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## MPSG FINAL EXTENSION REPORT

**PROJECT TITLE:** An economic assessment of the quality discount for Manitoba soybeans

**PROJECT START DATE:** 1 April 2019

**PROJECT END DATE:** 31 March 2020

**DATE SUBMITTED:** 31 January 2020

### **PART 1: PRINCIPAL RESEARCHER**

#### **PRINCIPAL**

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### **PART 2: EXECUTIVE SUMMARY**

*Outline the project objectives, a summary of the activities and results, and their relevancy to pulse and soybean farmers.*

Manitoba soybeans have been showing lower protein levels than those of soybeans produced in the US and Eastern Canada. For example, Manitoba soybeans have been showing protein levels of 37.4 percent (2008-2015 simple average) whereas Ontario soybeans have been showing protein levels of 39.4 percent (2008-2015 simple average) and Quebec soybeans have been showing protein levels of 40.3 percent (2008-2015 simple average). The value of Manitoba soybeans can therefore be discounted below that of soybeans grown in the US and Eastern Canada which can be an economic loss for Manitoba soybean farmers and can also be problematic for Manitoba soybean processors who need to deliver minimum protein levels with their processed products (e.g. soybean meal with 46.5 percent minimum protein guarantee), or face discounts levied by the users of their products. The research objectives are to assess what makes up the discounted value of Manitoba soybeans, to assess the discounted value of Manitoba soybeans from a processor perspective, and to assess the value of research that can narrow the quality gap. Since the protein level directly affects the local cash price of Manitoba soybeans, understanding what makes up the discount is important market information that can directly affect producer profitability. The protein levels also affect the viability of soybean processing in Manitoba and the value-added and employment opportunities that processing offers. Knowledge of the size and of the quality discount will assist with research decisions regarding narrowing the quality gap, and knowledge of the quality discount will assist soybean producers with production decisions relative to how much to invest to boost protein level and what constraints they may face in doing that. A review of relevant research includes a review of scientific published research, industry research published by soybean associations, and journalist research reported in the farm press. Procurers of soybeans are also consulted to get their insights into the problems associated with lower protein levels of soybeans grown in Manitoba.

### **PART 3: EXPERIMENT DESCRIPTION & RESULTS**

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*Concisely describe the experimental methods and results to date. You may include up to 3 graphs/tables/pictures in the Appendix.*

A review of soybean discount literature summarizes soybean discount knowledge published in scientific journals, extension publications, industry publications and articles in the popular farm press. Further to these articles, to get local, on-the-ground knowledge of the soybean business in Manitoba, a series of interviews was conducted with a Manitoba soybean meal procurer who procures soybean meal for livestock producers who include soybean meal as an essential ingredient in their feed rations. At times, minimum protein level guarantees (e.g. 46.5 percent protein) have not been met by soybean processors and buyers have filed claims for compensation substantiated by third-part laboratory results of samples taken. The size and make-up of these claims provides insight into the value of protein per unit and hence sheds some light on relative protein discounts.

Discounts to soybeans for not meeting quality specifications are common for many factors, but not for protein levels. Mike Staton from Michigan State University Extension published in 2015 a report entitled "Understanding Soybean Discount Schedules." The report documents standard scheduled discounts for soybeans. These include: test weight (60 pounds per bushel as reference with below 54 pound per bushel discounted); moisture, (grain moisture levels exceeding 13 percent are discounted); foreign material (foreign material above 1 percent causes discounts); damage, (heat damage, frost damage, immature seed, mold damage, insect damage and sprout damage with 2 percent damage being allowed before damage discounts apply); splits (greater than 20 percent splits brings a discount).

Low protein levels can be problematic in Manitoba. Base soybean meal is sold with a 46.5 percent guarantee. Dry soybeans (12% moisture) need to be no less than 40% protein to meet the guarantee, or they are subject to discounts. Furthermore, at 37.2% protein, Manitoba and Saskatchewan soybeans do not meet the minimum levels necessary for meeting quality specs for soybean meal. Discounts of \$6 per tonne for soybeans with under 33 percent have been reported in Manitoba and discounts of \$9 per tonne have been reported in Manitoba for soybeans with under 32.4 percent protein. Soybeans falling under 32 percent protein can face rejection.

There is one soybean processor in Manitoba. The processing plant processes soybeans using an extrusion process. The soybeans are cleaned, dried put through an extruder, pressed and hammered to get a soybean meal. The benefits of the cooking, sterilizing and stabilizing process are a high-energy soymeal with high digestibility. The lower protein in the soymeal is offset with other protein additives prescribed by livestock nutritionists who formulate rations for dairy, chickens and hogs. A question being addressed is whether the lower-protein soybeans grown in Manitoba are limiting soybean processing in the Province or whether alternative processing processes with protein from other sources being added to the ration later as prescribed by nutritionists can be a standard feeding process in the Province thereby encouraging more soybean processing.

