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NUTRITIONAL MANIPULATIONS IN REVITALIZED LAYERS: EFFECT ON ORGANOLEPTIC PROPERTIES OF DARK (THIGH) MEAT

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A study was conducted in the Department of Home Economics to evaluate the organoleptic properties of dark (thigh) meat of revitalized layers fed different moult diets. Revitalization was practised through the manipulation of 7 moult diets allotted at random to 3 replicates of 8 hens each. For meat samples one bird per replicate was picked up randomly and slaughtered at each stage i.e. pre-moult, post-fast, post-moult, at 50% production and at the termination of 2nd production cycle. The thigh meat samples collected at these stages were roasted and evaluated for colour, flavour, taste, texture, tenderness, chewability and acceptability. The results indicated that maximum ($P<0.05$) taste score (7.00 ± 0.188) was found in thigh meat oflayers fed pure corn diet, whereas maximum flavour score (7.00 ± 0.21) was observed at the end of second production cycle. However, minimum ($P<0.05$) tenderness (6.00 ± 0.15), juiciness (6.05 ± 0.13) and chewability score (6.05 ± 0.12) were observed at the post-moult stage.

Key words: moult, spent layer, tenderness, texture, thigh meat

INTRODUCTION

Among animal protein sources chicken meat is considered the best because of its high biological value and is recommended as an essential part of human food. Poultry meat as a food is quick and easy to prepare and serve with a number of desirable nutritional and organoleptic properties. It is low in calories and high in protein, supplying all essential amino acids (Panda, 1995). Cooked thigh meat contains 25.4% protein, 7.3% fat and 67.3% moisture and in addition has 1659 food energy calories per kilogram (Peterson et al., 1959). Cooked by different methods chicken thigh normally yields 79% edible meat (Mountney, 1975). Organoleptic properties of thigh meat have been reported to be affected with age and diet (Rafiq et al., 1999). Availability of chicken meat at cheaper price to the low income people may help make up the deficiency of animal protein in Pakistan. Apart from broiler chicken, 13 million layers are also contributing a lot towards meat production annually. Normally after completing first production cycle, the layers are used for meat purposes. But with the introduction of revitalization of spent layers, these would be used for another successful production cycle (Akram, 1998). After completing their two production years, the nutritive value of spent layer's thigh meat is not fully known. Therefore, it was planned to evaluate the organoleptic quality of layer thigh meat influenced by various diets and revitalization process.

MATERIALS AND METHODS

A trial was conducted in the Department of Home Economics to determine the organoleptic quality of spent layer dark (thigh) meat influenced by 7 moult diets varying in protein and energy with 3 replications. Of 21 experimental units, one bird from each unit was randomly picked up and slaughtered at 5 different stages of 2nd year life i.e. pre-moult, post-fast, post-moult, at 50% egg production and at the end of 2nd egg production cycle.

The thigh meat samples were roasted according to Passmore (1978) and were evaluated organoleptically for colour, flavour, taste, juiciness, tenderness, chewability and acceptability using the methods of Larmond (1977). The data thus obtained on the above mentioned parameters were subjected to analysis of variance technique in completely randomized design (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

Colour: The statistical analysis of the data revealed significant differences in mean values of colour score of dark (thigh) meat oflayers presented to the panel ofjudges at different stages of 2nd year life. Maximum (7.143 ± 0.210) colour score was observed at the end of 2nd year and minimum (6.381 ± 0.124) at post-moult (Table 1). Maximum colour score was also observed at the end of 2nd production cycle in induced moult layers (Rafiq et al., 1999). Comparison of means by applying DMR test indicated increasing trend in colour score of cooked thigh meat of layers with advancing age which might be due to increase in myoglobin contents of thigh meat. Improvement in colour with the advancement of age has also been reported by earlier workers.

Table 1. Sensory score (Mean±SE) of thigh meat in revitalized layers at different stages of 2nd year life

Sensory factors	Stages				
	Pre-moult	Post-fast	Post-moult	50%	End
Colour	AB 6.762±0.153	AB 6.810±0.164	B 6.381±0.124	AB 6.762±0.136	A 7.143±0.210
Juiciness	A 7.000±0.138	A 6.952±0.146	B 6.048±0.133	A 6.524±0.203	A 6.714±0.156
Tenderness	A 6.857±0.159	A 6.952±0.146	B 6.000±0.150	A 6.571±0.202	A 6.952±0.176
Flavour	AB 6.952±0.129	BC 6.452±0.135	C 6.214±0.145	BC 6.429±0.202	A 7.000±0.207
Taste	6.857±0.173	6.905±0.136	6.333±0.131	6.571±0.177	6.810±0.178
Chewability	A 6.952±0.146	A 6.905±0.168	B 6.048±0.129	A 6.810±0.245	A 6.905±0.194
Acceptability	7.048±0.129	6.857±0.143	6.381±0.138	6.857±0.221	6.905±0.194

Mean values with the same alphabets do not differ significantly at P< 0.05.

