

# Move Over Corn, Wheat's King In Western Canada

Western Canadian wheat growers anticipate ethanol will energize the wheat market there in the same way it has the U.S. corn market by creating a new use for the dominant grain crop. Using wheat to produce ethanol, however, has its challenges.

by Susanne Retka Schill

For more than 25 years, ethanol has been produced in a small way on the Canadian prairies. This year, two new plants coming on line will boost total ethanol capacity. In 2006, when Husky Energy Inc. brought its 130 MMly (34 MMgy) ethanol plant at Lloydminster, Saskatchewan, on line, it more than doubled western Canada's ethanol output, which was 79 MMly (21 MMgy). Ethanol capacity will more than double again this year with Husky's second 130 MMly plant commissioned in December at Minnedosa, Manitoba, and Terra Grain Fuels Inc.'s 150 MMly (40 MMgy) plant at Belle Plaine, Saskatchewan, scheduled to start up this spring.

While eastern Canada relies on corn for ethanol, western Canada's growing industry is turning to wheat as the primary feedstock. "We really are in the early stages of a large-scale biofuels industry in western Canada so it's difficult without a crystal ball to predict the full impacts," says Cheryl Jolly-Nagel, president of the Western Canadian Wheat Growers Association. But it's not too soon to foresee the possible benefits of an increase in ethanol capacity. In her presentation at the Canadian Renewable Fuels Association's fourth annual Canadian Renewable Fuels Summit in December, she listed five reasons wheat growers welcome the ethanol industry growth.

- >Increased ethanol production will help reduce Canada's dependency on foreign grain markets. Jolly-Nagel points to the export market's vulnerability to tariff and nontariff barriers as well as disruptions caused by incidents such as last year's railway strike and a trucker walkout at the Vancouver, British Columbia, port.
- >Increased local processing reduces the dependency on shipping via western Canada's two main railways, which haul about 65 percent of the grain produced.
- >Ethanol plants provide an additional local market. "As we have discovered in the canola, oats and pulse sectors, there's nothing like a local user of grain to help support local prices," she says.
- >Ethanol plants create jobs and economic activity in rural areas.
- >Ethanol plants promise environmental benefits. Although Jolly-Nagel declined to weigh in on the debate about ethanol's impact on greenhouse gas reductions, she says that at the very least, having local markets will reduce the fuel used to export grain.

The biggest challenge for Canadian ethanol plants may be encouraging farmers to switch from high-protein wheat that commonly garners a premium, to raising lower protein wheat classes. On the other hand, Canadian wheat farmers view ethanol plants as an alternative market for their low-quality feed wheat, which is primarily downgraded hard red spring wheat damaged by early frost, disease or rains during harvest. "The plants focused on the ethanol yield as the primary product and distillers grains as the secondary product are not as keen on utilizing these feed grains unless they're really, really dirt cheap," says Anita Brule-Babel, a professor of plant sciences and wheat breeder at the University of Manitoba. Ethanol producers avoid using Western Canada's dominant wheat class, Canadian red spring, because of its lower starch content and its high protein levels, which increase the viscosity of the mash in the ethanol process. And, other nonstarch polysaccharides create additional problems, Brule-Babel says. "It's not insurmountable," she says. "The proper enzymes will break down some of those components." While additional enzymes help, ethanol plants are turning to the low-protein, high-starch classes such as soft white wheat, the midprotein and midstarch winter wheats, and Canadian prairie spring. The protein content of soft white wheat ranges from 8 percent to 9 percent, which is much closer to corn protein levels, while hard red spring wheat ranges from 13 percent to 15 percent protein. Corn will still have a higher proportion of starch than lower protein wheat because of its larger kernel. Winter wheat may also be attractive for wheat producers because it out yields spring wheat by 30 percent to 40 percent.

Husky expects to buy 700,000 tons (26 million bushels) of grain to supply its two ethanol plants and would like to keep grain purchases within a 100-mile radius of its plants. "If we have to go further out to get the supply of feed grain we need, that costs us more," says Greg Seamchuk, Husky's marketing coordinator for grains and distillers grains. He says farmers have already started to grow more wheat tailored to ethanol production. Jolly-Nagel has joined the ranks of western Canadian farmers who are beginning to grow the classes of wheat favored by the ethanol industry. This year, however, the winter wheat grown on her farm near Mossbank, Saskatchewan, tested at more than 15 percent protein. "We certainly don't want to sell it as feed wheat," she says.

### **Designing for Wheat**

The key to building an efficient ethanol plant that's optimized for wheat is to make allowances for the grain's characteristics. Kansas-based ICM Inc. is completing the design for its first wheat ethanol plant this winter. "We're trying to move forward with wheat because it is the predominant starch in Canada and overseas," says Mark McCorkle, director of international project management. ICM was chosen to supply the design for Cyprus Agri-Energy Inc. which is proposing a plant at Shaunavon, Saskatchewan. ICM is working with two other Canadian wheat ethanol plants that are in the early planning stages, McCorkle adds.

The company plans to build on its solid reputation for engineering efficient corn ethanol projects to design a plant optimized for wheat. Wheat's higher viscosity levels and its tendency to foam are the biggest challenges, McCorkle says. Adding an extra enzyme at the beginning of the process helps to thin the slurry allowing a throughput and flow rate similar to corn. In addition to new enzymes, equipment modifications also help manage foaming issues. ICM has seen good results in foaming control by blending 10 percent corn into the wheat rather than using a more costly foaming agent such as corn oil. At the back end of the process, the amount of wet cake leftover after fermentation and distillation also increases when wheat is used as opposed to corn, which in turn increases the load on the centrifuges and driers, McCorkle explains. Once the wheat design is optimized, ICM will continue researching other feedstocks to meet its goal of developing a truly multi-grain feedstock facility for the international ethanol market.

Western Canada's ethanol capacity will need to expand even further to meet increasing mandates. Husky's two plants will produce the ethanol volume needed to meet the provincial mandates of 7.5 percent in Saskatchewan and 10 percent in Manitoba. Meeting the federal mandate for a 5 percent ethanol blend by 2010 will require a doubling of ethanol capacity in western Canada, Husky's Seamchuk says. Don't expect that to be met with the 100 MMgy-plus ethanol plants becoming popular in the Corn Belt. **With wheat yielding one-third the bushels per acre of corn—and at the best, only close to half for the top yielding winter wheat varieties—ethanol plants will be sized smaller to keep the available feedstocks within a cost-effective distance. EP**

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