

Exploring options for technology-driven value-enhanced lentil supply chains

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SPG Contributions	Project Status	Duration/Timeline of Project (Year to Year)	Total Project Cost
\$52,970.90	Completed	August 2012 – July 2014	\$52,970.90

Project Description

The Saskatchewan Pulse Growers (SPG) entered into an agreement with the Crop Development Centre (CDC) to fund a pulse breeding program where SPG would have royalty free access to all new pulse varieties developed by the CDC, and this breeding program has become the primary source of genetic advancement. Both green and red Canadian lentil varieties have seen large yield growth, particularly the red lentil, which has maintained a three percent annual yield increase over the past five years, a source of competitive advantage to the Canadian lentil producers.

Given the rapid genetic advancement in lentil varieties created by the CDC as compared to varieties bred elsewhere, Canadian varieties can perform better than locally available varieties, where similar agro-climatic conditions prevail. Russia and Kazakhstan, now in the process of developing their pulse industry, could be a potential threat to the Canadian lentil market. These areas might benefit from the use of elite Canadian red lentil (CRL) varieties in terms of growing their lentil industry and developing a competitive advantage.

Given the lack of effective intellectual property rights in these jurisdictions, Saskatchewan bred lentil varieties can be imported and grown in these jurisdictions. Such a scenario has the potential to erode the competitive advantage which Canadian lentil producers hold at present, resulting in lost economic welfare. The rate at which the lentil price will fall will depend on how fast the new CRL varieties are adopted by other countries.

Slowing down the transmission of CDC lentils to other countries would allow Canadian lentil producers to maintain a production advantage for a longer period of time, benefiting lentil growers in Saskatchewan. A physical mechanism to prevent the leakage of the intellectual property of the new Canadian lentil varieties would be to ship only de-hulled lentils to the final markets. Dehulling the lentils provides a form of genetic protection (GP) that makes the seeds unable to germinate, meaning other countries are not able to erode Saskatchewan's competitive advantage.

There would be economic benefits for Saskatchewan growers of red lentils to using dehulling prior to export as a method to delay potential competition from other countries.

The study began by identifying which countries of the world have significant potential to be future competitors which could grow CRL varieties. Russia and Kazakhstan have potential to converge towards the Canadian lentil industries position, allowing them to become large competitors.

Four plausible future growth scenarios, ranging from no convergence, one quarter convergence, half convergence to full convergence (when both countries will have an equivalent of five percent of their spring wheat hectares planted to lentils by 2034) were developed. These models were used to build a model of global supply and demand for each year between 2014 and 2034. The global demand projection incorporates income and population growth, and the supply side considers the impact of variety improvement, in Canada, Russia, Kazakhstan and the rest of the world under the assumption of no genetic protection (no GP) for CRL.

Costless dehulling based genetic protection was then incorporated into each model, on the assumption that it would delay Russian and Kazakhstan access to CRL varieties for a four-year period in each scenario. The market impacts of genetic protection for each of the four growth scenarios were then compared, with and without genetic protection. As a final step in each calculation, several experts were asked to assign a probability to each potential convergence scenario, to arrive at an estimate of the expected impacts of genetic protection.

Outcome

For the full convergence scenario, the GP of CRL varieties will result in slightly higher prices in the global lentil market over the next 20 years. The difference in the price of the no GP case and the GP case gets larger as the lentil industry in Russia and Kazakhstan grows from 2014 to 2034. The price impact of GP in 2034 for the full convergence scenario is \$5.92 per tonne. By 2034, lentil production increases by 102,000 tonnes in the full convergence scenario when new CRL varieties are genetically protected. For the full convergence scenario, the impact that occurs for the Canadian lentil producers is a net total of \$92.67 million of additional producer surplus.

The impact of genetic protection is relatively small in all four convergence scenarios. The empirical model results reveal that for every scenario examined, full convergence, half convergence, quarter convergence and no convergence, Canadian lentil producers are positively affected when Canadian firms use GP to protect the intellectual property rights of new CRL varieties. Understandably the results vary depending on the scenario, and the full convergence scenario shows the largest impacts to the Canadian lentil industry when there is GP for CRL varieties. When all four convergence scenarios are evaluated and weighted by probabilities solicited from industry experts, estimated overall expected economic impact for Canadian lentil producers from 2014 to 2034 will be \$47.12 million in additional producer surplus. The benefits derived from dehulling based genetic protection for Canadian Red Lentils are surprisingly modest.

The modest gains achieved through genetic protection suggests that if this policy were to be pursued, other potential industry benefits of a dehulling based supply chain should be considered. The creation of such a system might spark the creation of a whole new processing industry that is able to capture additional value from buyers and/or reduce significant marketing risks for the industry. It could also be part of a long-term industrial strategy that leads to the development of additional high value uses for lentils.

The development of a value chain where all recent CRL varieties are dehulled before export is a complex process. At a minimum it would involve substantial changes to

the processing sector, including new investments in processing capacity, new logistics, new marketing and developing activities, and the contractual relationship with growers. It could also impact upstream producers who might face more limited marketing options and perhaps different prices, and downstream buyers of CRL who formerly dehulled lentils closer to market.

This study analyzed expected benefits of dehulling all Canadian Red Lentils prior to export, as a way to protect the competitive advantage currently enjoyed by Western Canadian producers, who have funded and use modern higher yielding varieties developed by CDC, and delay the price drop expected if Russia and Kazakhstan, which have large areas of land suitable for lentils, are able to speed the development of their industry using CDC varieties. The benefits were smaller than expected, but the advantages and complexities of increased local processing should also be considered by the lentil industry.

Research Objective

OBJECTIVE 1

To explore the different institutional arrangements that could be developed within the Saskatchewan pulse value chain to establish a market for high-quality cleaned and de-hulled lentils milled from superior varieties with uniquely identifiable seed coats.

OBJECTIVE 2

To quantify the economic outcomes of these arrangements.