

## **Impact of ultrasound and protease addition on the fermentation profile and final characteristics of fermented goat and sheep cheese whey**

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Goat cheese whey (GCW) and sheep cheese whey (SCW) is a by-product usually destined for animal feed or improperly disposed in smallholdings, reducing the income of artisanal producers, and causing a negative environmental impact. Fermentation can improve the sensory/nutritional characteristics of goat (GCW) and sheep cheese whey (SCW); however, the limited nutrients availability for lactic acid bacteria (LAB) growth and the low stability of whey are challenges. To overcome these challenges, this project aimed to: (i) evaluate the GCW and SCW fermentation parameters under US, with or without proteases, and (ii) characterize the obtained products (up to 28 days of storage at 7°C) regarding LAB count, physicochemical characteristics, structural stability, and in vitro antioxidant activity. The results showed that the processes were able to increase the rate of pH decline in SCW (23-32%), when compared to traditional fermentation. The evaluation of the physical stability of fermented GCW and SCW showed that both products were destabilized, with cream (up to 60%) and translucent whey (up to 80%) separation during the shelf life of the products. However, the rate and way of destabilization (formation of cream, translucent whey, or both) was different between samples ( $p < 0.05$ ) due to partial hydrolysis of proteins (caused by protease), reduction of fat globule size (induced by US) and their interactions. The micrographs of proteins in the samples help to explain the observed phenomena. Regarding the LAB counts, there was a reduction during storage (1.5-3.0 log CFU/mL), caused by nutrient depletion and low tolerance at pH ~4.0, reached due to post acidification. For the in vitro antioxidant activities of the ABTS radical, it was observed an increase for the SCW (up to 40%) and GCW (up to 30%) samples during storage, when compared to unfermented whey. Therefore, US-assisted fermentation and the addition of proteases could be interesting interventions to improve the pH decline rate in whey fermentation and can be strategically used to change the way that samples will destabilize. Further studies should assess the impact of these interventions, associated with the addition of stabilizers and nutritional supplementation on the structure and LAB viability in GCW and SCW.