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CANOLA AS AN EMERGING INDUSTRY:
A Processor and Producer Perspective

prepared by:

Karen Coaldrake and Steve Sonka

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CANOLA AS AN EMERGING INDUSTRY: A Processor and Producer Perspective

Abstract

The canola industry in the United States has been very small with a limited canola oil demand being met through imports. However, an apparent increase in consumer demand for more healthful alternatives to traditional vegetable oils has sparked an interest among domestic processors desiring to be among the first entrants to a U.S. canola oil market. Processor interest has in turn led to some producer experimentation with the crop. This case study documents the early activities of U.S. Canola Processors (USCP), one of two companies processing the U.S. crop, and Ralph King, a Central Illinois canola producer.

USCP, a joint venture of Central Soya and Calgene, describes their role in terms of "building an industry," according to General Manager Larry Horn. The company actively participated in amending the 1990 Farm Bill which permitted producers to plant some canola without risking their wheat or corn bases. Also, USCP is pursuing the establishment of U.S. grain inspection standards for canola. Company representatives are holding farmer meetings and elevator training as a means of promoting the crop. The goal for USCP is to establish an infrastructure that would permit the company to secure adequate supplies of canola for their processing needs.

Ralph King, an Illinois farmer, had a positive experience with canola the first production season and plans to continue experimenting with the crop. Despite his positive production experience, other producers have been less enthusiastic about canola's production season, volunteer plant problems, questionable suitability of canola varieties to specific geographic areas, and a volatile market situation.



CANOLA AS AN EMERGING INDUSTRY: A Processor and Producer Perspective

Introduction

Larry Horn's enthusiasm about the future of the canola industry can only be described as contagious. His office shelves contain samples of canola oil in different stages of refinement, countless articles from the popular and scientific press, farmer caps with the U S Canola Processors logo, and a hard hat for walking through the processing facility.

As general manager of U S Canola Processors (USCP), the first U.S. canola processing and refining facility, Horn views his role and that of his staff as one of the greatest challenges of his 27 year career. As he leans forward on his desk and reaches for a sample of refined canola oil he says enthusiastically, "We're not just processing a new crop. We're building an industry." He smiles and asks, "How often do you get an opportunity like that?"

More than 500 miles away, Horn's enthusiasm is shared by another strong advocate of the emerging canola industry, Ralph King. King lives about two miles outside of Farmer City, IL, located in DeWitt County, a typical corn and soybean production area. His farm house and machinery shed are separated by a rock driveway and several large, shady trees giving his home that comfortable, rural appearance that almost acts as a trademark for Central Illinois. The view from his yard is also typical for the area, filled with countless acres of corn and soybeans, except for a small field of canola within walking distance of King's front door.

King was pleased with his first year's experience with canola. Prices were not all that attractive, but he had successfully produced the crop and it appeared to be a viable alternative to wheat on well-drained soils. He was certainly optimistic about the potential of the crop in Central Illinois.

Although Horn and King have never met, the two men share an interest in the future of the domestic canola industry. King as a farmer and Horn as a processor represent the two most basic elements of a new industry -- a producer and a market. Both face key challenges in establishing the industry.

Perhaps the greatest challenge for Horn and USCP is the ability to secure an adequate canola supply to meet its growing crushing demand. Although canola supplies are available

Research Assistant Karen Coaldrake prepared this case under the direction of FAM Program Director Steve Sonka and with the assistance of Business Administration undergraduate Kristin Albers.

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outside the United States, the ability to build a canola industry rests heavily on the availability of an adequate domestic supply of the crop. Currently, however, 80% of the canola oil used in the United States is imported from Canada. For King, availability of a stable, well-functioning market is a key factor affecting his decision to include canola in long run production plans.

History of the Canola Industry and Introduction to US Producers

"Canola" is often used interchangeably with the word "rapeseed", especially in the United States. The term "canola" (Canada oil - low acid), was registered in 1979 by the Western Canadian Oilseed Crushers Association. It specifically describes rapeseed varieties with low erucic acid and low glucosinolate levels. Worldwide, LEAR (Low Erucic Acid Rapeseed) and HEAR (High Erucic Acid Rapeseed) are also available for various uses.

Rapeseed varieties originally contained high levels of both erucic acid and glucosinolates, thereby limiting the use of the crop. Erucic acid is a fatty acid that has been linked to heart disease in humans. Glucosinolates, found in the meal byproduct, are unpalatable to animals. Thanks to the efforts of Canadian plant breeders in the 1970s, double low spring rapeseed varieties were developed. European plant breeders introduced winter "00" varieties in the 1980s.

Today, the "00" designation is used to indicate varieties that will produce processed oil containing less than 2% erucic acid and meal byproduct with less than 30 micro moles (1 mole equals 6.02257×10^{23} molecules) per gram of glucosinolates. These low levels make the canola oil a healthful alternative for humans and greatly improve the digestibility of the protein meal for animal feed.

Consumer interest in canola. Canola appears to be an ideal alternative to other vegetable oils. Canola oil is tasteless and contains only 7% saturated fat, as compared to 15% for soybean oil and 51% for palm oil (see Figure 1). Like olive oil, canola oil also contains a high level of monosaturated fat. This type of fat has been linked to the reduction of "bad" cholesterol, reducing the risk of heart attack. However, recent studies suggest monosaturated fats are ineffective against "bad" cholesterol and are only valuable as a replacement for unhealthy saturated fats. Soybean oil currently dominates the US vegetable oil market.

Canola seems a natural fit with the health-conscious America of the 1980s and 1990s. Currently, however, Americans choose to fry, mix and consume more than 11 billion pounds of soybean oil annually. Canola oil contributes only 550 million pounds to the total US vegetable oil market. The majority of this oil is imported (see Figure 2). It is estimated that 1989 imports into the US could have been supplied domestically with production of one half million acres.

Some food processors have taken steps in canola's direction. Proctor and Gamble has replaced their Puritan brand cooking oil product (see Figure 3), formerly a mixture of soybean and sunflower oil, with 100% canola oil. Industry rumors suggest that other companies will soon follow with blends of canola oil and corn or soybean oil. Frito-Lay, who buys 200 to 300 millions pounds of vegetable oil each year, has experimented with frying Ruffles and Lay's potato chips in canola oil at one plant. The company plans to introduce a new product, SunChips, a brand of corn chips fried in canola oil. Lance Foods has added canola oil to its ingredient list for crackers and cookies distributed in more than 35 states.

