EFFECT OF METABOLIC ACTIVITY OF *Lacticaseibacillus casei* VC201 ON CHEESE FREE FATTY ACID PROFILE

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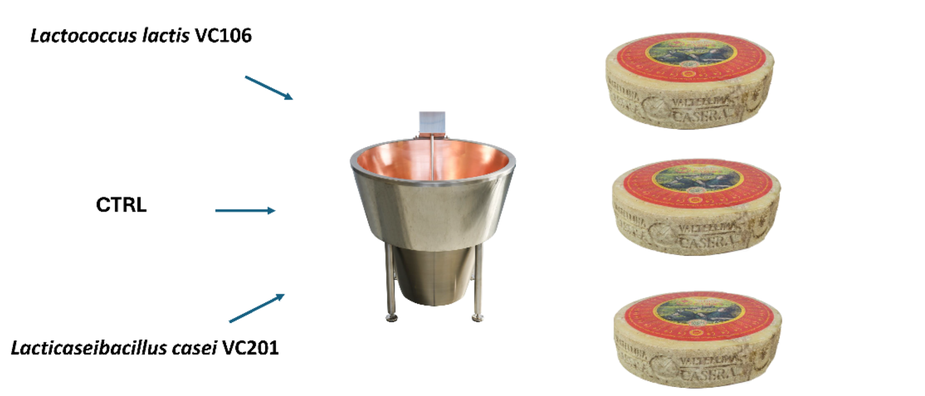
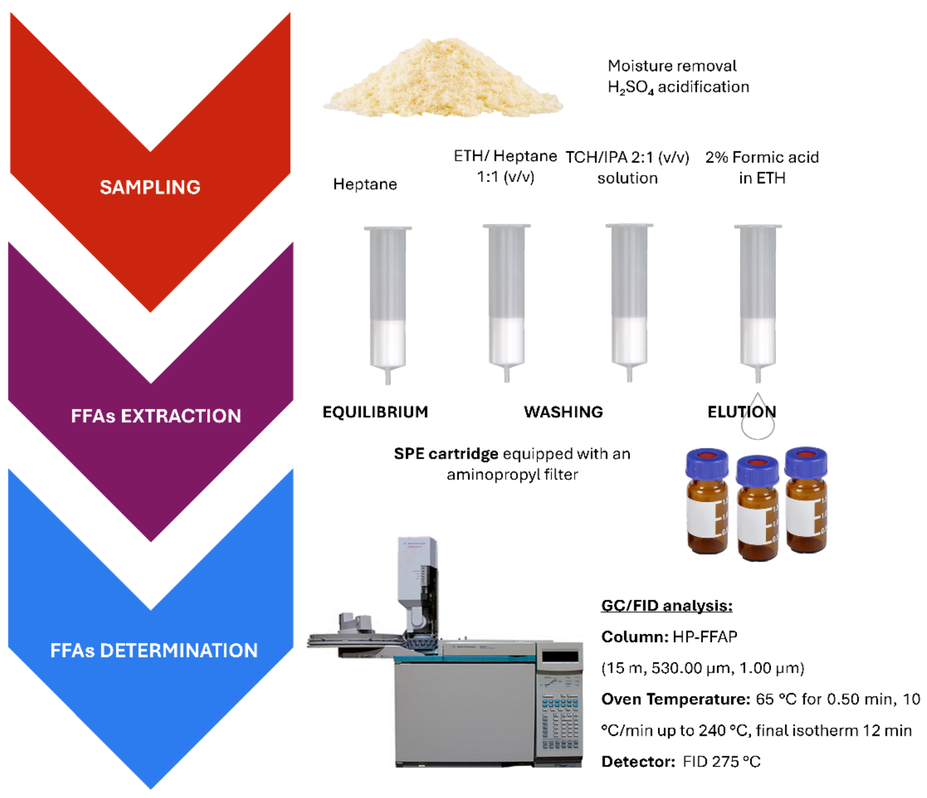
INTRODUCTION

