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Research Paper

Effect of Preservatives on the Shelf Life of an Indigenous Meat Product: Chicken Chukka*

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ABSTRACT

A study on the shelf - life of an indigenous spent chicken meat product chicken chukka with or without preservatives at room temperature was carried out. The quality parameters like sensory evaluation, pH, moisture per cent, thiobarbituric acid number, tyrosine value (mg/100g), total viable count (log/g) and anaerobic count (log/g) of preservative added (P) and preservative free (NP) chicken chukka samples stored for different periods at room temperature were analysed. There was no significant difference in sensory evaluation scores of both the treatments, due to uniform cooking time and oil temperature maintained during processing. The pH of the samples in both the treatments showed no significant difference. There was a highly significant difference between the two treatments in moisture per cent, thiobarbituric acid number and tyrosine values were significantly higher in preservative free (NP) chicken chukka samples. There was no significant difference observed in the total viable count and anaerobic count of both the treatments. The microbial load was within the safety level up to 28 days of storage in both the treatments. Based on the findings, it is concluded that chicken chukka could be stored up to 28 days under room temperature even without preservatives.

Key words: *Spent hen meat, chicken chukka, preservative, shelf life, room temperature.*

INTRODUCTION

A change in the lifestyle of young Indian population due to rapid and continuous urbanization, increased demand for quality and convenient food products. Further, the demand for spent hen meat is less as it is less juicy, less tender, high in fat and collagen content with poor functional properties. Hence, the demand and marketability of these hens could be increased by processing the tough meat into a palatable product.

A number of methods of preservation have been tried to retain the quality of meat from farm to fork. One of them is the use of chemical preservatives. Though the preservatives used for preservation of meat and meat products are within permissible levels, consumers are very conscious of the residual hazards and hence prefer products without preservatives.

Keeping this in mind, an indigenous, novel, value added, shelf-stable meat product - chicken chukka was prepared from spent hen meat and its shelf life at room temperature, with or without preservatives was studied.

MATERIALS AND METHODS

Spent hens, more than seventy two weeks old were procured from commercial retail outlets at Chennai and were slaughtered in the Department of Meat Science and Technology, Madras Veterinary College, Chennai. The hens were deskinned to prevent surface contamination of meat. Strict hygienic measures were followed while handling the carcass for deboning and cutting.

The deboned meat was diced into convenient sized pieces of about 5 g each. The meat pieces were first washed with potable water and then with vinegar (10% acetic acid) and kept immersed in vinegar for ten minutes.

The meat pieces were then marinated in a mixture of powdered spices (black pepper-15gms, cumin-7gms, cloves-3gms, cinnamon-7gms, red chilli-35gms, coriander-25gms, aniseed-5gms and turmeric-3gms) and condiments (garlic and ginger in the ratio of 2:1) for about

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eight hours along with permissible levels of preservatives (P), citric acid (0.5%), sodium benzoate (0.2%) and potassium meta bisulphite (0.2%) as one treatment and without addition of preservatives (NP) as another treatment.

The marinated meat pieces of both the treatments (P and NP) were deep fried in oil, until a golden brown colour *chicken chukka* was obtained. After cooling the product was immediately packed in sterile polyester polyethylene pouches, sealed and stored at room temperature.

Physico-chemical (pH, moisture, TBA number and Tyrosine value), microbial (TPC and anaerobic count), and organoleptic qualities (appearance, odour, juiciness, texture, tenderness, flavour and overall acceptability) were analyzed at weekly intervals viz 0, 7, 14, 21 and 28 days of storage.

The pH of the samples (P and NP) was measured using a digital pH meter (Cyber scan pH 510, Merck). Moisture content of the samples were analysed as per conventional air drying method, AOAC (1980). Thiobarbituric acid (TBA) number and tyrosine value were measured by a modified method by Strange *et al*. (1977). Sensory evaluation of the product was done by the help of semi-trained panelists using 10 point hedonic scale.

The microbial load of the meat samples were estimated as total viable count as per American Public Health Association (1960). Nine trials were conducted and the data obtained were subjected to statistical analysis as per the method outlined by Snedecor and Cochran (1994).

RESULTS AND DISCUSSION

The mean score with standard error of appearance, flavour, tenderness, juiciness and overall acceptability of preservative added (P) and preservative free (NP) chicken chukka samples are given in table 1. There was no significant (P>0.05) difference between the two treatments in appearance, flavour, tenderness, juiciness and overall acceptability which could be attributed to similar processing variable like uniform cooking time and oil temperature for both treatments.

Table 1. Sensory Evaluation scores (Mean ± SE) of preservative added (P) and preservative free (NP) chicken chukka on zero day

	P	NP
Appearance*	7.65 ± 0.02	7.81 ± 0.02
Flavour*	6.88 ± 0.01	7.03 ± 0.01
Tenderness*	6.84 ± 0.03	7.08 ± 0.03
Juiciness*	6.84 ± 0.03	6.80 ± 0.02
Overall acceptability*	6.92 ± 0.87	7.47 ± 0.91

* Maximum score for attributes in sensory evaluation is 10.

The mean values with standard error of pH, moisture per cent, TBA number, tyrosine value, total viable count and anaerobic count of preservative added (P) and preservative free (NP) chicken chukka stored for different periods at room temperature are presented in Table 2.

