Meat Pickle and its Storage Studies at Room Temperature

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ABSTRACT

Spent duck meat can be profitably utilized by preparing value added meat products. A study was conducted on preparation and storage stability of ready to eat meat product-pickle at room temperature. The storage studies were conducted at an interval of 15 days up to 90 days. The dressing percent, giblet percent, percent meat and bone yield were 53.84, 0.91, 61.22 and 29.92, respectively. Average cooking yield of the pickle was 58.4%. The mean per cent values for moisture, crude protein, ether extract, salt and total ash of the freshly prepared pickle were 33.12, 19.85, 39.86, 2.13 and 3.35, respectively. The Thiobarbuturic acid, free fatty acid, peroxide, acid values and total viable count and yeast and mould count did not increase significantly ($p < 0.05$) during the storage at room temperature up to 90 days. The pathogenic bacteria like *Salmonella* spp., *Staphylococcus* spp., *Clostridium* spp. and *E. coli* were absent in the pickle during the entire storage period. The sensory scores also revealed that the pickle was acceptable even up to 90 days storage. Hence it can be concluded that an acceptable meat pickle with storage stability up to 90 days at room temperature can be prepared from duck hen meat.

Key words: Spent duck, pickle, thiobarbituric acid, free fatty acid, pathogenic bacteria, sensory scores

INTRODUCTION

Ducks are raised primarily for meat. They are easy to raise, hardy and less susceptible to many of the common poultry diseases. Despite all these attributes, Spent duck meat is tough, dry and lowered prices contribute to the economic losses in the duck farming. Spent duck meat can be profitably utilized by converting it into value added meat products in an appropriate way to suit the taste of local consumers. Pickling of duck meat in edible oil with added salt, spices and condiments and vinegar provides a ready-to-eat product with good storage stability at room temperature (Gadekar *et al.*, 2010). Meat pickle is a traditional ready-to-eat product of indigenous origin that can be prepared from vegetables and meat especially spent hen and duck meat. Often meat pickles are made at homes. These products serve as adjuncts to bread and rice and are also used as snacks. Meat pickles have a long shelf life without refrigeration. In developing countries including India the storage of meat and meat products is a serious problem due to climatic conditions and limited refrigeration facilities (Bachhil, 1982). The information on the use of meat from spent duck meat for pickle preparation and its storage stability at room temperature is meager.

Hence, the present study was conducted on preparation of an easy to make, ready-to-eat product namely meat pickle from spent duck (White Peckin) and its storage stability in room temperature.

MATERIALS AND METHODS

The ducks 124 weeks old available at University Research Farm which is a constituent unit of Tamil Nadu Veterinary and Animal Sciences University, Madhavaram Milk Colony were utilized for the study. The ducks were kept in deep litter with swimming facilities prior to slaughtering where they had unlimited access to feed and fresh, cool water. Prior to slaughtering the birds were weighed and deprived of feed for 12 h. Six males and six females were utilized for the study. The slaughtered birds were thoroughly bled and the bled weight recorded. The birds were subsequently defeathered, dissected and all the internal organs were carefully removed. After slaughtering and dressing, the warm carcass weight was obtained and the dressing percentage calculated (Price, 1967). The dressed carcasses were chilled at refrigeration temperature before they were deboned. Meat pieces of about 0.5 sq. in were marinated in vinegar added with a pinch of common salt and turmeric for 4 h at $4\pm 1^{\circ}\text{C}$. The marinated meat pieces were pressure cooked for 10 min and fried in refined oil to golden brown colour. Dried spices were added and fried further for about one minute and broth was then added and heated with constant stirring till boiling started. Fried meat pieces were added to it and allowed to boil for 2 min. A top up quantity of heated and cooled refined oil was added to the pickle and it was kept for maturation for 24 h at room temperature. Pickle was packed in pet bottles and stored at room temperature for storage study. Recipe for south Indian traditional spent duck meat pickle in Table 1.

