

# #022

## Increasing the value of canola (*Brassica napus* L.) meal through breeding for higher protein and decreased fibre contents

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### Background:

The economic value of canola (*Brassica napus* L.) meal relative to soybean meal is limited by lower protein and higher fibre contents consequently utilization for feeding monogastric animals or fish is constrained by this lower energy density.

### Objective:

The objective of this initiative is to improve the feeding value of canola meal by increasing its protein content through breeding selection and to decrease acid detergent fibre (ADF) content through major effect native QTLs while maintaining competitive oil content and grain yield potential. This product concept is trademarked as ProPound.

### Methods:

Protein is a multi-genic trait and must be increased through stepwise selection in breeding populations. Biparental populations were created using parents having above-average protein content and doubled-haploid (DH) progeny were selected using whole genome prediction. Seed composition of these DH progeny were assessed under field conditions per se and in hybrid combination. In contrast to protein, ADF content can be reduced significantly with a single QTL. Numerous backcross conversions were created by introgressing a native gene QTL that targets ADF content. Seed composition of these conversions were assessed under field conditions. These studies have been done for spring canola in Canada and Australia and for winter oilseed rape in Europe.

### Results:

Canola meal typically contains 37-45% protein and 19-23% ADF on a zero-moisture meal basis across major canola growing areas of Canada, USA, Australia, and Europe. DH individuals screened with high selection intensity have successfully increased protein content by multiple percentage points while maintaining oil content thereby minimizing a natural negative genetic correlation between these two traits. A desirable negative correlation between protein content and fibre content has been observed and together with a native QTL-mediated ADF reduction the total ADF content has been lowered by multiple percentage points. The magnitude of the protein and ADF content changes has demonstrated unique and differentiated canola meal nutritional quality and feeding value after initial meal processing analyses and animal feeding studies.

### Conclusions:

Realization of the ProPound concept is a significant technical challenge because the targeted seed composition profile lies at the bounds of elite germplasm genetic variation and this differentiated profile cannot introduce detrimental non-target effects on other performance traits. Efforts to-date have demonstrated that protein content can be increased markedly without compromising oil content. These changes do lower ADF content by default however use of a major effect QTL is needed to drive ADF content further down to target levels. Meal processing analysis and initial animal feeding study results confirm the economic value of the differentiated ProPound profile that aims to develop new markets for a canola-based source of vegetable protein. Portions of this research have been supported by funding from Protein Industries Canada, Sofiprotéol (France), and France 2030.