SURFACE MOULDS AFFECTING THE SENSORY PROPERTIES OF TRADITIONAL CROATIAN DRY-CURED HAMS

Jelka Pleadin[1]*, Tina Lešić[1], Ivica Kos[2], Manuela Zadravec[3], Željko Jakopović[4], Nada Vahčić[4]

[1]Croatian Veterinary Institute, Laboratory for Analytical Chemistry, Savska Cesta 143, 10000 Zagreb, Croatia
[2]University of Zagreb, Faculty of Agriculture, Department of Animal Science and Technology, Svetošimunska cesta 25, 10000 Zagreb, Croatia
[3]Croatian Veterinary Institute, Laboratory for Feed Microbiology, Savska Cesta 143, 10000 Zagreb, Croatia
[4]University of Zagreb, Faculty of Food Technology and Biotechnology, Pierottijeva 6, 10000 Zagreb, Croatia

*pleadin@veinst.hr

Croatian Veterinary Institute 1933 Zagreb

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INTRODUCTION

Moulds play an important role in the production of dry-cured hams by affecting the sensory properties of the final product. Surface moulds present on these products is generally appreciated because of its enzymatic activity, such as lipolysis, lipid oxidation, proteolysis, and amino acid degradation, which contribute to the development of characteristic dry-cured ham flavour (*1,2*). The predominant mould genera isolated from the surface of these products belongs to *Penicillium* and *Aspergillus* (*3*). The aim of this study was to identify surface moulds overgrowing the surface of Croatian protected homemade dry-cured hams "Istarski pršut" and "Dalmatinski pršut" and to determine mould influence on sensory properties of the products.

MATERIALS AND METHODS

Dry – cured ham samples

Samples of "Istarski pršut" (n = 15) and "Dalmatinski pršut" (n = 20) were obtained in the amount of 1.5 to 2 kg from annual fairs held in Istria (west of Croatia) and Dalmatia (south of Croatia) during 2019. Dry-cured hams were produced in 2018/2019 using traditional recipes by different producers.

Surface moulds identification

Mould isolates were identified using a traditional method of depiction of macroscopic and microscopic morphological characteristics according to (*4*) and corroborated using a molecular polymerase chain reaction (PCR) method of beta-tubulin (benA) (primer pairs BTa2a & BTa2b) and calmodulin (CaM) loci sequencing (primer pairs CMD5 & CMD6) (*5, 6*). PCR reaction was performed using HotStarTaq Plus MasterMix Kit (Qiagen, Germany). Purified PCR products were sent to Macrogen Inc. (Amsterdam, Netherlands). The obtained sequences were aligned using the DNASTAR Software 16 (Lasergene, WI, USA), and then compared to those available from the GenBank database using the BLAST algorithm.

Sensory properties evalution

Sensory evaluation was conducted by a trained panel of 9 assessors (5 males and 4 females) with an age range of 34 to 60 years (mean age = 49.3, SD = 8.9). The assessors were selected and generically trained according to the ISO 11132 (2012). In total, 13 training sessions of 60 min each took place. Sensory analysis was carried according to the ISO 8589 (2007) and by use of a quantitative descriptive analysis (QDA) based on the numerical and unipolar intensity scale developed in collaboration with the Centro Studi Assaggiatori (Brescia, Italy).

RESULTS

Table 1. Moulds identified on the surface of Croatian dry-cured hams

Genus	Species	„Istarski pršut“ (n=15) % of isolates	„Dalmatinski pršut“ (n=20) % of isolates
Penicillium	*P. salamii*	9	-
	P. polonicum	3	-
	P. citrinum	9	12
	P. bialowienzense	6	-
	P. solitum	-	2
	P. nalgiovense	-	3
Aspergillus	*A. proliferans*	13	8
	A. chevalieri	5	15
	A. oxalicum	-	3
	A. pseudoglaucus	-	2
	A. niger	-	2
	A. cibarus	-	10

