

Name of Recipient: Pulse Canada / Saskatchewan Pulse Growers	
Project Title: Pulse Science Cluster Two	
Project Number: AIP-CL03	Period Covered by Report: 2015-04-01 to 2016-03-31
Activity #: H30 Name of Activity: The Effects of Lentil Fractions on Short-term Blood Glucose, Insulin, Food Intake, and Appetite	Principal Investigator: G. Harvey Anderson

NON-CONFIDENTIAL ABSTRACT/SUMMARY

Lentils are a rich source of nutrients and are particularly high in protein, starch, and dietary fibre, which have been shown to promote certain health benefits, such as reducing postprandial glycemia and subsequent food intake (exerting a second meal effect). However, it remains unclear as to which component(s) are responsible for the ability of lentils to lower postprandial blood glucose levels or promote satiety after consumption. To address this question, the present study examined the effects of consuming commercially prepared lentil fractions (fibre, starch, and protein) on subjective appetite, blood glucose (BG), and insulin before and after a pizza meal, served at two different times, in healthy young men.

Two randomized, cross over, repeated measures experiments were conducted in this study. Forty-eight healthy males consumed iso-volumetric (300 ml) soup alone, which served as the control, or with the addition of one of the following lentil fractions, which were added in amounts to introduce 20 g of the food component of interest (namely, protein, starch, fibre): lentil protein isolate, lentil protein concentrate, lentil starch, or lentil fibre. Treatment consumption was followed by serving the participants a fixed-energy pizza meal (12 kcal/kg body weight), which was served at 30 minutes (exp-1) or 120 minutes (exp-2) following the treatments. Subjective appetite, BG, and insulin were measured during both pre-meal and post-meal periods.

In exp-1, with the exception of lentil starch, which caused an increase in BG, there was no effect of treatment on pre pizza meal BG compared to the control. The lentil protein isolate and lentil protein concentrate, but not lentil starch or lentil fibre, treatments lowered post-meal glycemia compared to the control ($P < 0.0001$) without a significant surge in insulin concentrations. No effects were seen on pre-meal measures of satiety; however, post-meal BG and subjective appetite were lower ($P < 0.05$) after consumption of both lentil protein isolate and concentrate compared to the control. In contrast to our findings in exp-1, lentil starch resulted in lower pre- and post-meal subjective appetite compared to the control in exp-2 ($P < 0.05$); however, consumption of lentil starch also led to higher BG values. No effects were observed after consumption of the lentil fibre fraction, which is likely due to fibre exerting more long-term physiological effects (observed at > 170 minutes) and may also be due to lentils having a higher concentration of insoluble vs soluble fibre. However, this remains to be elucidated and is a focus of future studies being conducted in our lab. The beneficial effects of lentil consumption are attributed by the lentil protein fractions, which are responsible for reducing BG immediately after the pizza meal as well as promoting short term regulation of satiety. Lentil starch on the other hand elicited a more prolonged second-meal effect on appetite. These findings were presented and discussed in detail at the Experimental Biology conference in San Diego, USA, where a particular session was devoted to pulses.