Valtellina Casera PDO cheese, a traditional semi-hard cheese from Lombardy, in northern Italy, is produced using pasteurized, partially skimmed cow's milk and aged for a minimum of 70 days according to PDO regulations. This cheese is prone to late blowing defect (LBD), caused by *Clostridium* bacteria during ripening, leading to textural defects and off-flavors (Morandi et al., 2020). During ripening, various biochemical processes trigger the degradation and formation of new chemical compounds that ultimately define the cheese's flavor profile. Among these processes, lipolysis releases free fatty acids, which directly influence flavor and serve as substrates for further reactions, yielding flavor-active catabolic end products. Recently, there has been increasing interest in using lactic acid bacteria (LAB) as adjunct cultures for their antimicrobial metabolites to prevent spoilage and LBD. In cheese production, *Lactococcus lactis* is widely utilized as a starter or co-starter, known for producing nisin and enhancing cheese sensory qualities (Bukvicki et al., 2020). Additionally, strains of the *Lacticaseibacillus casei* group are gaining importance as secondary adjunct cultures due to their antimicrobial effects (Trevisiol et al., 2024). This study examines the use of autochthonous *Lactococcus lactis* VC106 as a starter culture, focusing on its ability to produce nisin during cheese ripening to inhibit *Clostridium* bacteria and prevent the occurrence of LBD. Similarly, the study evaluates the potential of *Lacticaseibacillus casei* VC201 as a secondary adjunct culture to act as an anti-blowing agent and its impact on the ripening process and sensory profile of Valtellina Casera PDO cheese over 180 days, particularly regarding the evolution of the free fatty acid profile. Experimental cheese production was carried out in two different dairies, involving 12 samples analyzed at two maturation stages, specifically at 110 and 180 days.

