rnuvola@vet.unipi.it

Session S16 no21

Selection and evaluation of autochthonous lactic acid bacteria for the manufacture of a traditional goat cheese of Garfagnana

Nuvoloni R., Fratini F., Faedda L., Pedonese F., Turchi B., Ebani V.V. and Cerri D.

Department of Animal Pathology, Prophylaxis and Food Hygiene - University of Pisa

Objectives

The aim of this study was to identify and select the lactic acid bacteria (LAB), isolated from raw milk and ripened goat cheese manufactured in Garfagnana (Italy), for the development of an autochthonous starter. The suitability of this starter was tested in a preliminary cheese-making trial.

Methods

Goats' raw milk and cheese samples, at different ripening times (2, 7, 14, 21 and 45 days), were collected from three representative farmers of the area of production. LAB were identificated by phenotypic and genotypic methods: API system (bioMérieux, France) and species-specific PCR. Mesophilic LAB were screened for salt tolerance, acidifying, proteolytic and aminopeptidase activities. Different mixed cultures of selected strains were prepared. The best association was chosen for the autochthonous starter.

The cheese-making trial was performed comparing three batches of experimental cheese produced with autochthonous starter, with control cheeses, manufactured with a commercial starter. Microbiological analyses targeted the presence and the evolution of lactic acid bacteria (LAB), hygiene indicator and spoilage bacteria (total coliforms, *Escherichia coli*, staphylococci and micrococci) and main pathogen microrganisms (*Salmonella enterica* and *Listeria monocytogenes*).

MILK THERMISATION (65°C x 15'')

↓

MILK COOLING (37°C)

↓

STARTER ADDITION

↓

RENNET ADDITION (after 20 minutes; pH 6,56)

↓

CURD CUTTING (after 45 min.) up to the dimension of a nut

↓

MOLDING AND DRAINAGE

↓

ARTISANAL WARM ROOM (36-37°C; 2-3 min.)

↓

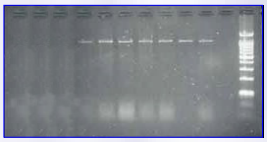
MANUAL SALTING (for 24 hours)

↓

RIPENING (45 days)

Results

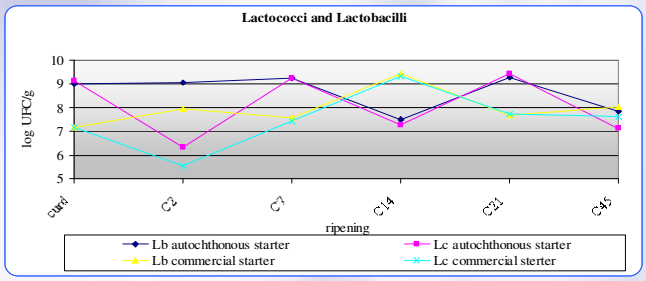
Five different mixed cultures of selected *Lactococcus lactis* subsp. *lactis* (4 strains) and *Lactobacillus paracasei* (4 strains), chosen on the basis of their technological attributes, were tested for the ability to growth and acidify in association. Autochthonous starter was prepared using the best association composed by one strain of *Lactococcus lactis* subsp. *lactis* (Lc 5) and two strains of *Lactobacillus paracasei* subsp. *paracasei* (Lb 28, Lb 35). The addition of the autochthonous selected strains resulted in a fast increase of mesophilic lactic acid microflora: LAB reached high value (10^9 UFC/g) at 7 days of ripening in experimental cheese, while in control cheese they showed a slower development, reaching a pick at 14 days of ripening (10^9 UFC/g). At the same time the adjunction of selected autochthonous strains result in a decrease of total coliforms, *E. coli* and staphylococci in experimental cheese. All samples resulted negative for *Salmonella enterica* and *Listeria monocytogenes*.

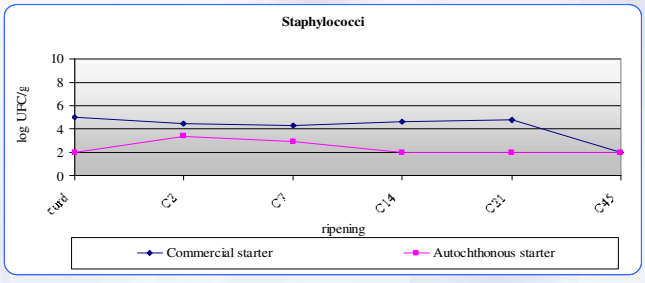


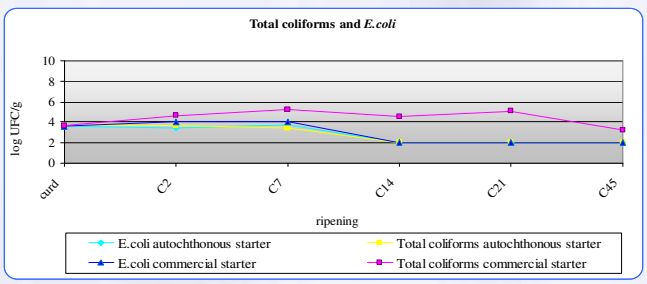
Lactococcus lactis subsp. *lactis* (933 bp)

Lactobacillus paracasei (500bp)

STRAINS	Genotypic identification by specie-specific PCR	pH (24h)	Salt tollerance (%)	Proteolitic activity (µg glicine/ml)	Aminopeptidase activity (%) H-Lys-βNa
Lactococcus					
7	*Lactococcus lactis* subsp. *lactis*	4,1	5	125,05	89,56
5	*Lactococcus lactis* subsp. *lactis*	4,08	5	134,51	87,98
39	*Lactococcus lactis* subsp. *lactis*	4,16	5	135,20	86,54
10	*Lactococcus lactis* subsp. *lactis*	4,04	5	138,67	85,99
Lactobacillus					
28	*Lactobacillus paracasei* subsp. *paracasei*	3,58	10	27,97	58,96
33	*Lactobacillus paracasei* subsp. *paracasei*	3,72	10	29,54	58,35
35	*Lactobacillus paracasei* subsp. *paracasei*	3,74	10	28,38	59,58
36	*Lactobacillus paracasei* subsp. *paracasei*	3,82	10	28,32	57,91







Conclusions

The addition of the autochthonous starter resulted in a good acidification and decrease of spoilage bacteria during the entire ripening time. At the same time the organoleptic evaluation on the experimental and control cheeses after 45 days of ripening detected the best characteristics in cheeses made with the autochthonous starter (texture, flavour and taste). The use of wild mesophilic LAB as starter cultures could help to produce a standardized and more stable product preserving the traditional characteristics of cheese.