Table 2. Sensory Score (Mean±SE) of thigh meat in revitalized layers fed different moult diets

Sensory factors	Moult diets							
	(A) Corn	(B) CP 14 ME 2700	(C) CP 14 ME 2900	(D) CP 16 ME 2700	(E) CP 16 ME 2900	(F) CP 18 ME 2700	(C) CP 18 ME 2900
Colour	6.694±O.221	6.767±0.200	6.667±0.193	6.533±0.192	6.900±0.148	6.800±0.228	6.767±0.200
Juiciness	*G.700±0.238*	6.533±0.2.31	6.767±0.175	6.400±0.190	6.767±0.212	6.733±0.200	6.633±0.192
Tenderness	6.600±0.214	6.600±0.219	6.767±0.223	6.600±0.289	6.800±0.206	6.667±0.159	6.633±0.221
Flavour	6.800±0.145	6.500±0.162	6.667±0.226	6.400±0.306	6.733±0.182	6.547±0.228	6.600±0.204
Taste	A 7.300±0.188	B 6.667±0.180	B 6.4.3.3±0.118	B 6.667±0.187	B 6.433±0.194	B 6.6.33±0.210	B 6.73.3±0.212
Chewability	6.767±0.194	6.7.3.3±0.22.3	6.83.3±0.238	6.7.3.3±0.248	6.600±0.277	6.767±0.22.3.	6.6.3.3±0.226
Acceptibility	6.9.3.3±0.175	*G.7.3.3±0.22.3*	6.933±0.228	6.600±0.254	6.667±0.216	7.0.33±0.158	6.767±0.175

Mean values with the same alphabets do not differ significantly at P< 0.05.
CP = Crude protein; ME = Metabolizable energy.

Flavour: Significant differences in the mean values of flavour score in thigh meat of layers evaluated at different stages of 2nd year life were found. Maximum (7.00±0.207) flavour score was observed at the end of 2nd year and minimum (6.214±0.145) at post-moult. Maximum flavour score was also observed at the end of 2nd year life by Raifq et al. (1999). Change in flavour in ,9ooked chicken meat was reported to be influenced with age (Mountney, 1975). Flavour of baked chicken was also influenced by age (Fry et al., 1958). Though the differences in mean values of flavour score in dark meat of layers fed different moult diets were statistically non-significant, yet numerically the maximum flavour score (6.80±0.145) was obtained in thigh meat of layers fed pure corn diet. Superior flavour score of meat of birds fed corn was compared to those fed various other diets. The chemical compound responsible for the flavour of poultry meat isolated and characterized as a flavour constituent was identified as a weak acid produced in the flesh during cooking (Bouthilet, 1949). The effect of ration was studied and it was found that the modern bird has as much chicken flavour as the old style bird (Hanson et al., 1960).

Tenderness : The differences in mean values of tenderness score in layer thigh meat at different stages of 2nd year life were found significant. Maximum tenderness score (6.952±0.176) was found at the end of 2nd year life and minimum (6.00±0.150) at post-moult (Table 1). Minimum tenderness score was also observed at post-moult stage (Rafiq et al., 1999). Large proportion of dark meat in patties was reported to increase its fat contents (Roland et al., 1981) which might be due to more fat in dark meat of layers as compared to white meat (Mountney, 1975). Increase in tenderness at the end of 2nd year life in the present study might be due to increase in its fat contents. However, the differences in the mean values of tenderness score in dark meat of layers fed different moult diets were statistically non-significant.

Juiciness: Maximum juiciness score (7.000±0.138) of dark (thigh) meat was observed at pre-moult and minimum (6.048±0.133) at post-moult (Table 1). The differences in the mean values of juiciness score in thigh meat of layers at different stages of 2nd year life were significant, whereas moult diets did not make any significant change in juiciness score. The minimum juiciness score was also reported at post-moult stage (Rafiq et al., *1999J.* Since fasting for 10 days and restricted feeding for 18 days during revitalization process tended to deplete body fat, thus decreased fat content resulted in decreased juiciness at post-moult. But prior to this process and at the end of 2nd year life, the birds had developed ample fat which apparently was responsible for juiciness.

Taste: Significant differences were found in the mean values of taste score in dark meat of layers fed different moult diets .. On the other hand, different stages of 2nd year life were unable to make any significant change in taste score (Table 2). Maximum taste score (7.30±0.188) was observed in thigh meat of layers fed pure corn diet. As corn diet is high in energy (3300 Kcal/kg), thus the maximum taste score might be due to higher energy value and aging process did not seem to affect the taste in dark meat of spent layers.

Chewability: Maximum chewability score (6.952±0.146) was observed at pre-moult and minimum (6.048±0.129) at post-moult. The statistical analysis revealed significant differences in the mean values of chewability score in thigh meat of layers at different stages of 2nd year life. The minimum chewability score at post-moult stage was also reported by Rafiq et al. (1999), whereas increase in chewability score had also been observed at the end of 2nd year life, which might be due to increase in fat contents as observed in the present study since fat contributes to eating quality by imparting tenderness. Non-significant differences in mean values of thigh meat of layers fed different moult diets indicated that such diets had no effect on the chewability score.

7. Acceptability : Maximum acceptability score (7.048 ± 0.129) was found at pre-moult stage and minimum (6.381 ± 0.138) at post-moult (Table 1). The differences in mean values of acceptability score in thigh meat of layers at different stages were found statistically non-significant. The mean values of thigh meat of layers fed different moult diets showed non-significant effect on the acceptability score.

Conclusions: It was found that taste was influenced by different moult diets. Favourable changes were observed in colour, flavour, tenderness, juiciness and chewability due to revitalization process. Nutritional manipulation during revitalization process, appeared to have desirable effect in respect of organoleptic properties of dark meat of spent layers.

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