According to Tim Dailey, a Proctor & Gamble purchasing manager, canola is a strong product in the marketplace. "It offers lower saturated fats, good frying and is competitively priced." For the food company, Dailey estimates that canola oil costs about one cent more per pound than soybean oil.

World production expands. Worldwide rapeseed production is estimated at 22.5 million tons from 30 million acres of cropland. The EEC produces 18% of the world's production and Canada, the leading canola exporter to the United States, provides another 18%. Worldwide consumption of canola oil nears 8.4 million tons, while animal consumption of canola meal is estimated at 13.3 million tons. The soybean crop is the largest of all oilseed crops worldwide, contributing 103.6 million tons in oil consumption and 73.1 million tons in meal consumption.

World rapeseed production* expanded throughout the 1980s (see Figure 4). From 1977/78-1981/82, rapeseed accounted for only 6% of world oilseed production, but by the latter part of the 1980s this percentage had nearly doubled to 11% (see Figure 5). Rapeseed's share of world vegetable oil production, consumption and trade also has increased over the past decade. Oil is the primary product of rapeseed crush.

Acceptance of rapeseed worldwide is heavily affected by government policies as well as market forces. High domestic price supports in the European Economic Community (EEC) for oilseed production caused an explosive growth in producer interest in that region. Today, rapeseed is the major oilseed grown in the EEC. In the mid-1980s EEC price supports for rapeseed were two to three times the world price. Supports were even higher for "00" varieties. In Canada, where minimal government support exists, rapeseed output between the mid 1970s and 1980s grew more slowly.

Eastern European nations have looked to rapeseed production as a protein crop, but struggle to improve self-sufficiency. Soybean production, another protein crop, has provided discouraging results in northern areas of this region. China and India, both with a demand for vegetable oil that exceeds domestic supply, also provided incentives to push local rapeseed prices above world price levels. By 1987/88, rapeseed oil accounted for nearly 15% of the world's vegetable oil.

Even though rapeseed is now the world's third most widely grown oilseed, the best estimates available indicate that 1989/90 production dropped from previous years. In the EEC, unfavorable returns occurred in 1989 as previous reductions in price supports forced producers to look for alternatives. Canada faced a poor growing season and better returns for barley and wheat further reduced production. India also experienced poor yields. These shortfalls offset production increases in China and Eastern Europe.

The US canola industry. In the United States the term "canola" is most commonly used to indicate "00" rapeseed varieties produced for human and animal consumption. Limited amounts of non-"00" rapeseed varieties are grown for industrial uses, including high temperature lubricants, plastic formulation and other industrial applications.

* Production statistics normally do not separate canola from rapeseed. Therefore, data on rapeseed is used.

Canola contains approximately 40% oil and its meal averages 36-38% protein, as compared to 18% and 44%, respectively for soybeans. As with soybeans, when canola oil is extracted, a high quality, high protein feed concentrate remains. New meal markets for the turkey and poultry industry are currently being explored, which could eventually be critical to further acceptance of the crop in the South and Midwest.

Even though the majority of world rapeseed production is provided by spring-planted varieties, about 80% of production in the United States is from winter varieties planted in Illinois, Indiana, Kentucky, Michigan, Ohio and Tennessee. Some spring varieties can be grown near the Canadian border. US acreage planted to canola in 1989 approached 90,000 acres, and declined to 70,000 acres in 1990. Industry enthusiasts estimate that 450,000 acres would meet the total US demand. Obviously canola production is currently quite small, but industry optimists believe that because of canola's strong reputation as a healthful oil seed crop, production could reach five million acres by 1995.

Bad start in the United States. Canola had to overcome several impediments during its introduction to the US. Petitions on the part of food companies to the US Food and Drug Administration (FDA) to include canola oil in foods were initially met with resistance by other oilseed groups, especially the American Soybean Association. The FDA maintains a list of foods Generally Recognized as Safe (GRAS) and eventually granted canola GRAS status, despite strong opposition.

Canola supporters also faced a second problem. Canola oil originally had to be labelled as "low erucic acid rapeseed oil" (LEAR). Many in the industry felt that consumers might react negatively to a product where the word "rape" appeared in the product identification. In 1988, the FDA permitted food companies to use "canola oil" as labelling identification if the oil contained less than 2% erucic acid.

One reason for canola's slow increase in production can be attributed to the federal farm income support programs of the mid-to-late 1980s. Farmers received government support and price guarantees based upon the number of corn and wheat acres idled. Each farmer's production base for a crop was determined by historic acreage of that crop on the farm. Prior to August 1989, planting canola on wheat acres meant that the farmer's wheat base for future years would be reduced. Therefore, the producer who tried a new crop, such as canola, ran the risk of not being able to shift production back to wheat. As a result of this disincentive to try new crops, farmers chose to stay with the old system. Canola advocates organized and in August 1989, the farm program was modified so that some canola could be planted on some wheat, or other subsidized, acres without risking next year's protected prices.

Many producers also were confused by historic uses of rapeseed. Rapeseed was originally introduced to parts of the Midwest as a forage crop, used for livestock feed. Canola's introduction as an oil crop was a new concept.

Infrastructure being established. In 1990, only two companies with four canola processing facilities were openly competing for the US crop: USCP of Chattanooga, TN, Archer Daniels Midland (ADM) of Windsor, Ontario, ADM of Velva, ND and ADM of Augusta, GA. Unfortunately, farmers who experimented with canola often found that they had to truck the crop to destinations far beyond their local grain elevator, the traditional marketing outlet. Additional transportation, of course, increased costs.

In the United States the majority of the canola crop was sold on a cash sales basis at a receiving elevator. Typically, canola prices tend to follow soybean prices (see Figure 6), both on the world market and in the United States. Futures contracts are available through the Winnipeg Commodity Exchange in Canada for quantities of 20 metric tons (882, 50 lb. bushels). However, these transactions are complicated for US producers by currency exchange fluctuations. Because canola is a new crop, a standard grading system has yet to be established in the US. Standards are expected to be in place by March 1991, but Canadian grades are currently being used.

Facilities that process soybeans typically cannot directly accept canola, but can be modified by adding a pre-press. The pre-press squeezes oil out of the seed and then standard solvent extraction equipment, also used with soybeans, further processes the crop. Once a pre-press is added, the facility becomes a multi-seed plant capable of processing sunflower, cottonseed, soybeans, canola and other oilseed crops.

Canola oil prices are likely to continue to fluctuate and be dominated by soybean oil. However, a domestic market is being developed as canola gains a reputation as a healthful product. A potential problem in the expansion of the US canola production is an increase in imports from the EEC. Support prices in the EEC are significantly high to overcome transportation costs and tariffs, making exports from that region profitable.

