

Opportunities for Value-added Utilization of Oilseeds in Minnesota

Executive Summary



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Executive Summary

The Oilseed Industry Worldwide and in the United States

The oilseed industry in Minnesota must be examined within the context of the oilseed industry worldwide and within the United States.

Oilseed processing is a vast, worldwide industry, dominated by soybeans, which account for 55% of worldwide oilseed production.

Worldwide vegetable oil consumption (of which soybean oil represents 28%) is growing at a faster rate than population—4.1% compared to 1.3% compounded over the past five years. As the developing world continues to improve its standard of living, this trend will continue. Per capita vegetable oil consumption is a good measure of a country's prosperity.

Worldwide protein meal consumption (of which soybean meal represents 56%) also is growing at a rate faster than population—3.9% compared to 1.3% compounded over the past five years. Soybean meal holds a unique role in protein meal markets due to its high protein content, excellent amino acid profile and low fiber content. As standards of living rise in the developing world, people will consume more meat, milk and eggs, the production of which bodes well for protein demand, particularly soybean meal.

The United States accounts for 29% of world oilseed production, double that of #2 China. The United States is #1 in both soybean and cottonseed production. The United States exports 35% of its soybean production, 11% of its soybean oil production and 20% of its soybean meal production over the past five years. The United States is the residual supplier of soybean oil and meal to the rest of the world.

Soybean processing in the United States is a mature industry, with excess capacity. The business tends to be quite cyclical in nature. Poor margins during the past 2 ½ years have led to the permanent closure of several plants and the curtailed operation of many others.

The soybean processing industry in the United States is dominated by ADM (31%), Cargill (21%), Bunge (14%), AGP (11%) and Central Soya (9%). All others account for 14%. ADM, Cargill and Bunge also dominate the industry worldwide. The multiseed processing industry in the United States is almost entirely in the hands of ADM (80%) and Cargill (14%).

Among other oilseeds, the United States has significant production in cottonseed, peanuts and sunflowerseed, with canola production increasing in recent years.

The United States has become a significant importer of canola oil and canola meal, all of which comes from Canada.

The Oilseed industry in Minnesota

Minnesota ranks #3 in soybean production in the United States, with production greatest in West Central, Southwest and South Central Crop Reporting Districts.

Production of sunflower has declined greatly in Minnesota during the past several years, to nearly insignificant quantities. The same is true of linseed (flax) production. On the other hand, canola production has increased to a significant amount in recent years.

There are four major oilseed processing plants in Minnesota—ADM at Mankato (soybeans) and Red Wing (sunflowerseed and linseed) AGP at Dawson (soybeans) and Cenex Harvest States at Mankato (soybeans).

Minnesota soybean processing capacity is a much smaller percentage of its soybean crop (37%) than other top five soybean producing states—Iowa, Illinois, Indiana and Ohio (51-77%).

Minnesota also has less surplus soybean meal production capacity (15%) than the other top five soybean producing states (63-85%).

Consumption of soybean meal in Minnesota is greatest in the hog, turkey and dairy sectors. Hog concentration is greatest in the South Central District. Turkey and cattle concentrations are greatest in the Central District.

One factor that works to the disadvantage of soybean processors in Minnesota is the historically lower protein content of Minnesota soybeans compared to soybeans grown farther south. This creates a disadvantage of 8-9 cents/bushel when competing with out- of-state processors in common markets.

The ADM and CHS plants at Mankato both have large refineries, capable of refining 150% of the soybean oil produced in the state, and five times as much as is consumed in the state. Thus, Minnesota imports crude soybean oil (mostly from South Dakota Soybean Processors in Volga, SD) and exports a large amount of refined soybean oil. However, some of this is later returned to Minnesota in the form of finished products containing soybean oil—cooking oil, margarine, shortening, salad oil, sauces, mayonnaise and fried foods.

Additional Commodity Soybean Processing Capacity

Minnesota Soybean Processors, in conjunction with South Dakota Soybean Processors announced in July its intention to build a 3000T/day soybean processing plant in Brewster, in Nobles County in southwest Minnesota. This still will leave Minnesota “short” of soybean processing capacity compared to the other top five soybean producing states, as measured in terms of processing capacity relative to soybean production and soybean meal production capacity relative to soybean meal consumption. CHS has delayed indefinitely its plans to build a 3000 T/day soybean processing plant in Fairmont, in Martin County in south central Minnesota.

If the CHS plant (or another 3000 T/day plant) is built, Minnesota’s soybean processing capacity would be more in line with the other top five soybean producing states.

If the Brewster plant is built, a better location than Fairmont for another 3000 T/day plant might be farther

east, in southeast Minnesota, farther from Mankato and Brewster, still in a good soybean producing area and nearer the good market for soybean meal represented by Wisconsin's large dairy herd.

Identity Preserved Soybean Processing

An alternative to a large, commodity soybean processing plant is a 800-1000 T/day identity preserved (IP) soybean processing plant. The need for such a plant may arise due to the development of genetically modified (GM) soybeans.

Currently most GM soybean varieties are agronomic trait ones, particularly "Roundup Ready" soybeans. Due to resistance to GM varieties in Europe and Japan (and increasing in the United States), it may be necessary to process GM varieties separately from non-GM varieties.

Even if the furor over GM soybeans subsides, there will still be a need to IP process nutritional trait GM soybeans, since their value resides in their products, not in their agronomic attributes. The developer/owner of these varieties (such as DuPont) will want to retain ownership of the soybeans and the products in order to capture the value of the products. This will require IP processing.

