



Fatty acid profile of chicken meat under different system of rearing

S. Satheeskumar^{1*}, R. Prabakaran², N. Kumaravelu³, S. Ezhilvalavan^{4} and
A. Serma Saravana Pandian⁵**

*Department of Poultry Science, Madras veterinary college, Tamil Nadu Veterinary and Animal Sciences
University, Chennai-51*

ABSTRACT

An experiment was carried out to compare the fatty acid profile of breast, thigh meat and skin from broiler (cobb), native chicken reared under intensive and free range systems. Saturated fatty acid contents were high in free range native chicken, while monounsaturated fatty acid contents were numerically higher in commercial broiler meat. Total n-3 fatty acids were significantly ($P \leq 0.05$) higher in breast and thigh meat of commercial broilers over native chicken reared under both free range and intensive systems, due to dietary fat inclusion in broiler rations.

I. INTRODUCTION

Meat contains high biological value of protein and important micronutrients that are needed for good health throughout life. It also contains a range of fats, including essential polyunsaturated fats. The nutritional composition will vary according to breed, feeding regimen, season and meat cut, in general lean red meat has a low fat content, is moderate in cholesterol and rich in protein and many essential vitamins and minerals. Consumption of poultry meat has increased vastly over the past 40 years, This indicates protein from animal origin keeps on increasing. More recently there have been concerns among the public that hybrid chicken meat contains considerably more fat than traditionally reared native chicken. Comparative studies on nutritional composition of native chicken versus commercial broilers are scanty. Hence, the present study was undertaken to compare fatty acids profile of meat from commercial broiler, native chicken reared under intensive and free range systems.

II. MATERIALS AND METHODS

The fatty acid profile was studied at the Department of Physiology, Veterinary College and Research Institute, Namakkal. The desi-birds from free range and broilers were procured from retail market. The intensive native chicken were collected from the farms where native chicken are grown under deep litter system with no outdoor paddocks. Twelve birds as representative samples with target weight of about 1.3 kg were selected from each group. The birds were subjected to slaughtering process as per Arumugam and Panda (1970). The breast, thigh and skin samples were collected and stored at -20°C . Fatty acids profile were estimated by gas chromatograph (CHEMITO, model CERES 800 plus, India) methods. The lipids were extracted as per the standard procedure of Folch *et al.* (1957) and transmethylated procedure was carried out as per the method of Sukhija and Palmquist (1988). The data were analysed using a one-way analysis of variance (Snedecor and Cochran 1989).

III. RESULTS AND DISCUSSIONS

Fatty acid composition of breast, thigh and skin of native chicken reared under intensive and free range system and commercial broilers are presented in Table 1. The present study showed higher values of saturated fatty acids in native chicken (both free range and intensive system) than commercial broilers. Wattanachant *et al.* (2004) observed that indigenous chicken muscle contained

higher percentage of saturated fatty acids than broiler chicken muscles which is in agreement with the present study. Similarly, samples (breast, thigh and skin) received from free range system had lower values of monounsaturated fatty acids than from commercial broiler meat. Monounsaturated fatty acids were higher in skin than muscles. Similar results were reported by Crespo and Esteve-Garcia (2001) that the fatty acid profile of different tissues reflected the dietary fatty acid profile.

The statistical analysis indicated significant ($p \leq 0.05$) difference on total n-3 fatty acid contents of breast and thigh of commercial broilers over native chicken under both free range and intensive system. The comparison of means indicated that breast meat (1.14 per cent) and thigh meat (3.86 per cent) from the commercial broilers had the higher total n-3 fatty acid contents when compared to other native chicken groups. Givens *et al.* (2011) observed that there was no evidence that meat from free range chickens had a fatty acid profile that would be classified as healthier than that from intensively reared birds and Pavlovski *et al.*, (2013) found that free ranged naked neck chickens have been shown to have significant different fatty acid composition compared with broiler chickens reared in conventional system. Breast meat from naked neck chickens had more SFA. The total n-3 fatty acids were lower in thigh meat of naked neck breed compared with thigh meat from Hybro G+ chickens which is in accordance with the results of this study.