Moisture, crude protein, ether extractives, salt and total ash were estimated as per AOAC (1980). Biochemical and microbial parameters recorded during storage were Thiobarbituric acid value (TBA, as per Tarladgis *et al.*, 1960) free fatty acids (FFA, as per modified AOAC, 1975), acid value (Flemming *et al.*, 1984) and peroxide value (AOAC, 1975). The total plate counts, yeast and mould counts, total coliforms, *Salmonella* spp. and *Staphylococcus* spp., were determined as per Quinn *et al.* (1994).

Sensory evaluation of the product was conducted using 8-point Hedonic Scale (8 = Extremely acceptable; 1 = Extremely undesirable) by semi trained taste panelists as per Peryam and Pilgrim (1957).

Statistical analysis: All statistical analysis were performed using X-L STAT. Results are presented as Means \pm SD. One way ANOVA was used to determine the physic chemical, microbiological and organoleptic changes analyzed. When the effect of storage period was significant, differences between the storage stability were determined using Fisher's Least Significant Difference (LSD) test at 5% level was used. The data obtained were subjected to statistical analysis as per the methods described by Snedecor and Cochran (1980).

RESULTS AND DISCUSSION

The dressing percent, giblet percent, per cent meat and bone yield were 67.65, 0.97, 64.22 and 29.92, respectively. Average cooking yield of the pickle was 59.4%. The mean moisture, crude protein, ether extract, salt and total ash percentages of the freshly prepared meat pickle were 34.12, 20.85, 45.86, 2.17 and 3.67, respectively. Overall mean of thio barbituric acid, Free fatty acids, Peroxide values and Acid values were 1.74, 0.84, 57 and 1.60, respectively.

The TBA, FFA, acid and peroxide values did not change significantly ($p < 0.05$) during the entire study period (Table 2). Similar observations were noted by Puttarajappa *et al.* (1996) in chicken pickle.

Table 1: Recipe for South Indian traditional spent duck meat pickle

Ingredients	Quantity (g)	Percentage
Spent duck meat	1700.0	-
Ginger paste	85.0	5.0
Garlic paste	85.0	5.0
Jeera	17.0	1.0
Mustard seeds	17.0	1.0
Asafoetida	8.5	0.5
Fenugreek seeds	8.5	0.5
Chilli powder	51.0	3.0
Turmeric powder	17.0	1.0
Salt	51.0	3.0
Vinegar	340.0	20.0
Vegetable oil	680.0	40.0
Chicken masala	17.0	1.0

Table 2: Physico-chemical changes during storage of duck hen meat pickle at room temperature

Parameters	Storage periods (in days)							Overall mean
	0	15	30	45	60	75	90	
Thio barbituric acid mg malonaldehyde kg ⁻¹	1.85±0.20 ^a	1.81±0.52 ^a	1.28±0.49 ^a	1.43±0.84 ^a	1.20 ±0.48 ^a	2.26±0.55 ^a	2.36±0.34 ^a	1.74
Free fatty acids (as% oleic acid)	0.73±0.06 ^b	0.66±0.12 ^b	0.74±0.13 ^b	1.00±0.32 ^b	1.05±0.39 ^b	0.85±0.13 ^b	0.86±0.15 ^b	0.84
Peroxide values (meq. O ₂ kg ⁻¹)	47±6 ^c	39±12 ^c	59±8 ^c	65±13 ^c	97±33 ^c	44±6 ^c	46±7 ^c	57.0
Acid values	1.46±0.12 ^d	1.30±0.24 ^d	1.48±0.27 ^d	1.99±0.64 ^d	1.61±0.36 ^d	1.69±0.26 ^d	1.70±0.29 ^d	1.60

Means with same superscript between the columns do not differ significantly (p<0.05); Mean±SE

Table 3: Changes in microbial quality of shelf stable duck hen meat pickle during storage at room temperature

Storage periods (in days)	Microbial counts (in log values)					
	Total plate count	Anaerobic count	Coliforms	Yeast and moulds	<i>Salmonella</i> Spp.	<i>Staphylococcus</i> Spp.
0	2.47±0.93 ^a	NIL	NIL	1.00±0.53 ^b	NIL	NIL
15	1.83±0.76 ^a	0.60	NIL	1.10±0.61 ^b	NIL	NIL
30	1.40±0.40 ^a	NIL	NIL	0.80±0.20 ^b	NIL	NIL
45	2.18±0.93 ^a	NIL	NIL	0.70±0.20 ^b	NIL	NIL
60	1.43±0.48 ^a	NIL	NIL	0.50±0.50 ^b	NIL	NIL
75	2.34±0.23 ^a	NIL	NIL	0.00±0.00	NIL	NIL
90	0.92±0.17 ^a	NIL	NIL	0.10±0.10 ^b	NIL	NIL