The pH values of cooked product were similar to the findings recorded by Bouton *et al.* (1971). The analysis of variance of pH revealed no significant (P> 0.05) difference between both the preservative added (P) and preservative free (NP) chicken chukka samples. As storage period increased, pH decreased significantly (p<0.05). This is in agreement with Kanimozhi and Mendiratta (2001), Pandey and Yadav (2001) and Sahoo *et al.* (2002).

Moisture per cent of both preservative added (P) and preservative free (NP) chicken chukka samples showed a linear decrease in moisture per cent as the storage progressed. Thiobarbituric acid number of both the treatments of chicken chukka increased as storage period progressed. The analysis of variance revealed a highly significant (P<0.01) difference between the two treatments, which might be attributed to the action of citric acid in preservative added (P) samples. This is in congruent with Cheah and Ledward (1996).

The tyrosine value (mg/100g) of both preservative added (P) and preservative free (NP) chicken chukka samples increased with the increase in storage period. This result is in accordance with the findings of Pearson (1968) and Strange *et al.* (1977).

The total viable count (log/g) and anaerobic count (log/g) of preservative added (P) and preservative free (NP) chicken chukka samples are given in table 2. There

Table 2: Mean (± SE) values of pH, Moisture per cent, TBA No, Tyrosine value (mg/100g), Total Viable Count (log/g) and Anaerobic Count (log/g) of preservative added (P) and preservative free (NP) chicken chukka stored at room temperature.

Parameter	Treatment	Storage periods				
		0	7	14	21	28
pH	P	5.57 ± 0.08	5.49 ± 0.07	5.39 ± 0.05	5.35 ± 0.05	5.26 ± 0.07
	NP	5.68 ± 0.05	5.62 ± 0.05	5.57 ± 0.04	5.52 ± 0.04	5.45 ± 0.05
	Mean	5.62 ± 0.05^{a}	5.55 ± 0.04^{b}	5.48 ± 0.04^{bc}	5.43 ± 0.04^{cd}	5.36 ± 0.05^{d}
Moisture per cent	P	22.30 ± 0.80	21.16 ± 0.72	20.26 ± 0.78	19.52 ± 0.89	18.95 ± 0.93
	NP	26.11 ± 1.58	23.46 ± 1.31	22.69 ± 1.23	21.94 ± 1.24	21.19 ± 1.21
	Mean	24.20 ± 0.98^{a}	22.31 ± 0.78^{ab}	21.47 ± 0.77^{b}	20.73 ± 0.8^{b}	20.07 ± 0.8^{b}
TBA number	P	0.02 ± 0.002	0.03 ± 0.004	0.05 ± 0.008	0.09 ± 0.009	0.13 ± 0.014
	NP	0.07 ± 0.001	0.08 ± 0.004	0.11 ± 0.006	0.13 ± 0.005	0.17 ± 0.007
	Mean	0.05 ± 0.008^{a}	0.06 ± 0.006^{a}	0.08 ± 0.008^{b}	0.11 ± 0.006^{c}	0.15 ± 0.009^{d}
Tyrosine value	P	2.41 ± 0.27	4.11 ± 0.29	6.42 ± 0.33	9.82 ± 0.49	15.46 ± 0.80
	NP	4.25 ± 0.24	6.47 ± 0.32	8.55 ± 0.47	10.31 ± 0.45	16.58 ± 0.80
	Mean	3.33 ± 0.28^{a}	5.29 ± 0.35^{b}	7.48 ± 0.38^{c}	10.06 ± 0.33^{d}	16.02 ± 0.56^{e}
Total viable count	P	0.98 ± 0.25	1.01 ± 0.25	1.63 ± 0.05	1.84 ± 0.05	2.17 ± 0.02
	NP	0.76 ± 0.24	1.31 ± 0.18	1.62 ± 0.05	1.8 ± 0.04	2.17 ± 0.03
	Mean	0.87 ± 0.17^{a}	1.16 ± 0.15^{b}	1.63 ± 0.03^{c}	1.81± 0.03^{c}	2.17 ± 0.02^{d}
Anaerobic count	P	0	0.65 ± 0.25	1.44 ± 0.05	1.56 ± 0.08	1.95 ± 0.05
	NP	0.14 ± 0.14	0.78 ± 0.25	1.57 ± 0.08	1.66 ± 0.06	2.01 ± 0.04
	Mean	0.07 ± 0.07^{a}	0.71 ± 0.17^{b}	1.50 ± 0.05^{c}	1.61± 0.05^{d}	1.98 ± 0.03^{e}

Note: Means bearing different superscripts within the row (a,b,c,d,e) differ significantly (P<0.05)

was no significant (P>0.05) difference between the two treatments and the values were within the safe limits for human consumption. Similar findings were obtained by Sachdev *et al.* (2002).

The bacterial count on 28th day was 2.17 ± 0.02 log/g (below 10^3) in both preservative added (P) and preservative free (NP) chicken chukka samples, indicating the products to be microbiologically stable till 28th day of storage at room temperature. There was no significant (P>0.05) difference in the anaerobic counts of both preservative added (P) and preservative free (NP) chicken chukka samples.

The Public Health Laboratory Service guidelines (USA) for the microbiological quality of ready to eat foods have categorized meat products with aerobic colony counts of 10^3 to 10^4 as microbiologically safe and satisfactory for consumption. In this study the microbial profile of both the treatments (P and NP) till the 28th day of storage was within the acceptable limits. Hence, it may be concluded that the product *chicken chukka* prepared without the addition of preservatives are microbiologically and organoleptically acceptable up to 28 days of storage at room temperature.

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