

Development of a starter of native lactic acid bacteria for the production of YoAlp[®] Aosta Valley fermented milk

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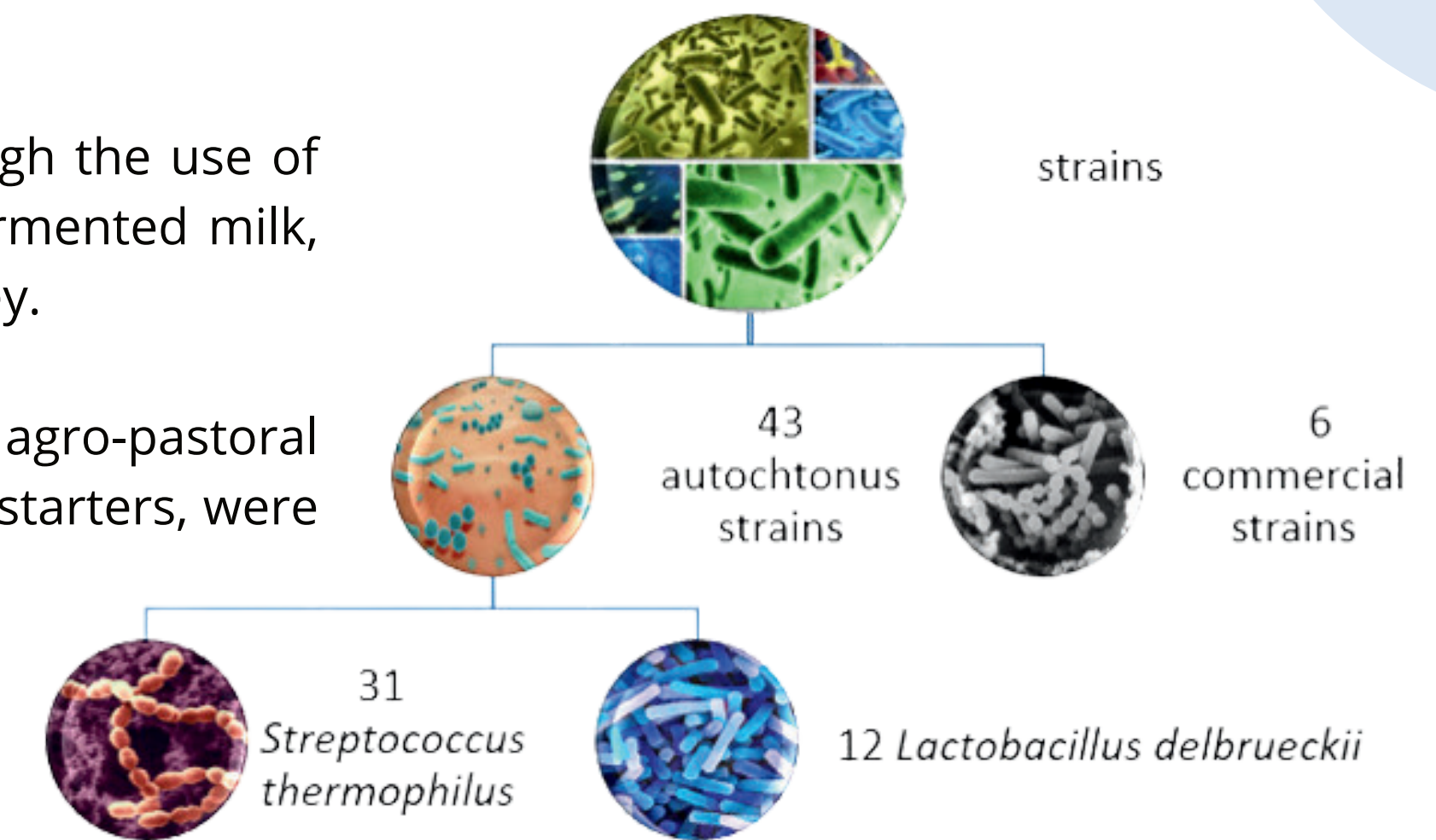
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INTRODUCTION

The research activity had the aim of enhancing the raw materials and microbial biodiversity of the Aosta Valley, through the use of native lactic bacteria belonging to the Institut Agricole Régional's bacteria strains collection for the production of a fermented milk, recognized YoAlp[®], with the characteristics of a yogurt, increasing interest in a dairy product entirely from the Aosta Valley.