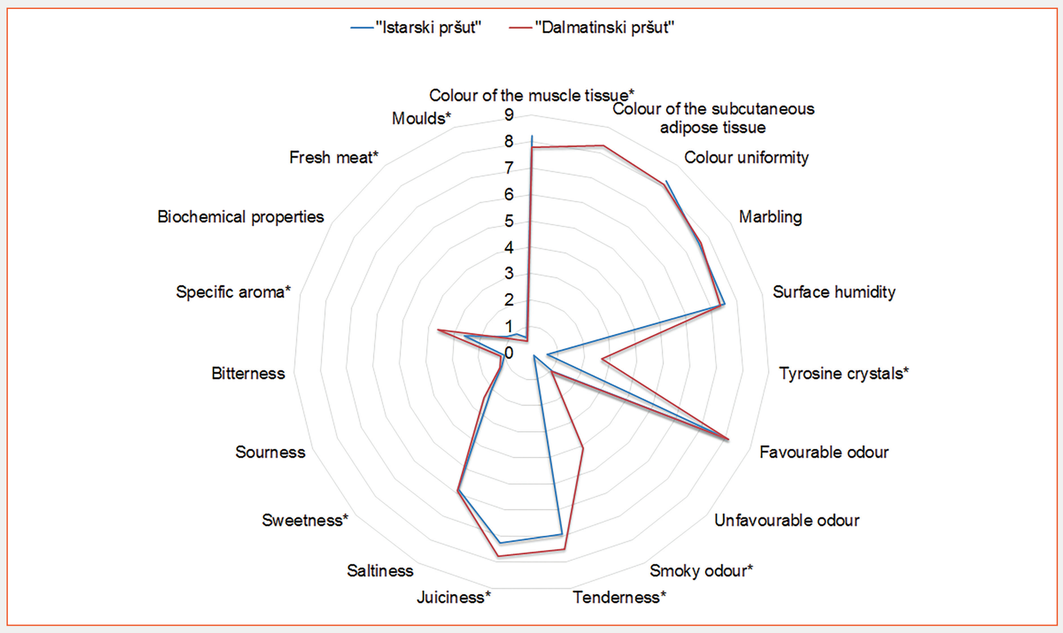

Figure 1. Sensory properties of Croatian dry-cured hams (appearance, odour, texture, taste, and aroma)

*statistically significant difference ($p < 0.05$)

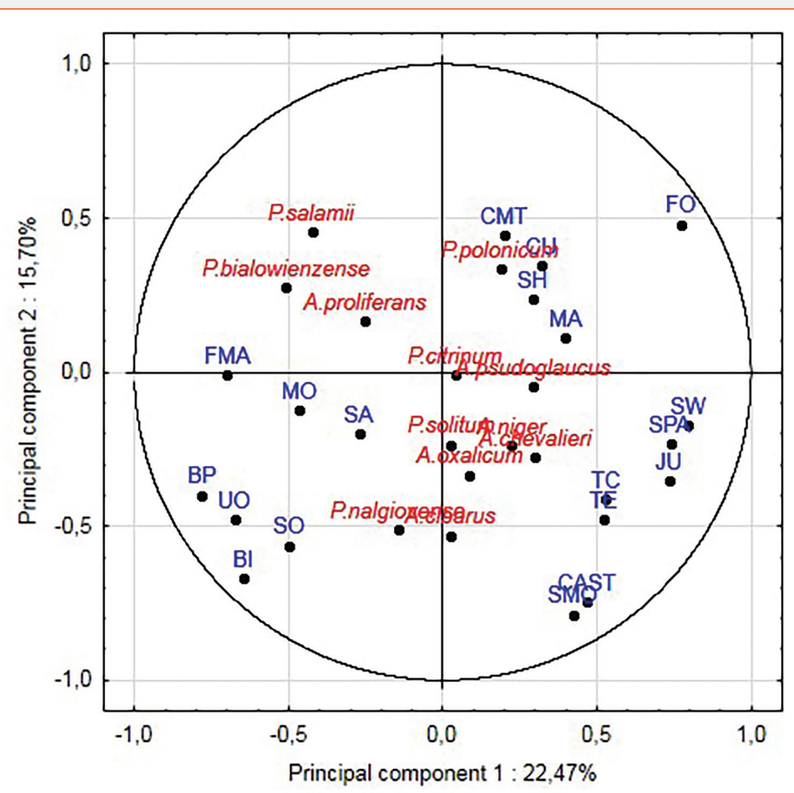

Figure 2. Score plot of the variables encompassed by the principal component analysis (PCA) of sensory properties and mould species of Croatian dry-cured hams

CMT = colour of the muscle tissue; CAST = colour of the subcutaneous adipose tissue; CU = colour uniformity; MA = marbling; SH = surface humidity; TC = tyrosine crystals; FO = favourable odour; UO = unfavourable odour; SMO = smoky odour; TE = tenderness; JU = juiciness; SA = saltiness; SW = sweetness; SO = sourness; BI = bitterness; SPA= specific aroma; BP = biochemical properties; FMA = fresh meat aroma; MO = moulds

CONCLUSIONS

- Predominant species found on the surface of "Dalmatinski pršut" were *A. chevalieri*, *P. citrinum* and *A. cibarus*, while those predominating on the surface of "Istarski pršut" were *A. proliferans*, *P. citrinum* and *P. salamii*.
- On "Dalmatinski pršut" surfaces, *Aspergillus* species were found in higher percentages and showed greater variability
- Different conditions under which dry-cured hams are processed, and consequently different moulds that develops on their surface, resulted in significant variations of 9 out of 19 sensory attributes.
- A more pronounced tenderness and juiciness and higher tyrosine crystals' content in "Dalmatinski pršut" samples, can be linked to the higher proteolytic activities of mould species populating their surface.
- The results of the PCA analysis show that moulds represent a significant source of information needed for better dry-cured hams' characterization.

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HrZZ Croatian Science Foundation
TMP mould RISK Mycotoxins in traditional Croatian meat products