

EFFECT OF SEX ON AMINO ACID COMPOSITION OF TURKEY MEAT

Domínguez, R.¹, Echegaray, N.¹, Gálvez, F.², Pérez-Santaescolática, C.¹, Pateiro, M.¹, Franco, D.¹ and Lorenzo, J.M.^{1*}

¹Centro Tecnológico de la Carne de Galicia, Rúa Galicia Nº 4, Parque Tecnológico de Galicia, San Cibrao das Viñas, 32900 Ourense, Spain, ²COREN, Sociedad Cooperativa Galega, 32003 Ourense, Spain

*Corresponding author email: jmlorenzo@ceteca.net

Abstract – Turkey meat was an important source of dietary amino acids. The influence of sex on amino acid profile of breast and thigh was studied. Regarding sex effect, the female samples presented the highest contents of proline (909 vs. 798 mg/100 g) in breast and cysteine (265 vs. 208 mg/100 g), methionine (314 vs. 234 mg/100 g), lysine (2236 vs. 2064 mg/100 g) and isoleucine (1180 vs. 1062 mg/100 g) in thigh. On the other hand, the breast samples presented the highest essential/non-essential ratio (1.06 vs. 0.96 for breast and thigh, respectively). However, the total essential and non-essential amino acids did not show significant differences for both pieces. Overall conclusion, sex had slightly effect on amino acid composition of turkey meat.

Key Words – essential/non-essential ratio, nutritional value, poultry

I. INTRODUCTION

Meat quality is related with the meat for eating and the processing or the storage, but also with other aspects related with their production (animal welfare, breed, feeding regime, pre-slaughter conditions or slaughter method). Meat is known as an important dietary source of B vitamins, amino acids, proteins and minerals [1]. To this regard, turkey meat is characterised by high protein and mineral content, low fat and good dietetic a flavour traits [2]. Scarc information is available about the effect of sex on nutritional composition of turkey meat. Therefore, the main objective was to evaluate the effect of turkey sex on amino acid composition in breast and thigh meat. In addition, this study contributed to a description of the nutritional composition and would be used to extend existing information about nutrient composition of turkey meat.

II. MATERIALS AND METHODS

II.1 Animal management and sample collection

For this study, twenty turkeys (10 females and 10 males) from Hybrid Turkeys (Hendrix Genetics Company) were used. Animals were reared in an intensive system and were fed with commercial concentrate. Females were slaughtered at 100 days old, while males were slaughtered at 132 days old, in an accredited abattoir. Immediately after slaughter, carcasses were chilled at 4 °C in a cold chamber for 24 h. At this point, the breast (*pectoralis profundus*) and thigh (*biceps femoris*, *semitendinosus* and *semimembranosus*) cuts were extracted from the right side of each carcass.

II.2 Protein amino acid profile

The hydrolysis of the protein, derivatization, and identification of hydrolysed amino acids were carried out following the procedure described by Domínguez *et al.* [3]. The hydrolysis of the protein was carried out on 100 mg of minced meat with 5 mL of hydrochloric acid (6 N) in an ampoule glass sealed for 24 h at 110 °C. After hydrolysis, the solution was diluted with 200 mL of distilled water and filtered through a 0.45-mm filter. Data regarding amino acid composition were expressed in mg/100 g of meat.

II.3 Statistical analysis

The effect of sex on amino acids profile (ten turkeys x two locations x two sexes) was examined using a one-way ANOVA, where this parameter was set as dependent variables and sex as fixed effect. The values were given in terms of mean values and standard error of mean (SEM). All analyses were conducted using the IBM SPSS Statistics 19.0 program software package.

III. RESULTS AND DISCUSSION

The amino acid composition of breast and thigh turkeys' meat is shown in Table 1. Both locations exhibit the following profile: the major amino acid was glutamic acid (around 3400 mg/100 g of meat; around 15% of total amino acids) followed by aspartic acid and lysine with similar values (around 2100 mg/100 g of meat; around 10% TAA), leucine (around 1900 mg/100 g of meat; around 9% TAA) and arginine (around 1800 mg/100 g of meat; around 8% TAA). The amino acid profile obtained in this research agrees with those reported in different cuts of chicken [4], turkey [2] and goose [5]. The essential amino acids that presented the highest concentration were lysine, leucine and arginine, representing together about 52% of total essential amino acids, while the methionine

and cysteine presented the lowest values of essential amino acids (between 208 and 415 mg/100 g of meat; each represented about 2-3% of total essential amino acids). Glutamic acid, aspartic acid and alanine were the most abundant amino acids found in the non-essential fraction, representing together around 61% of the total non-essential amino acids, whereas the lowest values were found in tyrosine, proline and serine, each representing 8-9% of total non-essential amino acids.