A total of 43 lactic acid bacteria strains, isolated over the years from lactic microflora typical of the Aosta Valley agro-pastoral environment such as mountain pastures and small dairies that traditionally process milk without the use of commercial starters, were studied.



RESULTS

- Analysis of the 16 rDNA portion identified 12 strains of *L. delbrueckii* and 31 strains of *Streptococcus thermophilus*.
- Identification of 2 autochthonous strains distinct of *L. delbrueckii* from commercial strains and other strains present in GenBank.
- Identification of 13 autochthonous strains of *S. thermophilus* distinct from commercial strains and other strains present in GenBank (Fig. 1).
- Strains phylogenetically closest to *L. delbrueckii ssp. indicus* (Ldb B) and *L. delbrueckii ssp. lactis* (Ldb A) (Fig. 2).

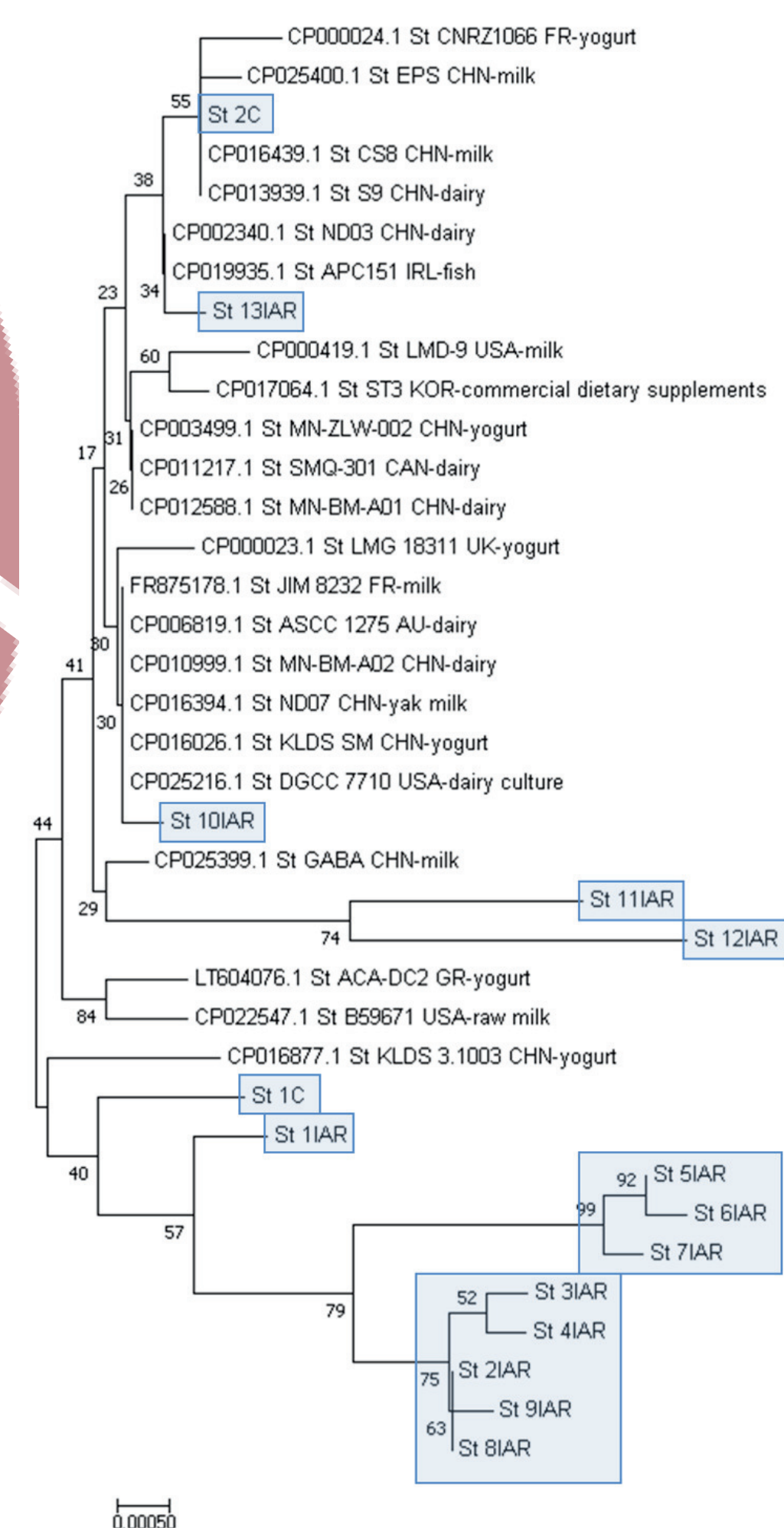


Fig. 1 Dendrogram of *S. thermophilus* strains based on distance matrix from six concatenated loci (for a total of 2576 bases) and using the Neighbor-Joining method. The Bootstrap test (500 replicates) is shown beside each branch. Evolutionary distances were calculated using the Kimura 2-parameter method.