Processor Perspective

In 1988, Horn left his Central Soya position in Toronto, Canada for corporate headquarters in Ft. Wayne, Indiana, after being asked to participate in analyzing the potential of the canola processing industry. Calgene, Inc. of Davis, California, had approached the organization about the possibility of creating a joint-venture company for canola processing. Central Soya concluded that canola was a good alternative crop for producers and that demand for canola oil would increase, because of recent evidence supporting canola oil's more healthful benefits.

Calgene and Central Soya decided to form USCP and enter the US canola oil and meal market. Both companies viewed any obstacles limiting the emergence of a US canola industry as movable roadblocks, not mountains, according to Horn.

Horn says, "We had to decide what was limiting the industry's viability and then pursue those aspects. Everyone involved found themselves flying more than a few miles, talking to representatives throughout the canola industry, meeting with government officials, and overall, feeling pretty good about their efforts." He concludes, "the roadblocks are moving."

The Building of U.S. Canola Processors

The building of an industry is certainly a task that requires organizational commitment in terms of people, time and finances. The formation of USCP is an example of independent companies combining resources and philosophies to pursue an entrepreneurial endeavor.

Central Soya processes soybeans, merchandises grain, manufactures feed, refines oil and manufactures soy proteins and lecithins. The company, a member of the Ferruzzi Agro-

Industrial Group of Italy, markets in over 60 countries and operates more than 65 plants worldwide. In 1989, company revenues exceeded \$2.3 billion with net earnings equalling \$15.1 million. In the 1989 annual report the company identifies three objectives for its long-term strategic development. They are:

1. to develop better technology to serve its customers.
2. to build a stronger global presence.
3. to aggressively develop the value-add businesses in which the company operates.

Calgene, founded in 1980, describes itself as a genetic engineering based seed and specialty crop company. Company subsidiaries include American Pedigreed Seed Company, Calgene Chemical, Noble-Bear, Plant Genetics and Stoneville Pedigreed Seed. American Pedigreed Seed, based in Memphis, Tennessee, is the leading supplier of canola seed in the United States. Calgene also maintains numerous research relationships with leading food and agricultural companies, many of which are located outside of the United States. Although Calgene maintains a technical staff of more than 150 and holds or has applied for more than 250 patents, the company's financial position has been uncertain. In 1989, net income dropped to \$-6.8 million from 1988's \$-5.3 million, while research expenditures remained constant at \$10.4 million.

Once the 50-50 joint-venture was agreed to in 1988, Central Soya's Chattanooga soybean facility underwent modification to handle both soybeans and canola. The facility was chosen for its location to the potential growing areas of the crop, available capacity due to the decrease in the local soybean crop and the attached refining facility. Canola processing includes all the steps required to extract the oil and meal (see Figure 7). Oil refining includes those processes which produce various qualities of oil. The Chattanooga facility also maintains a feed manufacturing operation. Byproduct canola meal is utilized as a protein ingredient.

During the modification period, key US personnel began efforts to learn as much about canola processing and refining technology as possible. Also, USCP began efforts to remove the roadblocks that prevented successful growth of the canola industry in the United States.

Moving Roadblocks

1990 Farm Bill. Among the projects tackled by USCP in 1988 was an amendment to the then current farm bill. Under the initiative of Central Soya, Calgene, Proctor and Gamble and Archer Daniels Midland, the US Canola Association was organized to address government policy. The result was a modification in the farm bill in August 1989, which permitted producers to plant up to 20% of their wheat or corn acres to canola, without risking their base or protected price. Horn openly admits this was a real victory, but the main objective was a friendly Farm Bill for 1990. Again, canola advocates were successful in achieving that objective.

Thanks to the lobbying efforts of the US Canola Association and the National Sunflower Association, and support by Kansas representatives, the nation's largest wheat producing state, the 1990 Farm Bill encourages producers to grow minor oilseeds such as sunflowers, safflowers, flax and canola. Under the new program, the government will continue to pay

farmers for fallowed grain acres, but will permit plantings of minor oilseed crops, without the loss of grain deficiency payments. Increased oilseed plantings on the Central and Northern Great Plains are expected to displace canola imports from Canada by the year 2000. Farmers also will be able to grow canola on 15% "triple base" acres for which they can no longer receive subsidies and 10% flexible acres, which can be shifted out of crop programs. Further, the new farm bill provides a marketing loan for minor oilseeds comparable to that available for soybeans. The result is the establishment of a floor price, offering some risk protection for canola producers.

Federal Grain Inspection Standards. As of yet, the Federal Grain Inspection Service (FGIS) has not established standards for canola grading. However, USCP is optimistic that federal standards, similar to Canada's, will become effective in the spring of 1991 (see Figure 8). Representatives of the FGIS met with Canadian Inspection Service staff at the invitation of USCP. Horn feels an established set of grading standards will be critical for both producers and the industry.

The Canadian grading system, which currently is commonly used in the United States, is based on visual inspection for immature or green seed, damaged seed, heated seed, and mixed or blended seed. Although the US FGIS lacks a defined grading system, USCP developed a discount schedule (see Figure 9) based on many of the same standards set in Canada.

Communicating with farmers. Representatives from Central Soya, Calgene and Ameri-Can Pedigreed Seed, on the behalf of USCP, began holding farmer meetings and elevator training in the fall of 1988. Questions on agronomic practices and handling problems were primarily addressed.

The purpose of these meetings was not only to share information, but also to gather the viewpoints of producers and elevator operators on the potential of canola in their areas, according to Horn. Meetings were conducted in targeted growing areas of Indiana, Ohio, Illinois, Tennessee, Mississippi and Georgia. However, the crop has been grown as far south as Florida and as far east as Maryland, Virginia and North Carolina.

Modifications Completed

In October 1988, plant modifications were completed and USCP purchased 80% of the crop grown east of the Mississippi River, or about 25,000 tons. A variety of unrefined and refined products are now available from USCP, with the main product being refined, bleached canola oil. Other products include canola meal, frying shortening and salad oil (see Figure 10, 11, 12). Cost of canola oil refinement is similar to that of soybean oil. However, the cost of processing runs much higher than that of soybeans, because the additional oil in canola increases extraction costs. Soybeans yield approximately 18% oil, compared to canola's yield of 40%.

Numerous commercial and industrial food companies are customers of USCP. Horn describes canola oil interest as "booming" and remains optimistic about the future. He says, "It takes awhile for canola oil to be tested in products, labels to be made and advertisements to be released. It's a long time between the decision to use canola oil and putting a product on

the shelf. So there is a lot of business coming, that's somewhere in the preparation process now."

