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MEAT QUALITY OF THREE ITALIAN RABBIT BREEDS FARMED UNDER FREE-RANGE CONDITIONS

Yazavinder Singh[1], Antonella Dalle Zotte[1], Stella Agradi[2], Cecilia Mugnai[2], Claudio Forte[2], Simone Blanc[3], Marco Cullere[1*]

[1] Department of Animal Medicine, Production and Health, University of Padua, Viale dell'Università 16, Legnaro, Padua, Italy.

[2] Department of Veterinary Sciences, University of Turin, Largo Braccini 2, Grugliasco, Turin, Italy

[3] Department of Agricultural, Forest and Food Sciences, University of Turin, Largo Braccini 2, Grugliasco, Turin, Italy

*Corresponding author email: marco.cullere@unipd.it

I. INTRODUCTION

Rabbit meat is well suited for inclusion in innovative agri-food chains and it is appreciated for its nutritional profile [1]. Despite this, the Italian rabbit meat production sector is facing challenging times, where productive sustainability is under pressure and future is uncertain. The progressive disappearance of rural production (lack of rationalization and profitability) is resulting in dramatic loss of livestock biodiversity and in growing social problems, being the most widespread nationwide [2]. Moreover, the overlapping roles that rabbits have as livestock and pet are contributing to an uncertain future [1]. The present research is a part of a wide project proposing a multidisciplinary approach to design a new strategy to valorize rural rabbit meat chain, by using national genotypes, thus protecting biodiversity, promote free-range system, and meet consumer's expectations for innovative, sustainable and welfare-friendly products. The first experiment studied three different breeds (Bianca Italiana - B, Grigio Piemontese - G, Leprino di Viterbo - L) farmed in a free-range system, aiming to select the most promising one for the second project part (test an innovative and low-input diet). The present paper evaluated the meat quality of the rabbit breeds deriving from the first experiment.

II. MATERIALS AND METHODS

The *in vivo* experiment, conducted at the University of Turin (Italy), involved n=150 weaned rabbits (35 days): B, G, L Italian breeds. Rabbits were housed into n=15 indoor pens (5 replicated pens/breed) which had an external paddock, accessible starting from 60 days of age. Rabbits were fed *ad libitum* with a commercial pelleted diet. At 90 days, rabbits were slaughtered at a commercial slaughterhouse, carcasses were chilled for 24 hours and a total of n=10 carcasses/breed were transported to the Department of Animal Medicine, Production and Health (LabCNX Laboratory; University of Padua, Italy) for meat quality evaluations: proximate composition [3], He-iron content [4], and fatty acids (FA) profile [5]. A one-way ANOVA (fixed effect: breed) was used to analyze data. Least square means were obtained using the Bonferroni test (significance: 5% confidence level).

III. RESULTS AND DISCUSSION

Meat quality evaluations indicated that the proximate composition and He-iron content of rabbit meat were similar among the three breeds considered in the present study (Table 1). An exception was the meat lipids' content which showed a higher value for L breed compared to B one, while G was intermediate (P<0.05).

Table 1 - Effect of rabbit breed (Bianca Italiana – B, Leprino di Viterbo - L, Grigio di Monferrato - G) on meat (half carcass) proximate composition (g/100 g meat) and He-iron content (mg/kg meat).

	Breed			RSD[1]	*P*-value
	B	L	G		
N.	10	10	10		
Water	74.8	75.1	74.4	1.00	0.3291
Protein	22.9	22.5	22.6	0.85	0.5917
Lipids	4.14[b]	4.87[a]	4.84[ab]	0.64	0.0246
Ash	1.29	1.31	1.32	0.07	0.6595
He-iron	2.74	2.64	2.70	0.37	0.8320

[1] Residual Standard Deviation; [a,b] Means with different superscript letters significantly differ (P<0.05).

From the analysis of the FA profile (Table 2) it emerged that meat lipids varied also in main FA classes: G meat displayed a higher proportion of saturated fatty acids (SFA) compared to that of L breed, while B showed an intermediate value (P<0.05). This result determined variations in the considered healthiness indexes of meat: G displayed the highest atherogenicity index (P<0.01), the lowest peroxidability (P<0.05) and hypocholesterolemic / hypercholesterolemic (P<0.01) indexes. The observed differences in lipids content and FA profile can be attributed to the different genetic background of the three breeds, which is a key factor affecting lipids metabolism, FA metabolic pathways and, consequently, FA synthesis and deposition. Specifically, different rabbit genotypes display variations in thioesterase, Δ^9-desaturase, elongase and Δ^5-Δ^6-desaturase enzyme activities [6].

