



Ability of Lactic acid bacteria to ferment cheese whey to produce whey-based drinks

Marine Penland, Marie-Bernadette Maillard, Fabienne Garnier-Lambrouin,
Sandrine Parayre, Nadine Leconte, Florence Valence, Geneviève
Gésan-Guiziou, Stéphanie-Marie Deutsch

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Marine PENLAND¹, Marie-Bernadette MAILLARD¹, Fabienne LAMBROUIN¹, Sandrine PARAYRE¹, Nadine LECONTE¹, Florence VALENCE¹, Geneviève GÉSAN-GUIZIOU¹ and Stéphanie-Marie DEUTSCH¹

¹STLO, INRAE, Institut Agro, Rennes, France

CONTEXT & OBJECTIVE

Cheese whey is the watery part obtained after milk curdling in cheese-making. With up to 9 L obtained for 1 kg of cheese produced, whey constitutes a major by-product of dairy industry. It mostly contains water but also lactose, minerals, vitamins (B6, B1, B12) and high-quality proteins. Despite these obvious nutritional qualities, the sour and salty taste of whey makes it not appealing to the consumer and restricts its direct consumption or use in food. For this reason, whey has long been poorly valorized and mainly used as feedstock for pigs or discarded. Nowadays, valorization rely on whey protein extraction/purification by heavy industrial process to obtain value-added food ingredients. However, these processes are only applicable to some cheese wheys, are energy-consuming and mostly concern large-scale dairy plants leaving small ones out of the system. As part of FAIRCHAIN project, we aimed at developing whey-based drinks, as alternative whey valorization, using microbial fermentation to preserve whey while also improving its native sensory properties.

This study explores the ability of Lactic Acid Bacteria (LAB) to ferment and acidify different types of whey and obtain the best aroma profiles for the drinks.