The US Supply Situation

Because domestic supplies were short in 1990, USCP was forced to source additional canola from Poland to meet its crushing requirements. "We really tried to get the supply up in the United States. But , crushing needs were high, so we began exploring alternatives," comments Horn. "We're hopeful supplies will improve domestically in the future."

Three seed companies, Ameri-can Pedigreed Seed, Canola, Inc. and Allelix, market less than 20 winter and spring canola varieties to US producers. Ameri-can Pedigreed Seed, a subsidiary of Calgene located in Memphis, TN, manages the largest domestic research program. The company maintains nine breeding locations and 26 yield trials throughout 13 states, spanning an area from Georgia to Michigan and New York to Iowa. Biotechnology support work is provided by Calgene. Canola, Inc., a subsidiary of Cargill, has established several sales and agronomy offices in the Midwest and South. Allelix, a major Canadian canola seed supplier, has marketed in the United States in small quantities for several years. The company was recently purchased by seed corn giant Pioneer Hi-Bred, International and Allelix's impact on the US canola market may change.

DNA Plant Technology Corporation (DNAP) of New Jersey, a leader in agricultural biotechnology, is also investing in the development of edible oils with superior health benefits. The company's canola research, in conjunction with DuPont, has advanced from the laboratory to the field where new varieties were tested at more than 30 test sites in 1989. DNAP has established a breeding station in the Northwest and has begun to service contract growers in this region. This year the company should have adequate supplies of differentiated canola oil samples available for testing by potential industrial customers. The company hopes to be a strong innovator and leader, both as a seed supplier to producers and as a canola producer for oil users.

Although available canola varieties are adapted for wide agronomic regions, producers face a limited selection of varieties possessing characteristics desirable for their specific conditions. Eric Rey, General Manager of Ameri-can Pedigreed Seed, believes that domestic research programs will expand the number of available varieties, while bringing average US yields up to Western European levels of 60 bushels per acre by the end of the 1990s.

Another problem Midwest farmers face in producing canola is the lack of delivery points. Elevators willing to receive the crop often are scarce and considerable distances away from the producer's fields. Forward contracts have not been available in most areas and producer's risk uncertain prices at the time of delivery. Lack of experience with the crop at elevators had resulted in high dockage charges, further reducing the attractiveness of the crop to potential producers. The number of delivery points in the Midwest appears to be increasing. As of November 1990, USCP was offering forward contracts for June/July 1991 delivery at \$215 per ton (approximately \$5.38 per bushel).

Evaluating the Future

"Everything's in place," says Horn. "We have a favorable farm bill, new grading standards that will soon be effective, an interested food processing industry and a growing number of producers."

But, Horn realizes that it is risky to be over optimistic in a new situations. USCP was established in response to the apparent growing demand for canola, based on the oil's healthful benefits. Recent studies still support canola's heathy attributes, when compared to other vegetable oils, but new evidence indicates that the role of monosaturated fats has been over estimated. It is uncertain how consumers and the food industry will respond to this type of new information.

Producer interest appears to be on the rise. USCP is very enthusiastic about the potential of the new Farm Bill for promoting oilseed crops, especially canola. Although the Farm Bill may open available acreage for canola, soybean and wheat prices will continue to play a major role in planting decisions, along with the number of available delivery points.

Competition within the canola processing industry, itself, is bound to increase. USCP was the first canola processing and refining facility established in the United States, but other companies, such as DNAP, have begun to enter the market as demand for canola oil increases. In fact, Archer Daniels Midland crushed canola seed at its Augusta, Georgia oilseed facility in the fall of 1990. Also, the 1989 Canada Free-Trade Agreement is expected to act as an incentive for US canola processing. Tariffs on imported canola seed and meal are already being phased out. Currently, canola seed duties have dropped to \$5.71 per metric ton from \$9.00. Canola meal carries a tariff of less than \$2.00 per metric ton. This situation is predicted to promote canola crushing and encourage the canola processing industry in the United States, creating competition for USCP. However, the agreement may negatively impact acreage in the United States. High canola/rapeseed subsidy prices also make Europe a strong competitor for interested U.S. producers.

Canola oil prices do run slightly higher than soybean oil prices, but are considered very competitive given the healthful benefits associated with the product. Price of canola oil, affected by available supply, will naturally impact the degree of acceptance by the food industry.

Increasing the Domestic Supply

Although Horn feels that "everything's in place", the roadblock of producer interest in the United States continues to be a concern. USCP and the company's parents, Central Soya and Calgene, are struggling with their role in attracting producer interest. Horn has considered and is exploring a number of options.

Ameri-can Pedigreed Seed, as a researcher and supplier of canola seed in the United States, is a direct link with producers. Although USCP and Ameri-can have worked together in coordinating farmer meetings and sharing information, the two companies are, at best, recognized as corporate cousins. Horn suggests that additional synergies could be explored and developed between the two companies, which would give USCP a more direct link with

producers. Ameri-can may also reap the rewards of being associated with USCP as a guaranteed market for the crop.

Horn suggests that USCP has not fully exploited the company's affiliation with Central Soya. He feels that potential canola producers want to be assured that their marketing outlets will not disappear. Through the establishment of the Chattanooga facility, Central Soya has demonstrated a commitment to the canola industry that could be promoted to producers interested in the crop. "We're not going away tomorrow," says Horn. "That's a message that may not be clear."

Over the past year, Central Soya has increased the number of its facilities available to receive the canola crop. As Central Soya becomes recognized for their involvement in the canola market, producers will feel even more comfortable experimenting and producing the crop, according to Horn. The questions then are, how aggressively should Central Soya make facilities available and what geographic locations would be a priority? Horn admits that the geography of the crop is not fully defined. He has been surprised at areas where the crop has been well received and at others where producers show little interest.

Finally, USCP has considered contract production, where either acres or bushels of the crop are contracted before the farmer plants. Horn feels that the risks are very high. First, preferred growing areas have not been identified, so there is a great deal of uncertainty surrounding yield expectations. Second, most farmers are not experienced with the crop, limiting their ability to produce at optimal levels. Horn also is concerned that these factors would limit the ability to make an arrangement which would prove to be fair to both the producer and USCP. However, he also knows contract production would give canola the exposure that the crop needs right now and, in turn, could generate producer interest.

The company will continue to explore its options. Despite the questions and concerns, Horn views the future with the same enthusiasm that carried USCP this far. "Of course there are more roadblocks ahead. No business has guarantees," reminds Horn. "But, we have an opportunity to impact this industry from the very start. And as I said before, how often do you get an opportunity like that?"