Table 2. Effect of rabbit breed (Bianca Italiana – B, Leprino di Viterbo - L, Grigio di Monferrato - G) on meat (half carcass) main fatty acid classes (% fatty acid methyl esters, FAME).

	Breed			RSD[1]	*P*-value
	B	L	G		
N.	10	10	10		
SFA	40.4^{ab}	40.0^{b}	42.6^{a}	2.24	0.0311
MUFA	17.3	17.6	18.9	2.42	0.3224
PUFA	31.3	32.0	29.7	2.88	0.2191
n-6	30.0	30.1	27.9	2.82	0.2179
n-3	1.70	1.85	1.77	0.24	0.3723
n-6/*n*-3	17.6	16.6	15.8	2.37	0.2762
AI[2]	0.61^{b}	0.61^{b}	0.72^{a}	0.08	0.0097
TI[3]	1.60	1.57	1.72	0.17	0.1413
PI[4]	56.1^{a}	53.5^{ab}	46.9^{b}	6.73	0.0141
hH[5]	1.79^{a}	1.78^{a}	1.54^{b}	0.18	0.0077

[1] Residual Standard Deviation; [2] AI: Atherogenicity index = (C12:0 + 4 x C14:0 + C16:0)/[total MUFA + total (*n*-6) + total (*n*-3)]; [3] TI: Thrombogenicity index = (C14:0 + C16:0 + C18:0)/[(0.5 x total MUFA) + 0.5 x (*n*-6) + 3 x (*n*-3/*n*-6)]; [4] PI: Peroxidability index = (% monoenoic x 0.025) + (% dienoic x 1) + (% trienoic x 2) + (% tetraenoic x 4) + (% pentaenoic x 6) + (% hexaenoic x 8); [5] HH: hypocholesterolemic / Hypercholesterolemic index = (C18:1 *n*-9 +C18:1 *n*-7 + C18:2 *n*-6 + C20:2 *n*-6 + C20:3 *n*-6 + C20:4 *n*-6 + C18:3 *n*-3 + C20:5 *n*-3 + C22:6 *n*-3)/(C14:0 + C16:0); [a,b] Means with different superscript letters significantly differ (P<0.05).

IV. CONCLUSION

The results of the present study alone do not provide a clear indication regarding the most promising rabbit breed for the second research step. A clear picture will emerge once *in vivo* productive outcomes, detailed meat quality evaluations and sustainability results of the three breeds will be holistically considered also referring to consumer's expectations for innovative, sustainable and welfare-friendly products.

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REFERENCES

1. Cullere, M.; Dalle Zotte, A. (2018) Rabbit meat production and consumption: State of knowledge and future perspectives. Meat Science 143:137-146.
2. ISMEA - Istituto di Servizi per il Mercato Agricolo Alimentare. Cunicolo da carne. (2023) https://www.ismeamercati.it/flex/files/1/8/9/D.7f55a8adb50172a43818/SchedaCunicolo_2022_12_rev02__1_.pdf
3. AOAC - Association of Official Analytical Chemists. (2012) Official methods of analysis, 19th rev. ed. Arlington, VA, USA.
4. Hornsey, H.C. (1956) The colour of cooked cured pork. I. Estimation of the nitric oxide-haem pigments. Journal of the Science of Food and Agriculture 7:534-540.
5. Dalle Zotte, A.; Cullere, M.; Tasoniero, G.; Gerencser, Zs.; Szendro, Zs.; Novelli, E., Matics, Zs. (2018) Supplementing growing rabbit diets with chestnut hydrolysable tannins: effect on meat quality and oxidative status, nutrient digestibilities, and content of tannin metabolites. Meat Science 146:101-108.
6. Dal Bosco, A.; Mugnai, C.; Roscini, V.; Paci, G.; Castellini, C. (2014) Effect of genotype on estimated indexes of fatty acid metabolism in rabbits. World Rabbit Science 22: 21-28.