Means with same superscript between the columns do not differ significantly (p<0.05); Mean±SE

Microbiological studies revealed that the pickle was free from pathogenic bacteria like Coliforms, *Salmonella* spp. and *Staphylococcus* spp., during the entire storage period and where as total counts, yeasts and moulds and anaerobes did not change significantly (p<0.05) during storage period (Table 3). This is in line with the observations recorded by Kumar and Bachhil (1993) and Pal and Agnihotri (1994) in pork pickle and chevon pickle, respectively.

A non significant decline in sensory scores of the attributes such as appearance, flavour, juiciness, texture, saltiness, sourness and overall acceptability was observed as the storage period

Table 4: Organoleptic changes in duck hen meat pickle during different storage periods at room temperatures

Sensory qualities	Storage periods (in days)							Overall mean
	0	15	30	45	60	75	90	
Appearance	7.10±0.21 ^a	7.12±0.34 ^a	6.90±0.10 ^a	6.90±0.10 ^a	6.83±0.17 ^a	6.75±0.14 ^a	6.83±0.17 ^a	6.92
Flavor	6.90±0.15 ^b	6.93±0.35 ^b	6.67±0.33 ^b	6.89±0.11 ^b	6.84±0.48 ^b	6.58±0.30 ^b	6.67±0.33 ^b	6.78
Juiciness	6.58±0.19 ^c	6.82±0.22 ^c	6.45±0.15 ^c	6.82±0.12 ^c	6.51±0.24 ^c	6.67±0.02 ^c	6.39±0.20 ^c	6.61
Texture	6.90±0.26 ^d	6.93±0.35 ^d	6.81±0.19 ^d	6.78±0.22 ^d	6.54±0.15 ^d	6.78±0.31 ^d	6.56±0.16 ^d	6.76
Saltiness	6.97±0.32 ^e	6.68±0.37 ^e	6.56±0.15 ^e	6.98±0.21 ^e	6.98±0.18 ^e	6.97±0.36 ^e	6.75±0.14 ^e	6.84
Mouth Coating	6.97±0.09 ^f	6.87±0.13 ^f	6.84±0.25 ^f	7.16±0.15 ^f	7.14±0.27 ^f	7.14±0.27 ^f	6.92±0.22 ^f	6.71
Sourness	6.48±0.12 ^g	6.58±0.30 ^g	6.60±0.47 ^g	6.99±0.51 ^g	6.67±0.67 ^g	6.67±0.67 ^g	6.67±0.38 ^g	7.01
Overall acceptability	6.82±0.24 ^h	6.93±0.35 ^h	6.67±0.33 ^h	6.57±0.30 ^h	6.58±0.30 ^h	6.58±0.30 ^h	6.67±0.33 ^h	6.71

Means with same superscript between the columns do not differ significantly ($p \leq 0.05$); Mean \pm SE

increases. The scores for appearance, flavor, juiciness, texture, saltiness, mouth coating, sourness were comparable to overall acceptability. Mean values for these attributes in samples stored at room temperature ranged from 6.61 to 7.01 over the entire storage periods of 90 days (Table 4). Organoleptic evaluation of the product showed that the spent duck meat pickle was acceptable even at the end of 90 days storage at room temperature. These observations are similar to those observed by Khanna *et al.* (2004) in bone-in meat pickle from spent hen.

CONCLUSION

From the results obtained in the present study on physico-chemical, microbiological and sensory evaluation, it may be concluded that vinegar based spent duck meat pickle acceptable to the local consumers and with storage stability up to 90 days at room temperature can be prepared from spent duck meat. This also opened an entrepreneurial opportunity for the unemployed youth, self help groups and rural women folk to take up this venture as a source of additional income.

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