Producer Perspective

Ralph King casually leaned against the white pickup truck while an agronomist from the FS seed company walked through the remnants of last year's production. Today, King was in the midst of trying to decide whether to plow up the thick volunteer growth that remained after the July 1990 harvest or allow the Illinois winter to take care of any problems. The volunteer plants would most likely die off in the winter, since they would be at a growth stage that could not tolerate the cold.

Although volunteer plants resulting from shattering have often been cited as a problem with canola, King viewed the thick regrowth in his 17 acre field as a benefit. He originally planted the winter crop as a soil conservation measure on land which is deemed highly erodible. The 1990 regrowth would permit King to maintain a cover crop for a second season. Canola plants grow close to the ground and produce a wide expansion of leaves which acts as a desirable cover.

King smiled and jokingly remarked to the FS agronomist, "I've been telling the boys at the coffee shop that I'm going to harvest this field again. It's only August, so I can probably keep that story going for at least another two months."

The King Enterprise

King has farmed for 20 of his 40 years. His wife, a receptionist for a nearby seed company, and his three daughters have lived near Farmer City all of their lives. King's activities are not limited to the farm and include participation in the volunteer fire department, church committees and he also serves as president of the DeWitt County Farm Bureau

King rents 717 acres and owns 33 acres, totalling a farm size of 750 acres. Even though he describes himself as a traditional farmer, in that most of his production is corn, soybeans and wheat, he does consider himself a bit of a "rebel" when it comes to new crops. King admits to actively looking for other opportunities. His most recent experiment prior to canola was in 1988 when he planted several acres of oats, a new crop to him. He proudly relates his oat experience by saying, "It was a beautiful crop - fantastic yields.... too bad there was no price."

King's interest in canola was initially sparked by two friends in the western part of the county, who were also looking at alternative crops. His primary objective was to find a crop that would satisfy his soil conservation objectives, however King was also attracted to canola for its summer cash flow potential. After hearing more about canola oil, learning that the production technology was similar to wheat, and locating seed through the FS seed dealer, King planted his first crop on September 6, 1989, on 18 of the 33 acres he owns.

Looking Back on the 1989/90 Production Season

King's efforts produced a yield of 44 bushels per acre and he was able to sell his crop for \$5.11 per bushel. Because of an 11% moisture level and some damaged kernels, King's delivery averaged 40 bushels per acre. This resulted in a return of \$204.40 per acre or \$3679.20 for the entire crop. Production costs totalled \$118.00 per acre (see Figure 13).

When King compared these costs with his winter wheat, he discovered the only difference was that wheat seed averaged about \$7 per acre less than did canola seed. Other production costs, such as labor, management, storage and equipment remained comparable between the two crops.

King's wheat yielded 46 bushels per acre (state averages normally fall between 60 and 70 bushels per acre) and he received less than \$3.00 per bushel at harvest. Keeping all costs constant between the two crops, except for the cost of wheat seed, King spent \$111.00 per acre on his wheat production, and received less than \$138.00 per acre for his efforts. By comparing the two crops, King calculated a \$59.00 per acre gain on his canola verses wheat.

However, King did face a number of frustrations when he harvested his canola crop in July. He knew before planting that there were a limited number of elevators available that would take his canola crop. His nearest canola receiving elevator was located in Lincoln, IL,

approximately 45 miles away. King estimates his transportation costs neared \$.07 per bushel, reducing the per acre return by about \$3. His only other cost was a roll of duct tape he used to seal cracks in the combine and truck. Canola seed is only about 1/16 of an inch in size. Duct tape is commonly used to preventing it from flowing through small leaks.

Because canola is priced at the close of the marketing day, King received a price of \$5.11 per bushel. However, when he arrived at Lincoln in the morning, prices had been \$5.45. King did not have any green seed or garlic.

Looking to the Future

Although his first year experience was favorable, there a number of opportunities and challenges that confront King and other innovative producers. These issues affect both production and marketing.

With respect to production, canola yields have been increasing, with gains of 5% to 6% per year among similar producers. Some experts feel that with the right mix of cultural practices, canola yields could exceed 60 bushels per acre. Canola is normally planted in late August to mid-September. Producers normally plant canola on corn silage stubble, wheat stubble or set aside acres. Because corn and soybean harvest normally occurs late in the fall season, it is difficult to follow either of these two crops with canola. Also, In the spring canola matures relatively rapidly, therefore, it can be harvested two weeks before the normal wheat harvest. This provides the possibility of double cropping with soybeans.