EXPERIMENTAL DESIGN

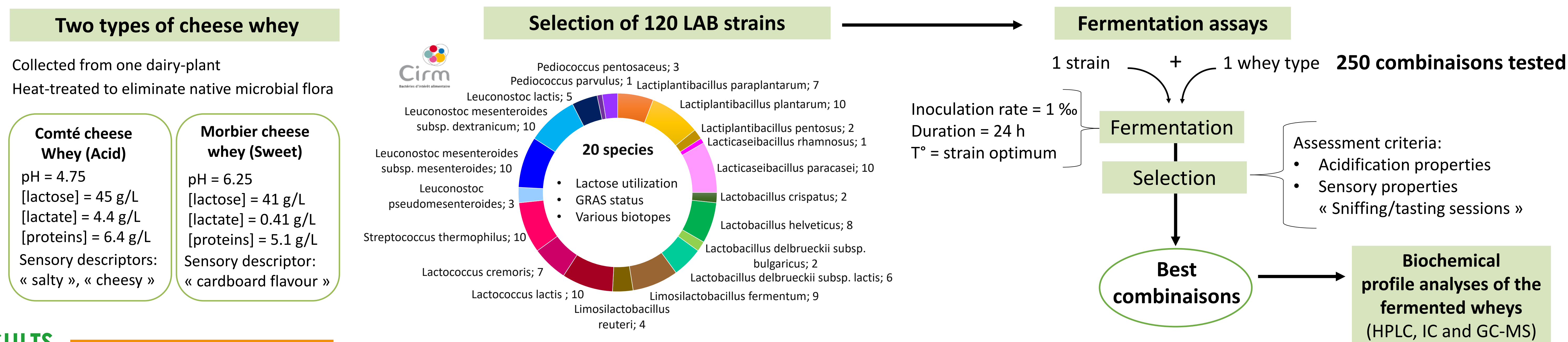
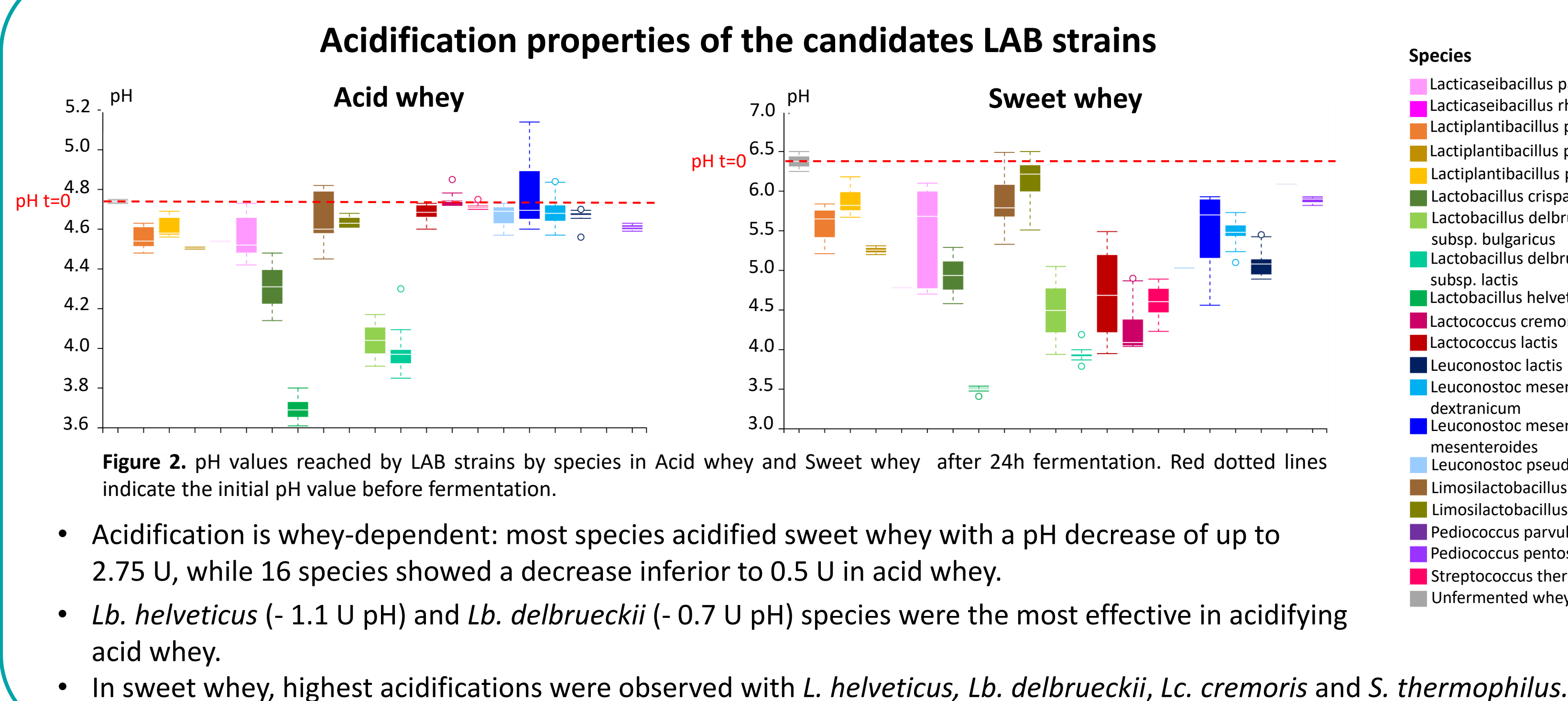


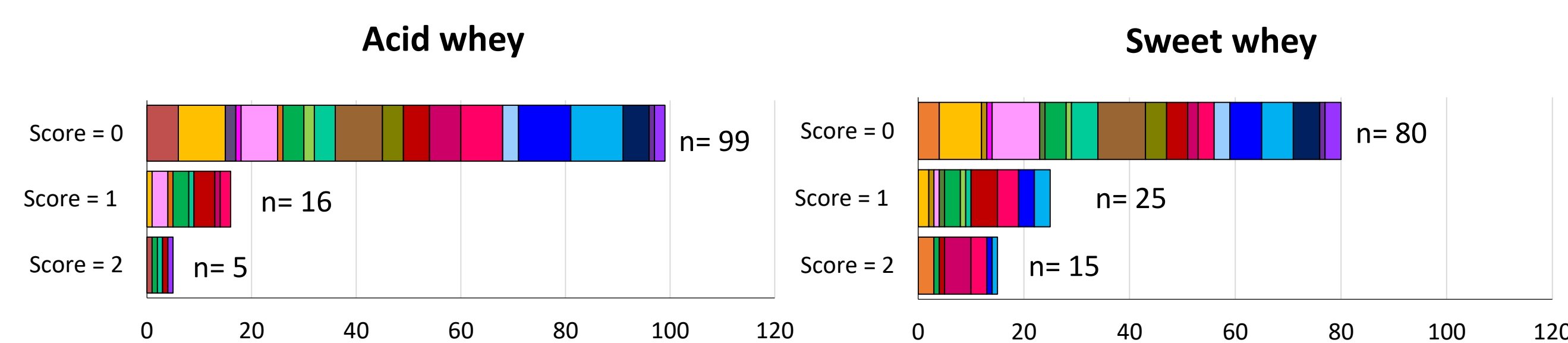
Figure 1. Separation of curd (coagulated milk) and whey during artisanal cheese-making.