How soon and how strong the demand for IP processing capacity will be no one knows, but it is unlikely that much capacity will be needed until at least 2005, since most of the nutritional trait GM varieties are still being developed.

Soybean Mini-mill

Mini-mills are smaller plants that use expeller technology rather than solvent extraction technology to remove the oil. These plants can be very small—down to 10T/day. They serve niche markets, such as processing of organic seeds. They also lend themselves to allied businesses, such as biodiesel production.

Multiseed Processing

There could be an opportunity for a multiseed plant located in west central Minnesota. A 1500 T/day plant could be supplied by sunflowerseed from the Dakotas, canola from northwest Minnesota and corn germ from Minnesota Corn Processors at Marshall, if the plant were built according to the requirements necessary to process corn germ. Lesser oilseeds such as crambe and linseed could also be processed, as well as soybeans, if margins so dictated.

NuSunä sunflowerseed oil

This term applies to recently developed sunflower varieties that contain "mid oleic" (about 65% oleic acid) oil. The advantages offered by NuSunä oil are good taste when used for frying, stability, and hydrogenation is not required (no trans fatty acids).

NuSunä has been well received by the market. Procter and Gamble announced recently that it will begin frying its Pringlesä brand of potato chips in NuSunä . ADM and Cargill both are producing it and have paid a premium for NuSunä varieties of sunflowerseed.

Press vegetable oil

This is oil that comes from expeller plants rather than solvent extraction plants. They bring a premium of up to double the price of solvent extracted oils in the retail market, where Spectrum and Hain are the dominant brands.

Derivatives of soybean oil

Some valuable compounds can be extracted from soybean oil gums, which are a byproduct of the refining process. The gums contain lecithin and deodorizer distillate, which can be fractionated into components that are used in the nutrition and pharmaceutical industries.

Soy concentrates, isolates and flour

These are made from soy flakes. Concentrates and isolates have high concentrations of protein (65% and 90% respectively). They are used as food and feed ingredients and in nutritional products. Soy flour is used in the baking industry for its functionality. It also is used to produce milk replacers.

Isoflavones

These compounds have been receiving favorable attention due to their health benefits. Among these are easing the effects of menopause and prevention of cardiovascular disease and osteoporosis. With the “Baby Boomer” generation entering middle age, demand for isoflavones should increase significantly.

Oligosaccharides

These compounds are used as food ingredients for their functionality characteristics and in the pharmaceutical industry. In the latter application they promote the growth of beneficial bacteria in the gut. Soy-based oligosaccharides have been almost entirely displaced in recent years in the United States by inulin from chicory root. Oligosaccharides may have a role as dietary fiber, but there are many inexpensive sources of dietary fiber available.

Soy-based foods

Among these are textured soy protein (TSP), tofu, miso, tempeh, soy dairy products and beverages and soynuts. Most of these have been around for several years and have not gained a strong following among the majority of consumers. Their appeal has been primarily among health conscious consumers and vegetarians.

This may change with the recent proclamations of the health benefits of soy protein, which have been endorsed by FDA. But it is open to question whether most Americans are health conscious enough to make significant changes in their diets.

Soy milk has shown great promise, with consumption increasing by 25% annually for the past few years. SunRich, Inc. of Hope, MN, is the largest producer of soy milk concentrates in the United States.

Soynuts are also gaining in popularity. Dahlgren & Company of Crookston, Amport of Minneapolis and Waymouth Farms of New Hope, MN all are major players in soynuts. However, they are still a very minor snack food category compared to peanuts and sunflower seeds.

Salad dressings and sauces

These products have soybean oil as a major ingredient, but little of them is produced in Minnesota. Freight economics favor production near major metropolitan areas.

Biodiesel

There has been good interest in biodiesel made from soybean oil due to high petroleum prices, emissions benefits coupled with the renewability of the crop and, its lubrication properties. The lubrication property of biodiesel and its ability to function as a sulfur replacement provides a realistic alternative as the Environmental Protection Agency continues to require sulfur reduction in petrochemical diesel.

Industrial uses of soybeans

Among these are soy ink, paints, waxes, solvents, cleaners, adhesives and building materials. Only soy ink has made significant inroads into the market for products made from conventional materials.

Conclusions

- The proposed Minnesota Soybean Processors plant in Brewster is sufficient expansion of commodity soybean processing at this time.
- There may be a need for identity preserved soybean processing capacity, but not until at least 2005. However, it merits further study now.
- Soybean mini-mills have a role to play, particularly in conjunction with allied enterprises, such as biodiesel and soy-based industrial products; merits further study.
- Multiseed processing, including corn germ processing, has good potential; merits further study.
- NuSun[®] production would be allied with a multiseed processing plant.
- Press vegetable oil would be allied with either a soybean mini-mill or a multiseed processing plant.
- Derivatives of soybean oil have good potential; merits further study.
- Soy concentrates, isolates and flour do not appear to be particularly attractive; further study is not recommended.
- Isoflavones have good potential; merits further study.
- Soy-based oligosaccharides are declining in use; further study is not recommended.
- Among soy-based foods, soy milk merits further study.
- Salad dressings and sauces do not offer much potential; further study is not recommended.
- Biodiesel is best suited to be allied with a soybean mini-mill.
- Industrial uses of soybeans are best suited to be allied with a soybean mini-mill.

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