METHOD



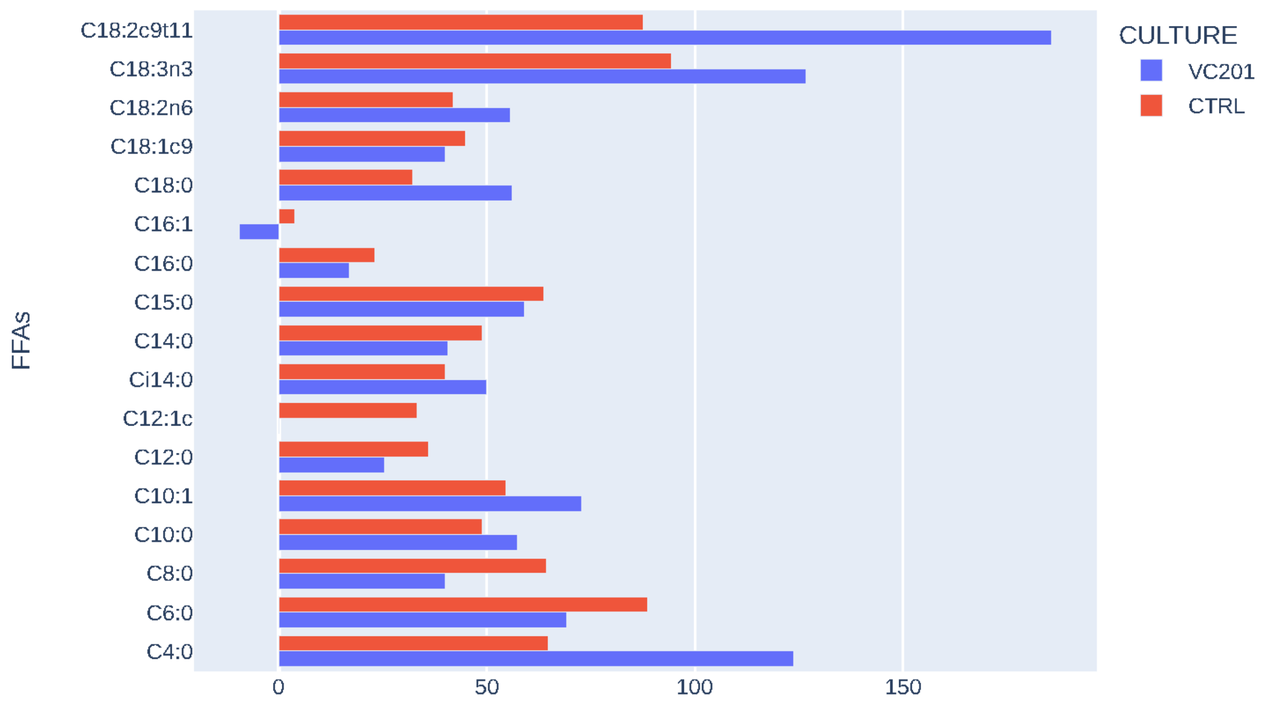


RESULTS

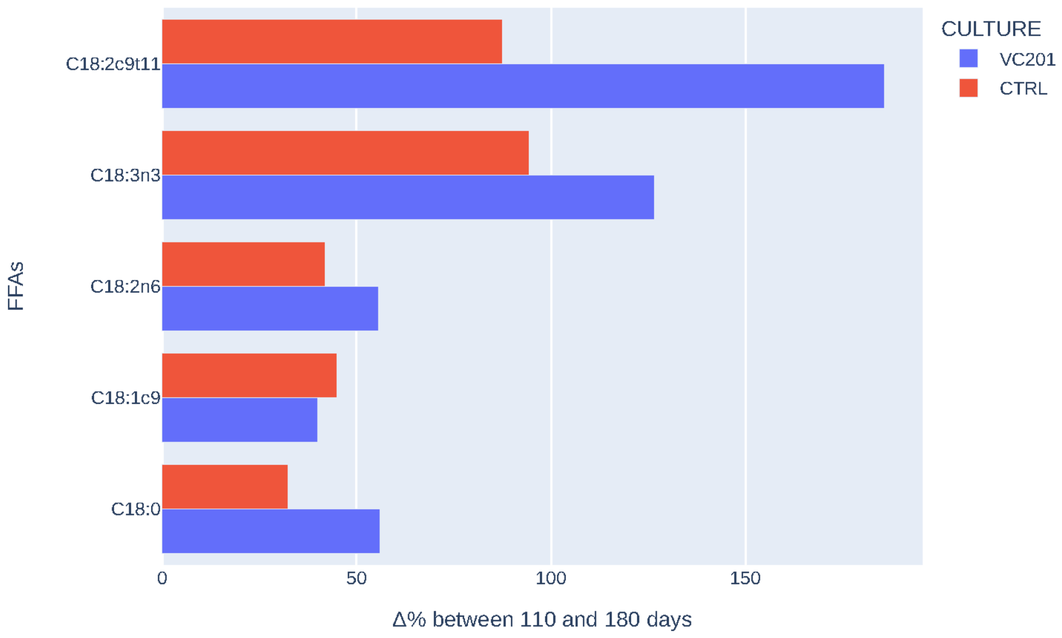
control (CTRL)

Lacticaseibacillus casei VC201

Results obtained after 180 days of aging indicate a reduction in the formation of eyes in Valtellina Casera PDO cheese within VC201 samples compared to the control (C) cheese. A progressive increase in butyric acid (C4) concentration was observed across all samples during the ageing process. After 110 days, the butyric acid levels in VC106 samples did not significantly differ from those in the control samples. However, after 180 days, these same samples exhibited a reduced C4 content relative to their respective controls, highlighting less development of butyric clostridia.



A representative distribution of FFAs expressed as a percentage variation (Δ%) between 110 and 180 days using VC201 and CTRL cultures



Focus on **stearic acid** (C18:0); **oleic acid** (C18:1c9); **linoleic acid** (C18:2n6); **α-linolenic acid** (C18:3n3) and **conjugated linoleic acid cis9, trans11** (C18:2c9t11)

The most abundant free fatty acids (FFAs) identified across all samples were palmitic acid (C16) and oleic acid (C18:1c9). The percentage variation (Δ%) calculated for all identified fatty acids generally indicated a progressive increase in FFAs concentration during the ripening process, with some exceptions. The experimental trials conducted with VC106 did not reveal significant differences in acid content. In contrast, the use of VC201 resulted in a reduction of oleic acid (C18:1c9) levels compared to the control samples. Additionally, a notable increase in the concentrations of α-linolenic acid (C18:3n3) and conjugated linoleic acid cis9, trans11 (C18:2c9t11) was observed, as previously reported by Rodrigues et al. 2012.

CONCLUSIONS

Preliminary data demonstrate that the inoculation of V201 as a secondary adjunct culture may offer protection against clostridia development and potential benefits in modulating the fatty acid profile. These findings could have implications for quality, nutritional and sensory properties of the cheese, highlighting the role of specific bacterial strains during Valtellina Casera PDO cheese ripening.

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