RESULTS

Are LAB strains able to ferment acid and sweet wheys?



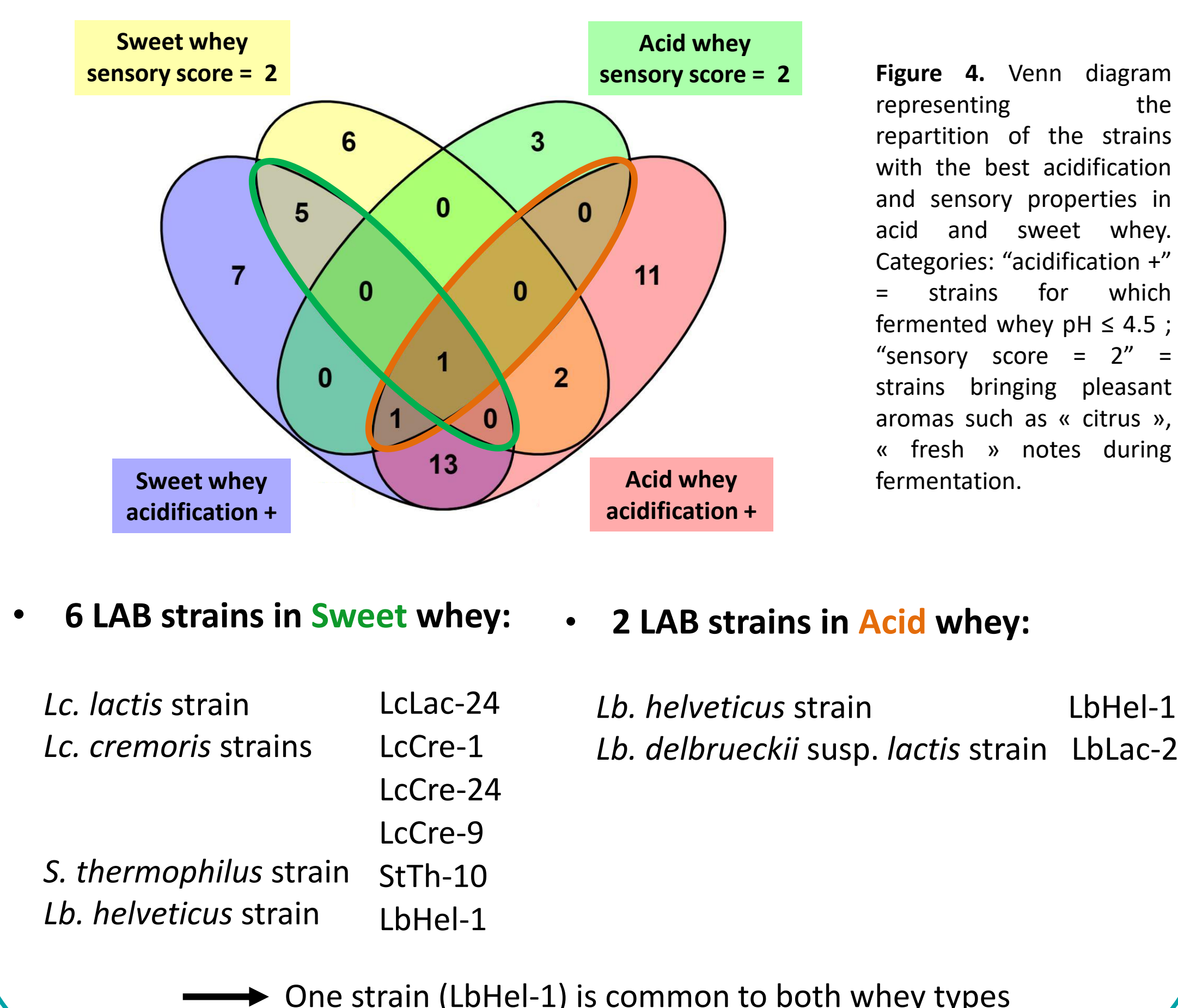
Sensory properties of the wheys fermented with the 120 LAB strains



- Only 4 % and 12.5 % of strains improved taste in acid and sweet whey respectively.
- In acid and sweet wheys, the strains with the highest sensory score (score =2) belonged to 5 and 7 species respectively, revealing that sensory profiles of fermented whey are strain-dependent.