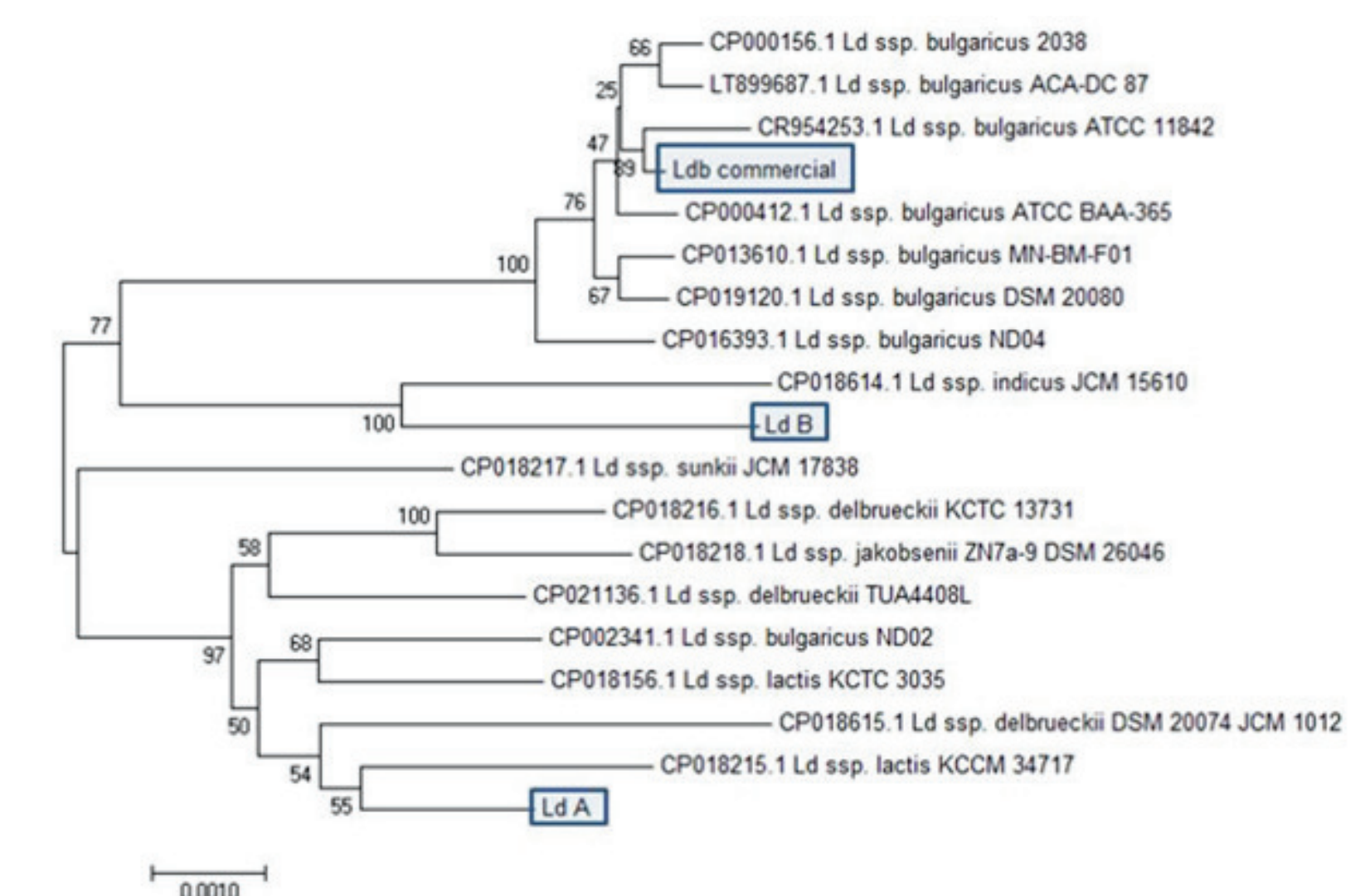