Table 1 Effect of turkey sex on amino acids composition (mg/100 g of meat)

Amino acids	Breast		SEM	Sig.	Thigh		SEM	Sig.
	Male	Female			Male	Female		
Non-essential								
Aspartic acid	2145	2213	35.5	ns	2059	2105	41.3	ns
Serine	964	903	29.3	ns	1030	1047	34.3	ns
Glutamic acid	3388	3535	51.8	ns	3357	3568	72.7	ns
Glycine	1005	973	18.2	ns	1134	1051	52.5	ns
Alanine	1329	1375	34.3	ns	1382	1367	41.8	ns
Proline	798	909	26.3	*	863	986	37.8	ns
Tyrosine	853	832	12.7	ns	828	883	33.8	ns
<i>Total non-essentials</i>	<i>10730</i>	<i>11010</i>	<i>188</i>	ns	<i>11293</i>	<i>11555</i>	<i>285</i>	ns
Essential								
Histidine	897	903	11.8	ns	650	767	33.0	ns
Arginine	1791	1845	38.9	ns	1767	1828	45.4	ns
Threonine	1060	1075	25.7	ns	1059	1100	33.9	ns
Cysteine	208	242	9.2	ns	208	265	12.2	*
Valine	1123	1167	18.3	ns	1076	1170	36.4	ns
Methionine	393	415	20.1	ns	234	314	20.5	*
Lysine	2107	2197	41.7	ns	2064	2236	43.9	*
Isoleucine	1150	1205	18.1	ns	1062	1180	27.9	*
Leucine	1901	1990	31.0	ns	1795	1949	48.4	ns
Phenylalanine	935	963	10.8	ns	885	988	32.5	ns
<i>Total essential</i>	<i>11357</i>	<i>11759</i>	<i>176</i>	ns	<i>10642</i>	<i>11532</i>	<i>244</i>	ns
Essential/Non-essential	1.06	1.07	0.01	ns	0.96	0.97	0.02	ns

Sig.: significance: * ($P < 0.05$), ns (not significant); SEM: Standard error of the mean

On the other hand, analysis of amino acid composition (in breast and thigh) showed no great difference between sexes. In fact, in breast location only the content of proline was affected by sex, reaching the highest values in females samples. The rest of individual amino acids and the total essential and non-essential amino acids did not show differences. In thigh, the sum of total essential, sum of total non-essential and individual non-essential amino acids also showed no significant differences. However, individual essential amino acids showed differences between sexes. Females had higher ($P < 0.05$) amounts of lysine, isoleucine, methionine and cysteine. Finally, the values of essential/non-essential ratio were about 1.06 in breast and 0.97 in thigh pieces.

IV. CONCLUSION

The values obtained for amino acids composition exhibited an important source for an adequate nutrition and health. As a general conclusion, this research allows obtaining more accurate nutritional information regarding to turkey meat.

ACKNOWLEDGEMENTS

Authors are grateful to GAIN (Project NUTRIGRUPS/2015) for the financial support.

REFERENCES

- Lombardi-Boccia, G., S. Lanzi, & A. Aguzzi. (2005). Aspects of meat quality: trace elements and B vitamins in raw and cooked meats. *Journal of Food Composition and Analysis* 18: 39-46.
- Ribarski, S., & M. Oblakova. (2016). Slaughter yield and quality of meat from wild turkey (*meleagris gallopavo silvestris* vieillot) reared in hunting reserve in south Bulgaria. *Trakia Journal of Sciences* 14: 135-141.
- Domínguez, R., P. Borrajo, & J. M. Lorenzo. (2015). The effect of cooking methods on nutritional value of foal meat. *Journal of Food Composition and Analysis* 43: 61-67.
- Zhao, G. P., H. X. Cui, R. R. Liu, M. Q. Zheng, J. L. Chen, & J. Wen. (2011). Comparison of breast muscle meat quality in 2 broiler breeds. *Poultry Science* 90: 2355-2359.
- Geldenhuis, G., L. C. Hoffman, & N. Muller. (2015). The fatty acid, amino acid, and mineral composition of Egyptian goose meat as affected by season, gender, and portion. *Poultry Science* 94: 1075-1087.