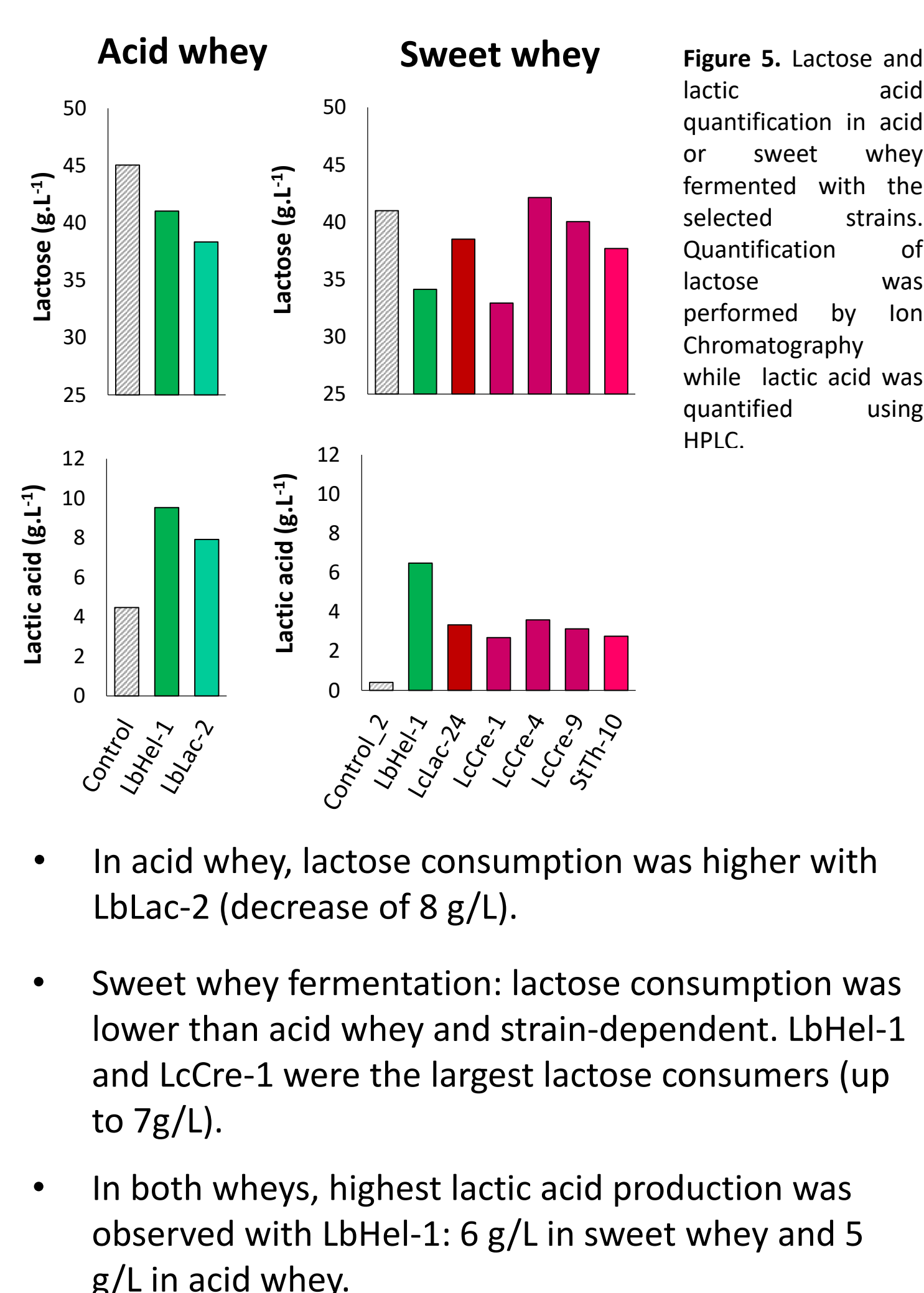
Which strains are the best candidates for each whey fermentation?