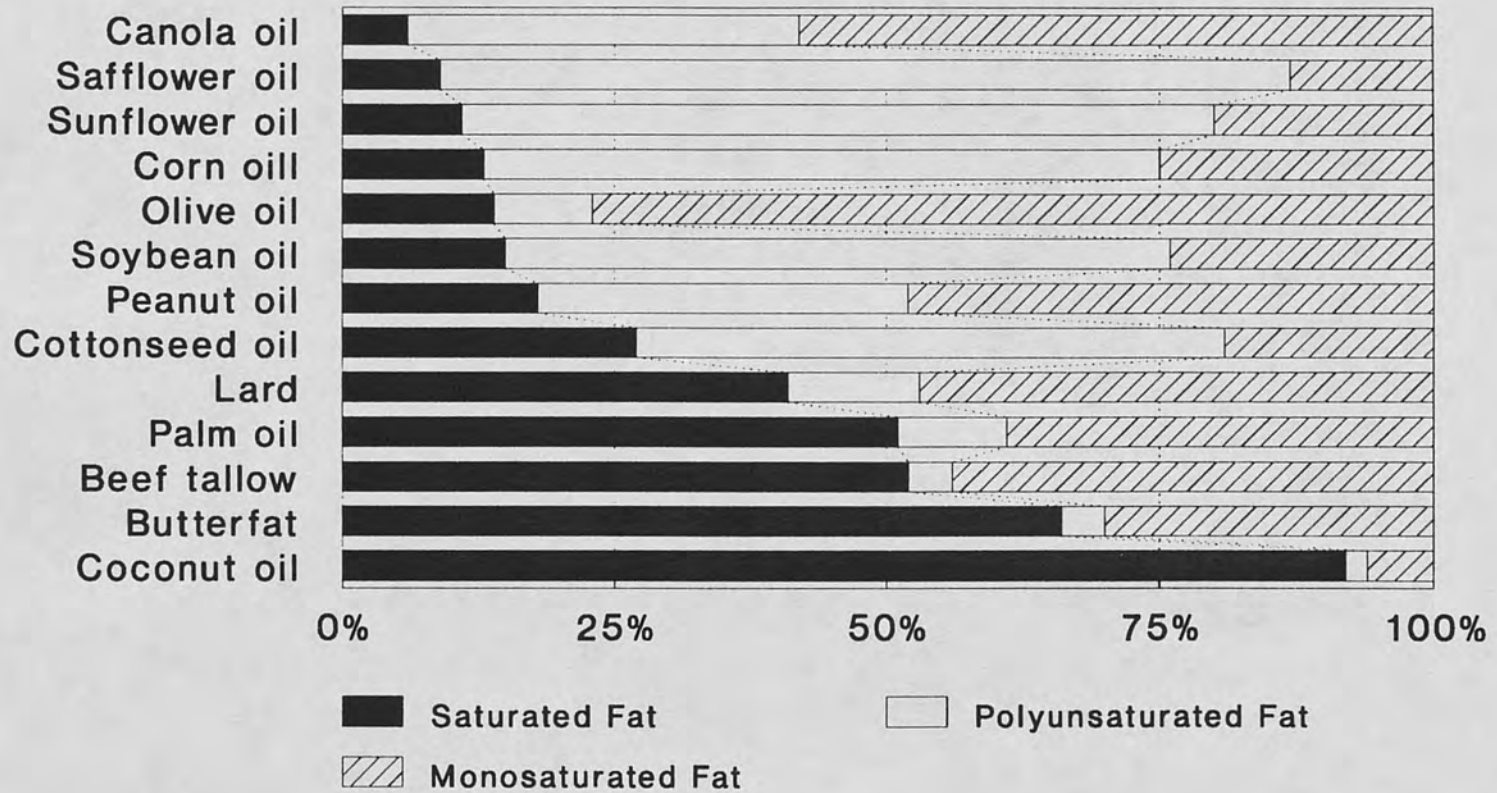
With respect to marketing, the geographic areas best suited to canola production in the United States have not been well-defined. Fall-planted varieties are still being testing throughout the mid-South and southern parts of the Corn Belt. Marketing opportunities are likely to be best where the largest concentration of production develops.

Market availability has been volatile. For example, the number of Illinois and Indiana elevators accepting canola increased from two in 1988 to 25 in 1989, but dropped back to six in 1990 (see Figure 14). Dockage at the elevator depends on the percent of green seed, moisture, and garlic. Because of the newness of the crop, elevators which began to handle the crop initially deducted as much as \$1.00 per bushel for garlic. Recently these dockage charges have declined to about \$.25 per bushel. It is rumored that production contracts may be offered in the future by some processors. Such contracts would guarantee a price for specified amounts of production prior to planting.

In the long-run, producers such as King are considering whether there will be an increased demand for the crop due to the healthful qualities of the oil. Even though a strong domestic demand might create additional processor interest in the crop, Europe and Canada will remain strong competition for local producers, in both experience and price.

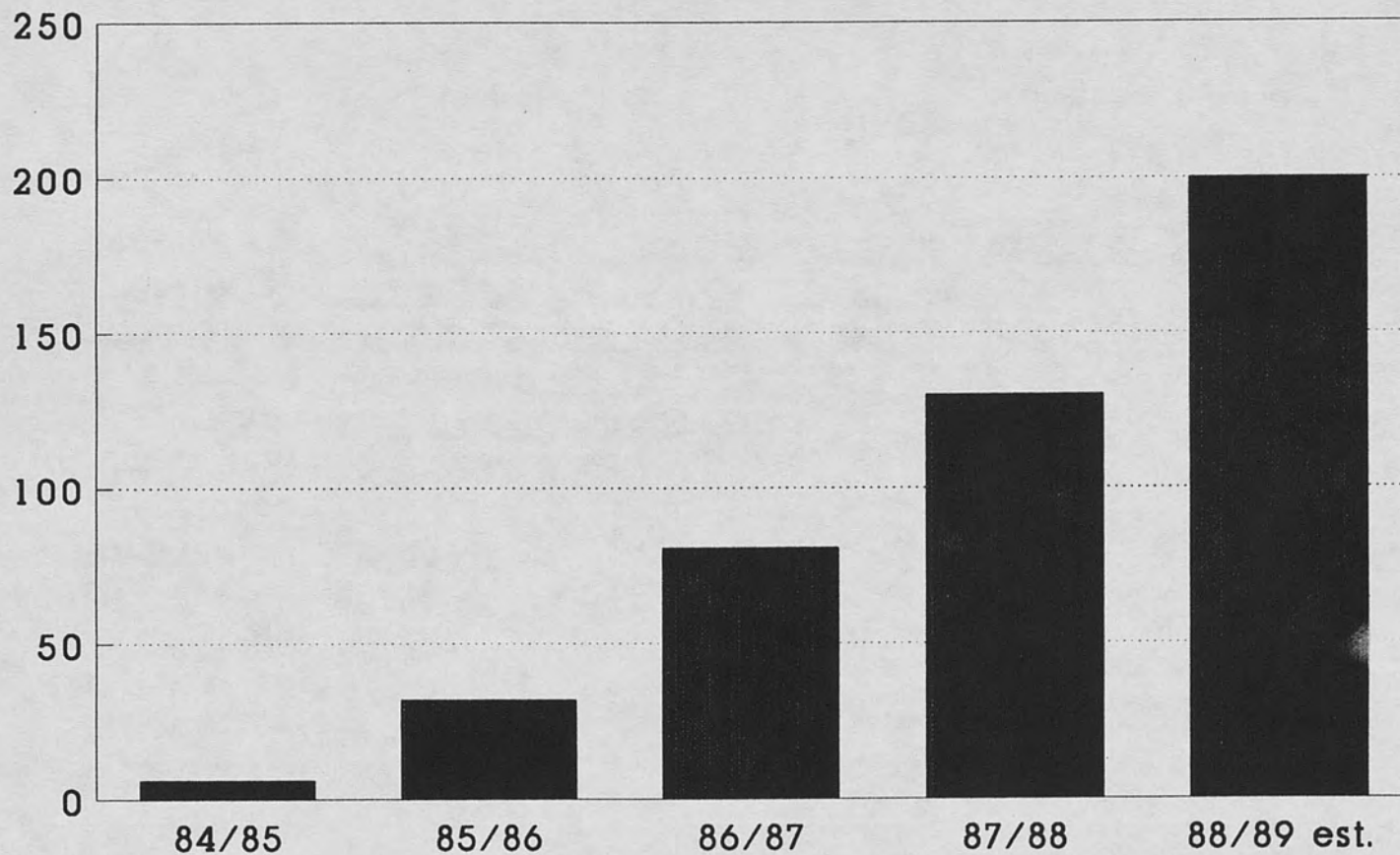
A more optimistic view is that innovators like King may be gaining valuable experience with the crop now. Today's canola producers may find themselves in a strong position in the future as canola demand increases, processor interest is sparked, and marketing channels develop.