Increase in n-3 fatty acids content in broiler tissue might be due to addition of dietary fat in poultry feed. n-3- fatty acid contents in native chicken meat can be enriched by inclusion of fish oil, linseed oil and algae in native chicken feed formulation.

BIBLIOGRAPHY

- [1] Arumugam, M.P. and Panda, B. 1970. Processing and inspection of poultry. Indian Veterinary Research Institute, Izatnagar, U.P.
- [2] Crespo, N. and Esteve-Garcia, E. 2001. Dietary fatty acid profile modifies abdominal fat deposition in broiler chickens. *Poult. Sci.*, **80**: 71-78.
- [3] Folch, J., Lees, M. and Stanely, G. H. S. 1957. A simple method for the isolation and purification of total lipids from animal tissues. *J. Biol. Chem.*, **226**: 497 - 507.
- [4] Givens, D.I., Gibbs, R.A., Rymer, C. and Brown, R.H. 2011. Effect of intensive vs. free range production on the fat and fatty acid composition of whole birds and edible portions of retail chickens in the UK. *Food Chemistry*, **127**: 1549-1554.
- [5] Pavlovski, Z, Skrbic, Z , Stanisic, N, Lilic, S, Hengl , B, Lukic, M and V. Petricevic, 2013. Differences in fatty acid composition of meat between naked neck and two commercial broiler chicken breeds, *Biotechnology in Animal Husbandry* **29**: 467-476 .
- [6] Snedecor, G.W and Cochran, W.G. 1989. Statistical methods. VIII Edn. Iowa state University Press, Ames, Iowa.
- [7] Sukhija, P.S. and Palmquist, D.L. 1988. Rapid method for determination of total fatty acid content and composition of feedstuffs and feces. *J. Agric. Food Chem.*, **36**: 1202-1206.
- [8] Wattanachant, S., Benjakul, S. and Ledward, D.A. 2004. Composition, color and texture of Thai indigenous and broiler chicken muscles. *Poult. Sci.*, **83**:123-128.

Table 1. Mean (\pm S.E.) fatty acid composition of breast, thigh and skin of native chicken under intensive and free range systems and commercial broilers

System of rearing	Saturated fatty acids			Monounsaturated fatty acids			Polyunsaturated fatty acids			Total n-3 fatty acids		
	Breast meat	Thigh meat	Skin	Breast Meat	Thigh meat	Skin	Breas t meat	Thigh meat	Skin	Brea st meat	Thigh meat	Skin
Native chicken under intensive system	37.30 \pm 1.54	33.00 \pm 1.68	39.03 \pm 3.33	41.96 \pm 2.07	41.09 \pm 1.48	42.49 \pm 3.15	20.70 \pm 1.62	23.72 \pm 1.80	19.48 \pm 1.19	0.34 ^b \pm 0.17	1.36 ^b \pm 0.39	1.38 \pm 0.40
Free range	41.68 \pm 1.99	35.76 \pm 0.49	45.16 \pm 1.27	37.63 \pm 1.50	36.76 \pm 2.40	40.12 \pm 2.02	20.09 \pm 2.16	20.13 \pm 1.42	18.72 \pm 0.85	0.62 ^b \pm 0.25	1.02 ^b \pm 0.10	1.74 \pm 0.44
Commercial broiler	36.42 \pm 3.83	31.33 \pm 1.85	38.88 \pm 3.05	39.88 \pm 3.74	41.23 \pm 1.42	42.75 \pm 2.70	22.90 \pm 1.04	26.44 \pm 2.80	21.53 \pm 0.62	1.14 ^a \pm 0.20	3.81 ^a \pm 1.48	1.98 \pm 0.59
F value	0.69 ^{NS}	2.39 ^{NS}	1.75 ^N _S	0.68 ^{NS}	0.20 ^{NS}	1.07 ^N _S	0.01 ^N _S	2.30 ^N _S	2.87 ^N _S	3.70 [*]	2.96 [*]	1.39 ^N _S

Column bearing different superscripts differ significantly

NS- Non significant; * - Significant ($P \leq 0.05$)