Selection of LAB strains based on their acidification properties and the fermented whey sensory profiles

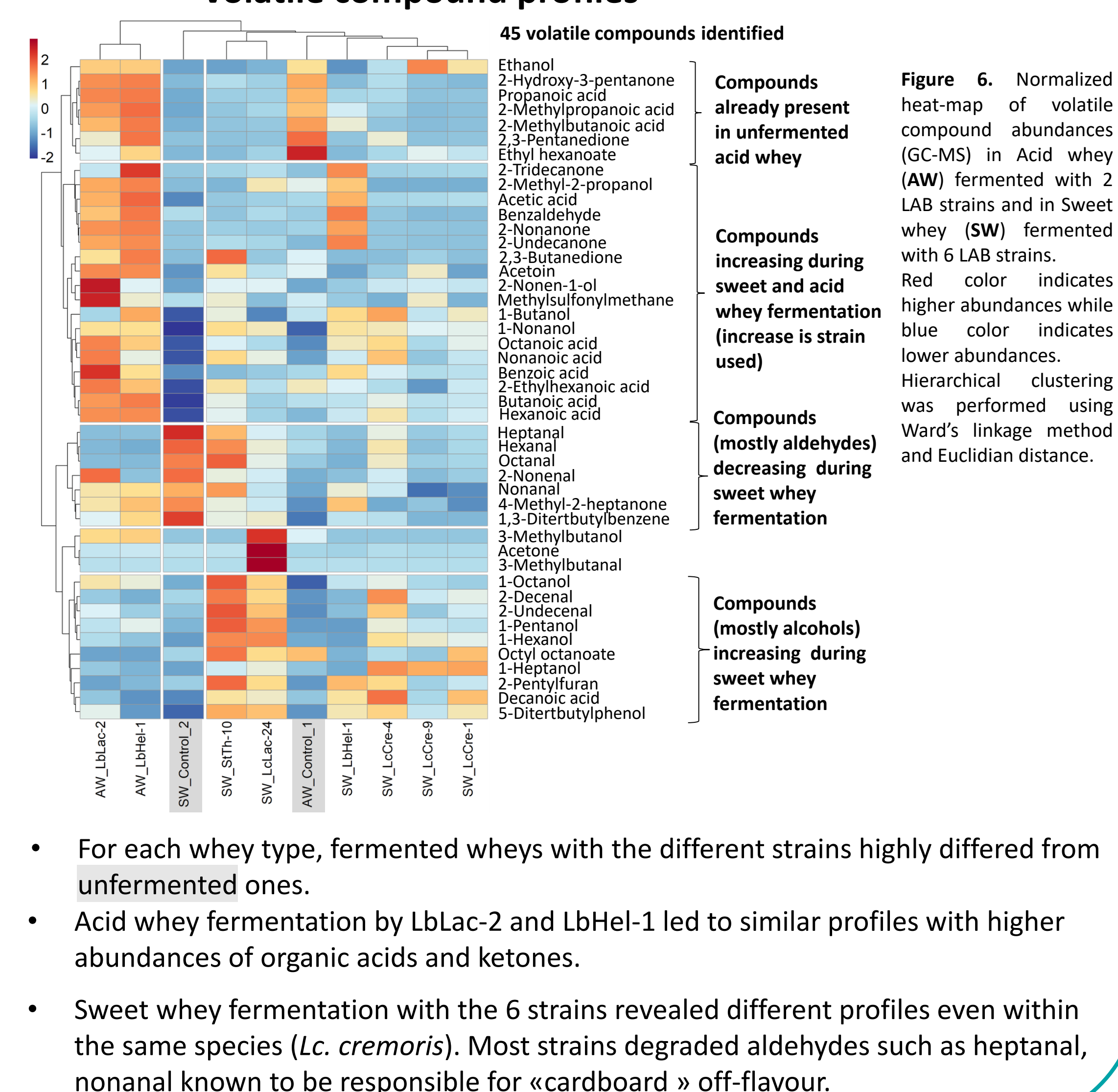


What is the biochemical profile of the fermented wheys?

Lactose and lactic acid concentrations



Volatile compound profiles



CONCLUSION AND PERSPECTIVES

- Lactic Acid Bacteria are able to ferment both acid and sweet whey. However, fermentation outcomes are strain-dependent and due to its low initial pH, fewer strains satisfyingly acidified acid whey.
- Two and six LAB strains were identified as good candidates for drink development in acid and sweet whey, respectively. One *Lb. helveticus* strain, namely LbHel-1, showed promising results on both types of whey.
- Biochemical analyses of the fermented wheys revealed that fermentation considerably changed sugar and aroma profiles. Adequate strain selection thus allowed to obtain a fermented whey with acceptable sensory profile. Aromatization experiments are currently carried out to further improve the taste of the fermented drinks.