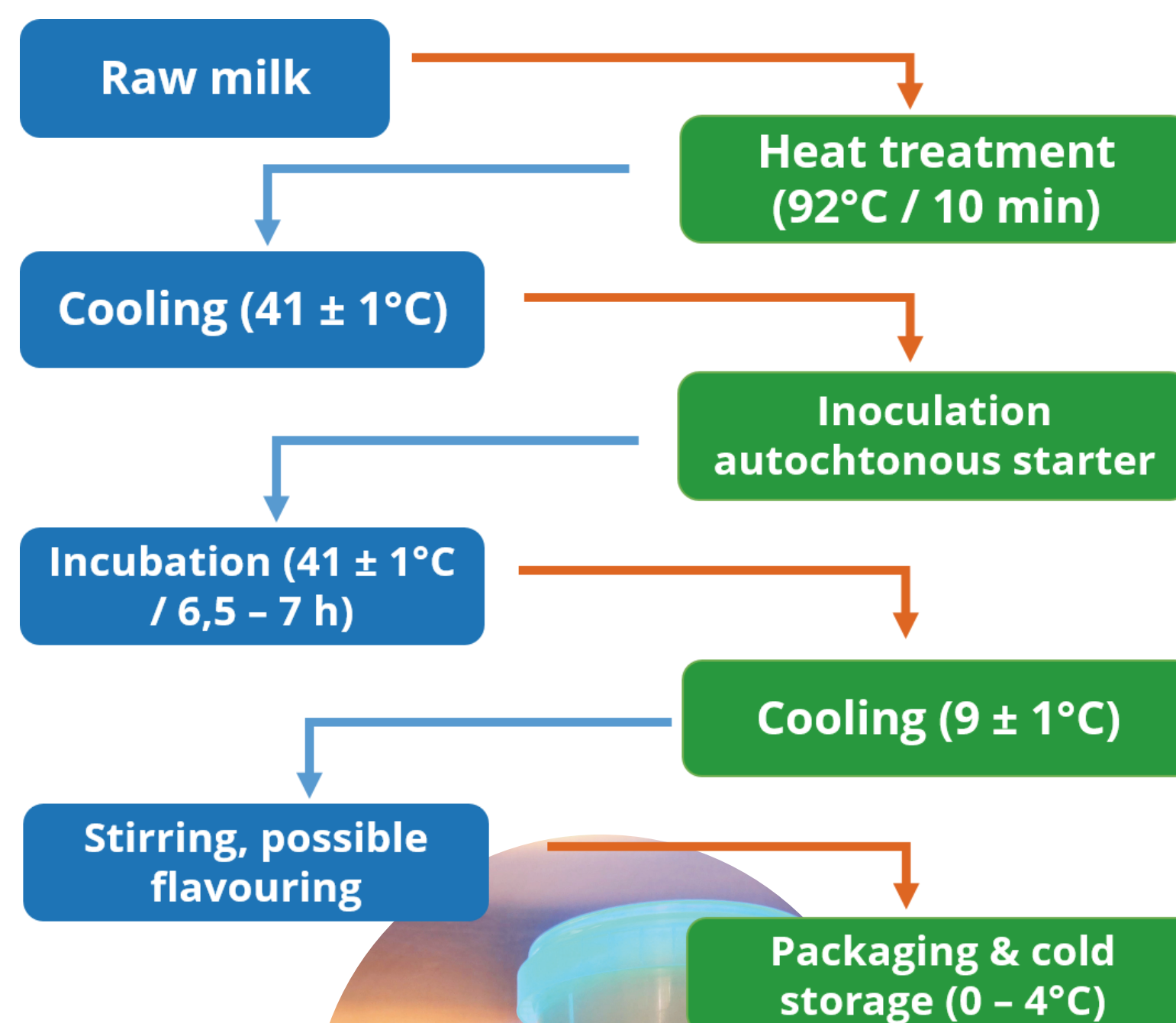