Figure 1
Comparison of Dietary Fats



Source: Agricultural Handbook No.8-4 and Human Nutrition Information Service, USDA Washington D.C. 1979.

Figure 2
U.S. Canola/Rapeseed Oil Imports
(million of metric tons)



Source: World Markets, Cargill Bulletin,
July 1989.

Figure 3
Puritan Oil Advertisement

The facts for life.

PURITAN OIL (Canola Oil)	6%
Corn Oil	13%
Olive Oil	14%
Veg. Oil (Soybean)	15%
Margarine	18%
Veg. Shortening	26%
Butter	54%

A SCALE OF SATURATED FAT.
 These numbers represent % saturated fat of total fat content. Values are typical; individual products may vary.

It's smart to lower saturated fat in your diet every way you can. Diets high in saturated fat can raise blood cholesterol. And high levels of blood cholesterol raise the risk of heart disease.

Compare corn oil, olive oil and butter with Puritan® Oil. Puritan is lowest in saturated fat. In fact, it's 94% saturated fat free. Switching your cooking oil is one small step you can take to help yourself and the people you love reduce saturated fat in their diet. It's never too soon to know the facts for a healthier, happier life.

Puritan®
Make it your oil for life.

For an information guide on how to lower blood cholesterol by reducing saturated fat in your diet, write to Puritan Oil Cholesterol Guide, P.O. Box 9962, Maple Plain, MN 55359. Enclose \$1.00 postage & handling for each booklet requested (limit 3). Offer expires 3/1/91.



Source: Better Homes and Gardens

Figure 4
World Rapeseed Production*

Region	1982/83-86/87	1987/88 average	1988/89	1989/90
	1,000 MT			
World	16,902	23,231	22,530	21,499
Canada	3,107	3,847	4,311	3,164
EC	3,178	5,952	5,200	4,959
Eastern Europe	1,700	2,172	2,193	2,469
India	2,635	3,240	4,200	3,500
China	5,128	6,605	5,044	5,600

1 MT approximates 2,250 pounds or 45, 50 pound bushels.

*US production equals less than 1 percent of world canola production.

Source: USDA/FAS

Figure 5
Rapeseed's Oil Share of World Oilseed Production and Consumption

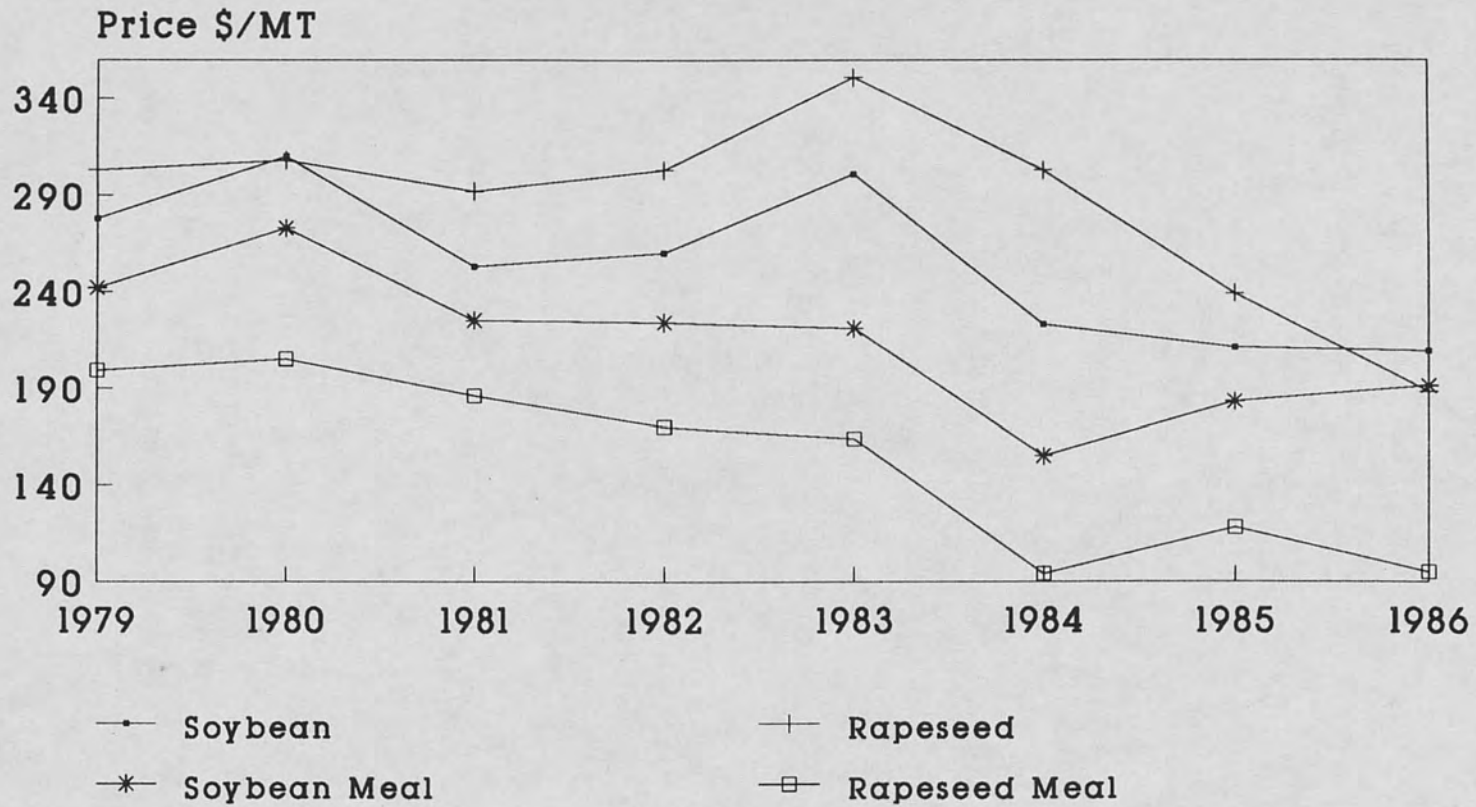
Region	1982/83-86/87	1987/88	1988/89 average	1989/90
Oilseed Production^{1/}				
<i>World</i>	9.10%	11.20%	11.20%	10.00%
<i>US</i>	na	na	na	na
Vegetable Oil Consumption				
<i>World</i>	12.30%	13.80%	13.70%	12.80%
<i>US</i>	0.46%	2.01%	3.31%	3.27%

na= not available..

