High-Pressure Pasteurization of a Side Stream from Food Production

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Objective: This study aimed to increase the very limited shelf life of the plant-based drink residue from oat, oat okara, without the use of heat. It was investigated to what extent high-pressure pasteurization could be applied to inactivate potentially harmful microorganisms while still preserving functional properties. Method: High-pressure pasteurization (200, 400, and 600 MPa) was applied to wet oat okara. A microbiological storage study was performed and thermal properties (differential scanning calorimetry), viscosity (rapid visco analyzer), and water and oil holding capacities were analyzed to evaluate the effects of high-pressure pasteurization. Results: The total aerobic count, including yeast and mold, had a significant reduction of growth at 600 MPa after four weeks of storage (4 °C) compared to lower pressures and no treatment. The growth of lactic acid bacteria at 400, 600 MPa, and no treatment was kept at the detection limit (2.3 log cfu/g) after four weeks of storage, while treatment at 200 MPa had a significantly higher microbiological load. The thermal properties of non-treated and high-pressure treated oat okara indicated an increase in protein denaturation of the 12S globulin, avenalin, when higher pressure was applied. This was also visualized in the viscosity measurements where a viscosity peak for avenalin disappeared at 400 and 600 MPa. The water holding capacity did not change (3.5-3.8 ml/g), except for the treatment of 200 MPa which was reduced (2.7 ml/g). The oil holding capacity was constant (1.2-1.3 ml/g) for all treatments. Conclusion: High-pressure pasteurization treatment was able to reduce the microbiological growth in oat okara and prolong the shelf life. Proteins were denatured and viscosity was reduced as an effect of the pressure, but several functionalities, such as water and oil holding capacities were maintained. However, future studies should identify the microbes and spore formation in oat okara to fully understand the microbiological safety of oat okara and its applications.