Fig. 2 Dendrogram of *L. delbrueckii* strains based on distance matrix obtained from the analysis of sequences concatenated from nine loci (for a total of 5362 bases) and using the Neighbor-Joining method. The bootstrap test (500 replicates) is reported next to each branch. Evolutionary distances were calculated using the Kimura 2-parameter method.

ID IAR	LAB	Lactic acid g/L 6,5 h	Acidification start time (minutes)	pH 6,5 h	Aspect of the clot	Acetaldehyde g/L 6,5 h
M17Pet2'96-20/7A/24	ST-LB		>360		liquid	
MTH17FE4-20/7A/24	ST-LB	4,4	>360	5,3	liquid	0,00265
MTH17V6-20/7A/24	ST-LB		>360	4,52	compact	
MTH17FV5-20/7A/24	ST-LB	7,56	231,1	4,01	compact	0,00708
MTH17C8-20/7A/24	ST-LB		295,1	5,01	liquid	
M17Pet2'96-66QU1MRS/60	ST-LB	6,52	199,6	4,23	compact	0,00175
MTH17FE4-66QU1MRS/60	ST-LB		>360	5,82	liquid	
MTH17V6-66QU1MRS/60	ST-LB		>360	5,11	liquid	
MTH17FV5-66QU1MRS/60	ST-LB	5,54	230,7	4,45	compact	0,00052
MTH17C8-66QU1MRS/60	ST-LB		>360	5,68	liquid	
Commercial starter	ST-LB	6,33	125,9	4,51	compact	0,00563

Fig. 3 List of blends tested on fresh pasteurized milk and selected pairs with the best technological characteristics (green lines).

- 3 pairs of ST - LB (M17Pet2'96-66QU1MRS/60, MTH17FV5-20/7A/24 e MTH17FV5-66QU1MRS/60) presented the best technological application characteristics and interesting starter potential (Fig. 3).
- On pasteurized milk, these cultures have shown high acidifying power, to which are corresponded significant quantities of lactic acid and acetaldehyde which are essential for obtaining a compact clot and the production of aromatic compounds (Fig. 3 and Fig. 4).

