Development of an oat based beverage rich in dietary fiber and protein

Final Report

Sponsor:
Prairie Oat Growers Association
Alberta Crop Industry Development Fund

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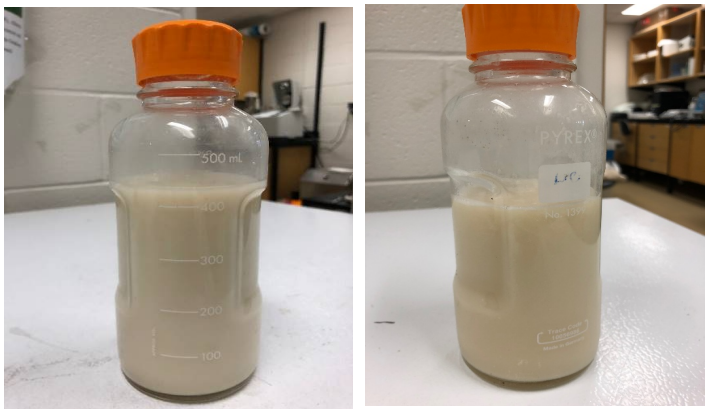
PROJECT SUMMARY

Rising rate of milk allergies and lactose intolerance among consumers is responsible for the growth of the plant-based milk alternatives market. Moreover this market is driven by consumers increasingly looking for plant-based/vegan options with high protein, high fiber and low lipids as healthy lifestyle choices. Oats are good source of dietary fibers (approximately 10–15 g/100 g), proteins, vitamins and phytochemicals. The human food market for oat has been gaining momentum due to recognition of health benefits of β-glucan for reducing blood cholesterol and regulating blood glucose levels. In addition oat is the only cereal containing a globulin protein, avenalin, as the major (80%) storage protein, thus oat protein is considered to be more nutritious than most cereals with higher quantities of essential amino acids lysine and threonine. This has opened up opportunities to develop plant-based milk products from abundant oats crops grown in western Canadian.

With the support of the Prairie Oat Growers Association (POGA) and the Alberta Crop Industry Development Fund (ACIDF), the University of Alberta was successful in developing oat milk drink prototypes from both whole oat flours and oat fractions concentrated with protein and β-glucan by air classification technique. The drink prototypes possess acceptable smell, viscosity and texture, and the storage stability tests suggest that the drink prototypes have a shelf-life of 6-12 months over refrigerator storage. From 6-12 months, minor sedimentation was observed, but after shaking, the precipitates were rapidly dispersed again in the solution.



6 months **12 months**

Storage stability of oat milk drinks prepared from whole oat flours

The oat milk drink samples showed significantly higher protein content (2.18-2.20%) than many commercial oat milk products in the market which typically contain 1-1.5% protein. The β-glucan content (0.3%) in the oat drinks prepared from whole oat flours is comparable to that of commercial products currently available in the market. Using oat fraction flours as the feedstock significantly enhanced the β-glucan content (0.81%) in the final oat drink samples. According to FDA, the recommended level of β-glucan in a functional drink should be 0.75 g per serving. Thus the oat milk beverage prototype

prepared from the oat fractions is qualified for β-glucan health claim. Our data shows that using oat fraction flours as the feedstock did not significantly enhanced the protein content of the final oat drinks. Further research to better understand the processing properties of fraction flours for oat milk production is suggested in the future. The generated knowledge will assist process optimization to produce new oat drink products with further increased protein content comparable to real milk products (3.5-4% protein).

Reduced food intake and malnutrition are frequent among patients with cancer. Inadequate nutrient intake among patients with cancer has been associated with malnutrition and decreased quality of life, reduced response to treatment and decreased survival. The best way to maintain or increase energy and protein intake is with normal food, however only a few food products have been developed for people with cancer. Therefore the second objective of the project was to enhance the oat beverage with nutrients known to be deficient in cancer patients and study the acceptability of the beverage with the cancer patients. Specifically this research designed oat beverages by mixing dry oat-based powder products with hot or cold water or milk. When mixed with milk, the protein and vitamin D contents are increased. The beverages were evaluated at the Cross Cancer Institute (Edmonton, AB, Canada) by patients with cancer (n=92) and their accompanying caregivers as well as staff and volunteers (n=136). Overall, the oat-based beverage were liked by patients at both cold and hot temperatures. The addition of protein, EPA and vitamin D into the oat beverage product did not change liking compared to the unfortified product. Attributes that could be modified to improve acceptance of the fortified products are the high sweetness of all products and the thickness of the low protein fortified product.

Patients were aware of positive health benefits of oats and consumed them in some form frequently. Oat food products were consumed by 77% of the patients and 58% of them consumed oat products at least once per week. The most frequently eaten oat products were oatmeal, oat cereal, cookies and bars. With respect to agreement of specific health benefits of oats, over 90% agreed that oats are highly nutritious, and about 60% agreed that oats provide health benefits related to heart disease and acknowledged the benefits of oat fibers and beta-glucan. Most participants considered that it was easy to incorporate oats into their daily diets. Together, the positive sensory acceptance of flavored oat beverages and their perceived and established health benefits, reveal the potential for oats to be included in fortified and unfortified products targeted to patients with cancer. Future developed products must be evaluated by consumer panels of patients with cancer to confirm product and sensory attribute acceptance, which may differ from the healthy population. Furthermore, the evaluated oat-based beverages may be accepted by older adults and other populations with similar nutrient needs and eating challenges.