

## **Change in characteristics during fermentation of different sunflower press cake mixtures**

*The cold-pressed and dehulled press cake was the most suitable for fermentation. The addition of whey decreased pH but increased the lag phase. The effect homogenisation has on stability was not conclusive.*

Plant-based eating become an important part of many people's diets. The consumption of a diet rich in plant-based foods does not only lower the risk of for example getting cancer, diabetes, and heart-related disorders but it is also good for the climate. The increasing interest in climate-friendly foods also gives value to the use of waste products. An example of a plant-based by-product is the sunflower press cake (SFPC). It is left after the production of sunflower oil and is currently often sold as animal feed or as a raw material to produce biofuel. Depending on the methods used during oil extraction the press cakes have different characteristics and nutritional compositions.

The objective for this project was therefore to see if it was possible to ferment mixtures of different sunflower press cakes. The results were analysed on the bases of changes in pH, viscosity, and physical stability. For the fermentation *L.plantarum*, a versatile bacterium which lately has been used to ferment plant-based yoghurts, is used. The fermentation has given good results with for example increased concentration of free amino acids. One problem is however that *L.plantarum* is a bacteria which needs rich media with a lot of nutrients to grow properly. It is therefore suggested to add whey, a waste product from cheese production, which might solve the issue.

There are two other possible problems with the fermentation. One is that plant-based proteins are not able to gelatinize into a cohesive protein network, which is the reason for the increased viscosity of yoghurt. This problem is hoped to be addressed with the addition of whey. The other problem is the physical stability over time. It is not wanted for the press cakes particles to separate and create large particles or sediment. This is hopefully solved by the addition of homogenisation, a processing step which uses pressure to break the particles into smaller pieces.

The results show a clear effect of the method used during oil extraction. The cold-pressed and dehulled press cake had the highest protein content, soluble protein content and soluble fibre content but the lowest insoluble fibre content. The fat content was the highest for the hulled press cake before solvent extraction and the lowest after solvent extraction. The lowest protein content was seen before solvent extraction. The pH started at 5.8-6.2 for the different press cakes and finished at 4.1-5.1 depending on the press cake and the methods. The lowest end pH was seen for the cold-pressed and dehulled press cake with added whey, the homogenisation did not affect the result. The highest end pH was seen for the hulled press cake after solvent extraction.

The viscosity decreased for all samples, confirming the lack of gelling properties in plant-based proteins. The addition of whey did not change the results significantly, probably since there were no caseins present. The highest viscosity was seen for the sample with hulled press cake after solvent extraction and the lowest was seen for the cold-pressed and dehulled one. This gave the hypothesis that a combination of low fat content together with a high fibre content makes the particles able to hold more water, leading to high viscosity. However, more research is needed to draw any conclusions. The conclusions from the stability tests are unconvincing.