Over time there has been a general increase in acres of soybean production moving from the more southern US states to the more northern US states and now in to Manitoba and Saskatchewan. Then tendency has been for soybean protein levels to fall as production moves northward so the questions is whether soybean protein levels relate mostly to climate and heat or is it the particular varieties that are being grown in northern climates. There seem to be a multitude of variables contributing to the lower protein level of soybeans in Manitoba and those are listed and considered in the final report.



#### **PART 4: RELEVANCE TO FARMERS AND FUTURE RESEARCH**

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*Describe how the project results can be captured to benefit pulse and soybean farmers (production recommendations, innovation items, marketing plans, commercialization of technology etc). Identify any future research opportunities.*

This research benefits the MSPG farmer members. Since the discount directly affects the local cash price of Manitoba soybeans, understanding what makes the discount is important market information that can directly affect producer profitability. Knowledge of the size of the quality discount will assist with research decisions regarding narrowing the quality gap, and knowledge of the size of the quality discount will assist soybean producers with production decisions relative to how much to invest to boost protein level and what constraints they may face in doing that.

Soybean processing within the province is currently practiced at just one plant. That plant uses an extrusion process. The soybeans are cleaned, dried put through an extruder, pressed and hammered to get a soybean meal. The benefits of the cooking, sterilizing and stabilizing process are a high-energy soymeal with high digestibility. The lower protein in the soymeal is offset with other protein additives prescribed by livestock nutritionists who formulate rations for dairy, chickens and hogs. A question is whether the lower-protein soybeans grown in Manitoba are limiting soybean processing in the Province or whether alternative processing processes with protein from other sources being added to the ration later as prescribed by nutritionists can be a standard feeding process in the Province thereby encouraging more soybean processing. That question is a subject to be addressed in this and future research. Perhaps the extrusion process makes the lower-protein soybeans grown in Manitoba viable for producing soybean meal for animal feed. The soybean meal can be efficiently supplemented with additional protein from other sources.

This research and future research can help to identify the variables that are affecting soybean protein levels. It may be most economical to address those variables directly or perhaps most economical to work with the existing low- protein soybeans with more effective processing processes (e.g. extrusion).

#### **PART 5: COMMUNICATION**

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*List extension meetings, papers produced, conference presentations made, project materials developed.*

The focus of this research has been to assess what makes up the discounted value of Manitoba soybeans, to assess the discounted value of Manitoba soybeans from a processor perspective, and to assess the value of research that can narrow the quality gap. The research approach has been to review relevant literature but also to get on-the-ground insight by interviewing soybean procurers and processors. Those interviews have led to a productive exchange of information and therefore participatory extension. The participatory extension is yielding results as unexpected insights are coming forth showing need for future research, particularly regarding the question whether it may be most economical to address the low-protein soybean problem directly or perhaps most economical to work with the existing low-protein soybeans with more effective processing processes (e.g. extrusion). This participatory extension comes with the usual expectation of confidentiality. At a future date the learned material can be presented generically at extension meetings and conference presentations.



**APPENDIX**

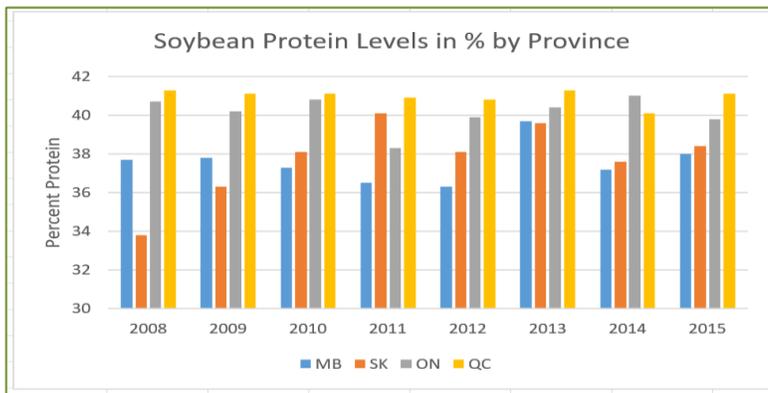
Include up to 1 page of tables, graphs, pictures.

Soybean Protein Levels by Latitude: Further north lower protein<sup>1</sup>

Lower Protein	North Dakota, South Dakota, Nebraska, Minnesota, Iowa
Medium Protein	Wisconsin, Illinois, Missouri, Kansas
Higher Protein	Michigan, Illinois, Indiana, Missouri, Kansas, Oklahoma, Arkansas,

<sup>1</sup>USSEC Soybean Quality Survey 2009

Soybean Protein Levels in % by Province<sup>2,3</sup>



<sup>1</sup>CGC Quality of Canadian oilseed-type soybeans

<sup>2</sup><https://www.grainscanada.gc.ca/soybeans-soja/harvest-recolte/2017/oil-oléagineux/hqso17-qrs017-03-en.html>

