APPLICATION OF SELECTED LACTIC ACID BACTERIA FOR THE YEAR-ROUND PRODUCTION OF VASTEDDA-LIKE CHEESE

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The autochthonous lactic acid bacteria (LAB) of PDO Vastedda della valle del Belìce cheese were investigated for the development of a starter culture for the year-round production of this cheese.
Winter and spring PDO cheese productions were analysed by plate counts on several media commonly used for isolation of LAB. All colonies showing different appearance were differentiated phenotypically and genotypically. All strains were subjected to a technological screening consisting of acidification capacity, diacetyl formation and production of antimicrobial compounds (1). Based on the technological performances evaluated in vitro, 12 LAB strains were selected and used in different combinations (all strains belonging to each species in triple combinations, all thermophilic strains and all mesophilic strains) to produce experimental cheeses by means of a dairy pilot plant. The different bacterial combinations (107 CFU/mL) were tested in different conditions: 1) growth in the optimal synthetic media, re-suspended in Ringer's solution and inoculated in pasteurised ewes' milk; 2) growth in whey-based medium (WBM) and inoculated in pasteurised ewes' milk; 3) growth in WBM and inoculated in raw ewes' milk (2). Final cheeses were evaluated for microbial counts, pH and total titratable acidity, sensory properties and subjected to the analysis of the volatile organic compounds (VOC) carried out by gas chromatography coupled with mass spectrometry (GC/MS) (3).
Plate counts showed the total microbial counts till levels of almost 109 CFU g-1 and all cheese samples were dominated by coccus LAB. A total of 72 strains were found to represent 13 LAB species belonging to five genera (Enterococcus, Lactobacillus, Lactococcus, Leuconostoc and Streptococcus). All lactococci were able to perform the rapid acidification of the curd in winter conditions (Tab.1). The sensory evaluation of the resulting cheeses indicated the cheeses processed with lactococci in single and multiple combinations as those well appreciated by the judges.
On the basis of the results shown for the winter and summer productions, at pilot scale and industrial level, respectively, and combining VOC and sensory evaluation, the multi-strain combination of lactococci was selected to act as starter preparation for the four-season production of Vastedda-like cheese.
1) Gaglio R., Francesca N., Di Gerlando R., Cruciata M., Guarcello R., Portolano B., Moschetti G., Settanni L. Identification, typing, and investigation of the dairy characteristics of lactic acid bacteria isolated from "Vastedda della valle del Belìce" cheese. Dairy Science & Technology. 94, 157-180. 2) Gaglio R., Scatassa M. L., Cruciata M., Miraglia V., Corona O., Di Gerlando R., Portolano B., Moschetti G., Settanni L. 2014. In vivo application and dynamics of lactic acid bacteria for the four-season production of Vastedda-like cheese. International Journal of Food Microbiology, 177, 37-48. 3) Carlin, S., Versini, G., 2005. La caratterizzazione dei formaggi trentini attraverso la frazione volatile. In: Gasperi, F., Versini, G. (Eds.), Caratterizzazione di formaggi tipici dell'arco alpino: Il contributo della ricerca. Temi, San Michele all'Adige, Italy.
Processi produttivi e sicurezza alimentare
LAB, Pilot plant, ewes' milk cheese

Tab. 1 Changes of pH during experimental Vastedda-like cheese making and microbial counts curd before stretching.

Production process[a]	Inocula	pH curd at T_0	Time of curd pH in the range of 5.2–5.4	pH cheese at T_0	pH cheese at 15 days	Curd before stretching			
						PCA-SkM 30°C	M17 30°C	MRS 42°C	M17 44°C
3	Control cheese	6.48 ± 0.00	72 h (5.35 ± 0.00)	5.60 ± 0.01	5.57 ± 0.01	7.3 ± 0.4	7.6 ± 0.1	4.6 ± 0.5 5	.3 ± 0.4
3	Lc. lactis subsp. cremoris PON36	6.66 ± 0.01	5 h (5.29 ± 0.01)	5.49 ± 0.00	5.29 ± 0.02	9.0 ± 0.1	9.5 ± 0.2	n.d.	n.d.
3	Lc. lactis subsp. cremoris PON153	6.67 ± 0.00	24 h (5.28 ± 0.01)	5.45 ± 0.02	5.30 ± 0.00	8.7 ± 0.3	9.4 ± 0.5	n.d.	n.d.
3	Lc. lactis subsp. cremoris PON203	6.65 ± 0.02	5 h (5.33 ± 0.01)	5.52 ± 0.00	5.32 ± 0.01	8.6 ± 0.5	9.3 ± 0.4	n.d.	n.d.
3	Multi-strain combination of three lactococci	6.11 ± 0.00	6 h (5.32 ± 0.02)	5.50 ± 0.00	5.10 ± 0.01	8.9 ± 0.1	9.5 ± 0.1	n.d.	n.d.

[a] 3, growth in WBM and inoculated in raw ewes' milk.