

The utilization of pulses in the manufacture of crumb used as a binder in a model meat system

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SPG Contributions	Project Status	Duration/Timeline of Project (Year to Year)	Co-funders	Total Project Cost
\$155,000.00	Completed	July 2015 – November 2017	Best Cooking Pulses	\$156,000.00

Project Description

Exploring options in which pulses can fully or partially replace other ingredients in regularly consumed food products is one way to increase the utilization of pulse ingredients in North America. Detection of off aroma and/or flavour are among the major concerns for the utilization of pulses. Previous studies have shown that heat treated pulse flour through micronization was effective at reducing the beany notes. This study looked at other common heat treatment processes used in the manufacture of crumbs to be applied to pulse flours. The objectives included evaluating the effectiveness in the reduction of unfavourable pulse aroma and flavour characteristics and the suitability of a pulse based crumb to replace wheat crumb as a binder in ground beef patties.

Outcome

Three market classes of pulses (low-tannin faba beans, yellow peas, and red lentils) were subjected to a sheeted crumb process and two extrusion methods. One extrusion method yielded an open structured crumb and the other a closed structured crumb. The faba bean flours in combination with the closed crumb processing failed to deliver a usable crumb like product. The higher protein and lower starch content combined with lower exit pressure may have contributed to the lack of expansion necessary for the manufacture of the crumb. Extruded crumbs were comprised of 100% pulse flour. The pulse flour was reduced to 60% in the sheeted crumbs and rice flour (20%) and tapioca starch (20%) were incorporated to achieve mechanical characteristics necessary for the sheeting process. A trained sensory panel described the intensity of aroma and flavour attributes of the pulse crumbs and their parent flour to evaluate the impact of processing. Final data collection focused on the yellow pea and red lentil market classes for each of the closed, open, and sheeted crumb types. Results showed a reduction in pea aroma and flavour and an increase in wheaty aroma and flavour for all three processes. Sheeted crumbs showed the largest shift in aroma and flavour intensities followed by open and then closed crumbs. Processing method resulted in greater impact than pulse market classes.

- Beef burgers containing pea and lentil prepared from closed and open crumbs (extruded), and sheeted crumbs at 5% inclusion level, were not significantly different than the wheat control in cook loss and patty dimensions.
- Extruded crumbs produced burgers with greater cohesion, springiness and chewiness compared to the sheeted crumbs and wheat control.
- The consumer sensory panel indicated positive acceptance of burgers using pulse based crumbs, with the exception of the yellow pea open crumb treatment which was described more frequently as beany and off flavour.
- Extrusion technology and sheeted processing reduced the pea aroma and flavour of pulse flours. The sheeted pulse crumbs properties showed the greatest similarity to the sheeted wheat crumb control and had the largest reduction in pea aroma and flavor intensities.
- Extrusion and sheeting produced functionally acceptable pulse crumbs that could be utilized as a gluten free alternative to a standardly used wheat crumb for meat binder applications.

Research Objective

OBJECTIVE 1

To select and source varieties of pulses through consultation of experts in the field.

OBJECTIVE 2

To screen and evaluate functionality of pulses for efficacy in crumb production.