INFLUENCE OF GOAT BREED SAANEN AND NERA DI VERZASCA ON MICROBIOLOGICAL QUALITY AND VOLATILE ORGANIC COMPOUNDS IN FORMAGGELLA DEL LUINESE PDO CHEESE

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INTRODUCTION & AIM

Formaggella del Luinese (FL) PDO is a semi-hard cheese from the Varese Pre-Alps in Italy, made from raw goat milk. Its flavor is shaped by microbial diversity, including starter cultures and non-starter lactic acid bacteria (NSLAB), which produce volatile organic compounds (VOCs). This study examined the VOCs in cheese made from Saanen (S) and Nera di Verzasca (NV) milk and microbiological evaluations for hygiene and food safety.

MATERIAL AND METHODS

Sample collection

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2 DAIRY FARMERS

A B

4 FL x S
4 FL x NV

4 FL x S
4 FL x NV

Microbiological analyses

- LAB (30 °C)
- Enterococci
- Enterobacteriaceae
- Coliforms
- *E. coli*
- Coagulase-positive staphylococci

According to ISO procedures

VOCs determination

SPME/GC/MS

Fiber: DVB/CAR/PDMS, 50/30 um, 2-cm-long
GC/MS: [1]
Identification: Wiley 7n-1 MS library

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RESULTS

DAIRY	Goat breed	Enterobacteriaceae	Coliforms	*E. coli*	CPS	*Enterococcus* spp.	LAB
A	S	4.3 ± 0.3	4.3 ± 0.6	3.3 ± 0.4	< 2.0	6.7 ± 0.1	8.4 ± 0.2
	NV	3.9 ± 0.4	3.3 ± 0.7	2.2 ± 0.2	< 2.0	6.6 ± 0.3	8.3 ± 0.3
B	S	< 2.0	< 2.0	< 2.0	< 2.0	6.7 ± 0.2	8.2 ± 0.2
	NV	< 2.0	< 2.0	< 2.0	< 2.0	7.1 ± 0.2	8.0 ± 0.2

CPS: Coagulase positive staphylococci; LAB: Lactic acid bacteria

TAB 1. Microbial load in FL PDO expressed as $\log_{10}$ UFC/g (mean values ± standard deviation)

FIG 1. ETHANOL content

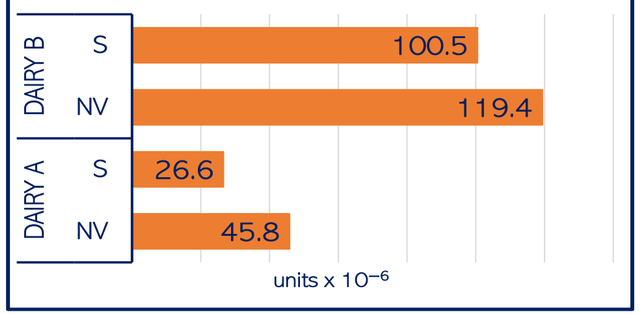
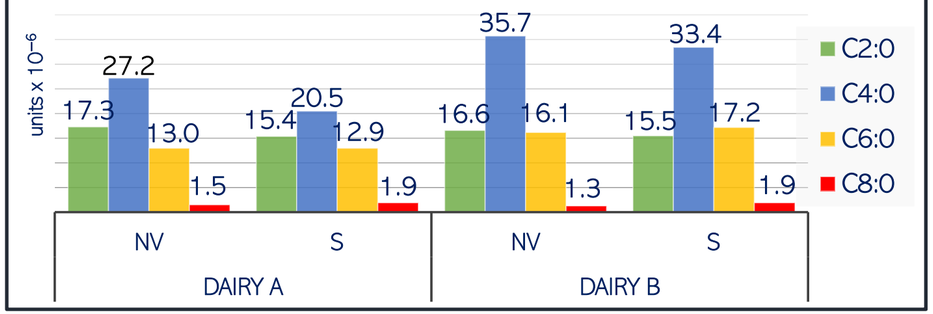


FIG 2. FREE FATTY ACIDS content



Free fatty acids and alcohols were the dominant compounds in all samples. *FIG 1.* Ethanol was the most abundant alcohol, significantly higher in dairy B, likely due to the activity of heterofermentative NSLAB, despite similar bacterial loads between producers. *FIG 2.* Butyric (C4:0) and caproic acids (C6:0), were higher in dairy B, while acetic acid (C2:0) levels were higher in the NV breed across both dairies. Caprylic acid (C8:0) was more concentrated in the S breed.

CONCLUSIONS

The VOC profile of Formaggella del Luinese PDO cheese is shaped by goat breeds and production techniques, with free fatty acids and alcohols being the key contributors to its complex flavor. The study highlights the distinctive characteristics of the cheese, encouraging its continued production. Special thanks are extended to the Consorzio di Tutela della Formaggella del Luinese and BIO4VERBA PROJECT for the support.

Reference: [1] Battelli G., Scano P., Albano C., Cagliani L.R., Brasca M., Consonni R.; LWT, 116 108576