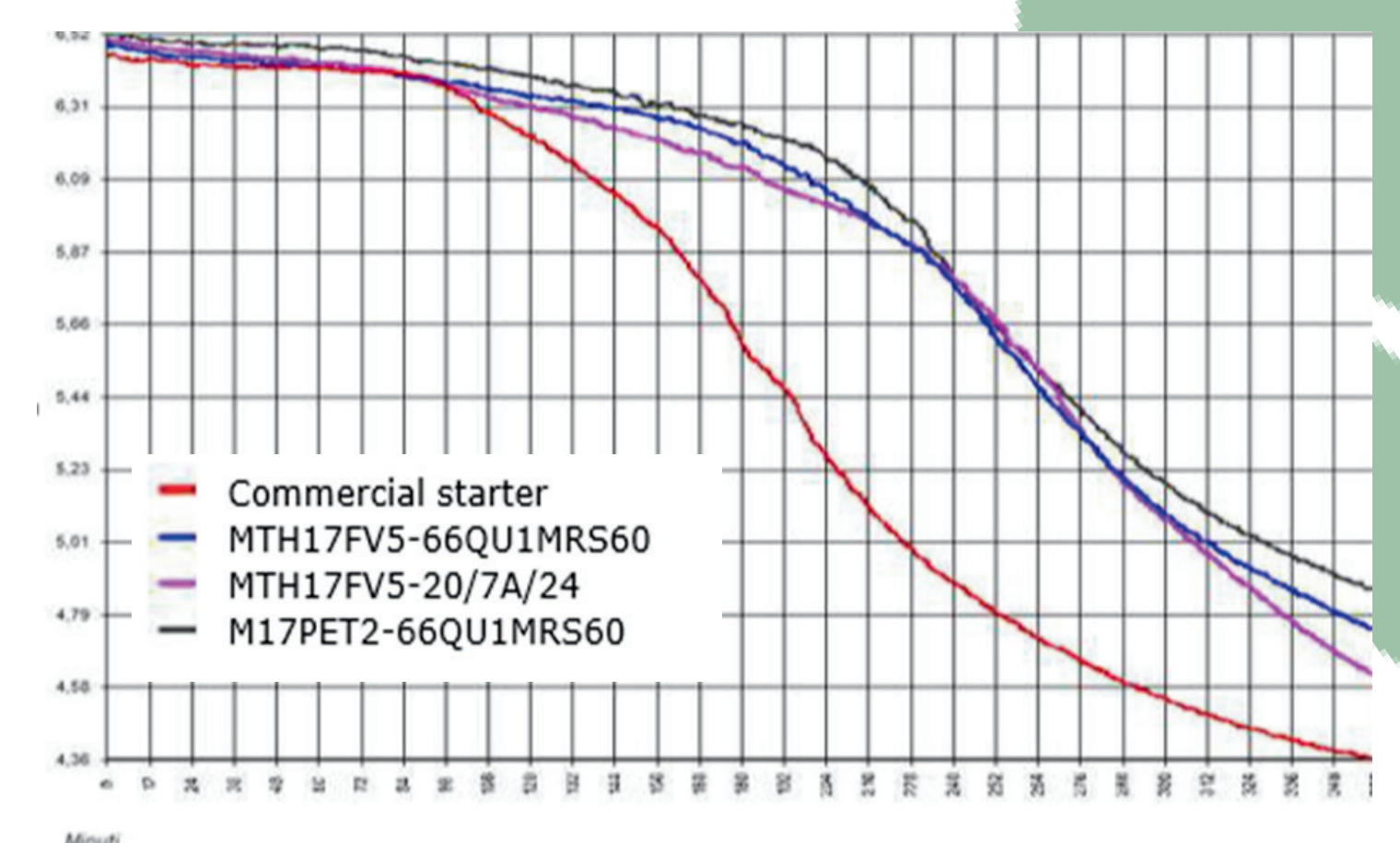


Fig. 4 Acidification curves.

CONCLUSIONS

The results of the molecular analyses and the technological evaluation of the strains made it possible to identify two strains of *L. delbrueckii* (20/7A/24 and 66QU1MRS/60) and two strains of *S. thermophilus* (M17Pet2'96 and MTH17FV5) suitable for the production of a fermented milk. After freeze-drying only two strains of *S. thermophilus* (M17Pet2'96 and MTH17FV5) and a strain of *L. delbrueckii* (66QU1MRS/60) were found to be suitable for producing a freeze-dried blend. The *Lactobacillus* strain does not belong to the *L. bulgaricus* subspecies but it has a high homology with *L. delbrueckii ssp. lactis*. The culture showed high technological performances and ensured a high vital microbial load during product storage. The mixture presented a high acidifying power and a typical aroma, flavour and a compact clot. Overall, the blend also showed excellent technological properties on different types of milk (sheep, goat, skimmed, lactose-free), even on vegetable drinks and in presence of honey.