1/ Refers to harvested oilseed crop.

Source: USDA/FAS

Figure 6
 World Oiseed Prices
 World Oilseed Meal Prices



Source: USITC Publication 2045.
 December 1987.

Figure 7
Canola Processing Stages

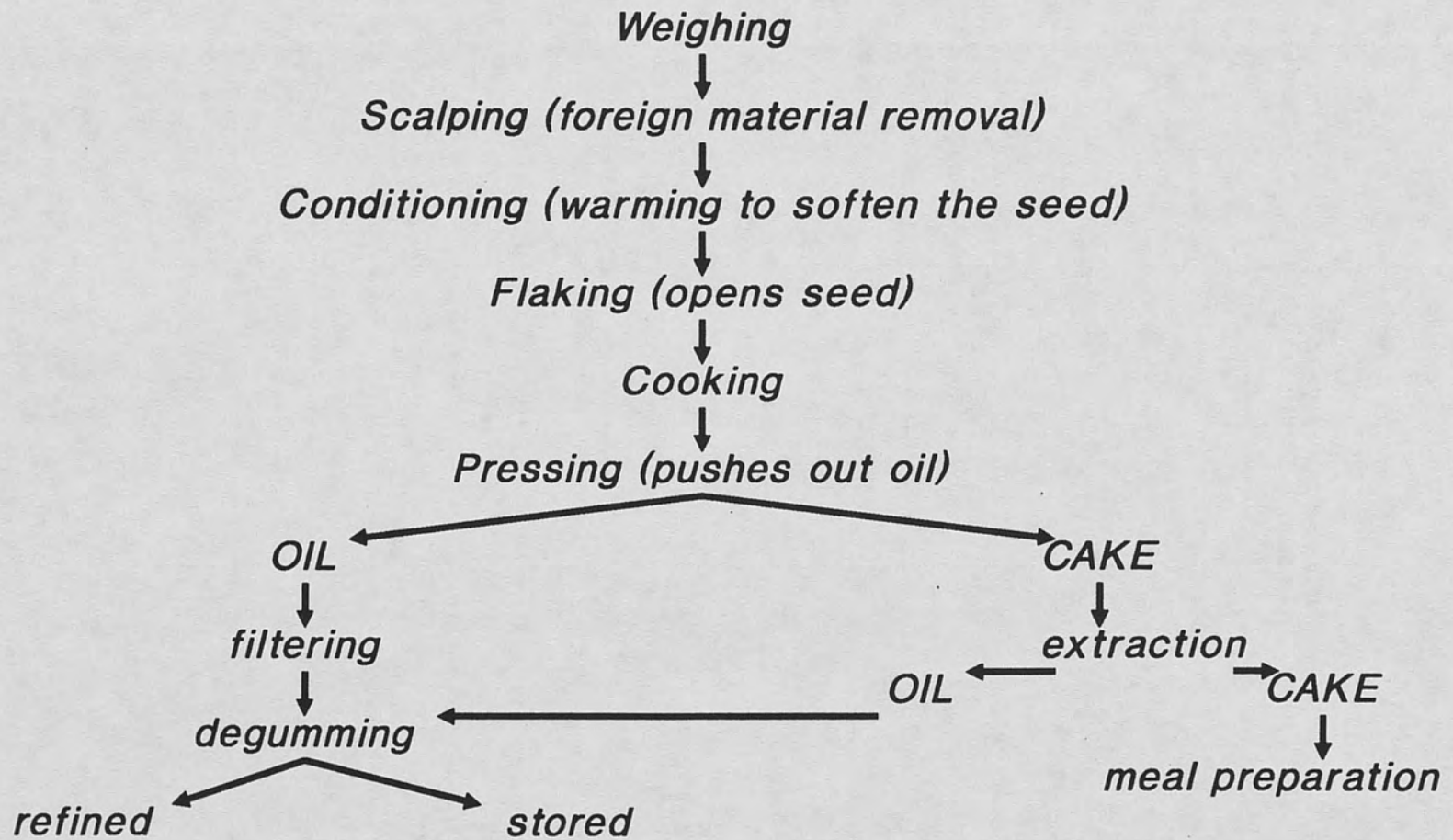


Figure 8
Proposed US Canola Grades and Grade Requirements

Grade	Maximum Limits of Damaged Kernels		Total (%)
	Heat Damaged (%)	Distinctively Green (%)	
U.S. No. 1	0.1	2.0	3.0
U.S. No. 2	0.5	6.0	10.0
U.S. No. 3	2.0	20.0	20.0

Grade	Maximum Limits of Conspicuous Admixture			Total (%)
	Ergot (%)	Sclerotinia (%)	Stones (%)	
U.S. No. 1	0.05	0.05	0.10	1.0
U.S. No. 2	0.05	0.10	0.10	1.5
U.S. No. 3	0.05	0.15	0.10	2.0

Grade	Maximum Limits of ----- Other Material -----				
	Inconspicuous Admixture (%)	Dockage (export only)	Glass (count)	Animal Filth (count)	Unknown Foreign Substances (count)
U.S. No. 1	5.0	2.0	0	3	1
U.S. No. 2	5.0	2.0	0	3	1
U.S. No. 3	5.0	2.0	0	3	1

**Figure 9
U S Canola Processing Official Discount Schedule**

Canola seed is a member of the rapeseed family. In order to be designated as canola, the oil in the seed must contain less than 2% erucic acid, and the solid component must contain less than 30 micro moles of glucosinolates. Standard canola bushel weight is 50 lbs.

Moisture Grades	Drying and Shrink Charge Discount % of Contract Value/Ton
9.1 to 9.5	1%
9.6 to 10.0	2%
10.1 to 10.5	3%
10.6 to 11.0	4%

Dockage: All dockage will be deducted from the gross weight and there will be no compensation for the material. Dockage includes, but is not limited to, stones, ergot (fungus), sclerotinia (fungus), insect excreta, garlic and inseparable foreign material which is easily visible. Dockage also includes underdeveloped, shriveled and small pieces of canola seed.

In addition to being deducted from the weight, any garlic bulbs in excess of 6 per 1000 gram sample will be discounted at 20 cents per bulb/per ton. The maximum garlic discount taken will be \$10.00 per ton.

Foreign Seed: All foreign seed will be deducted from the gross weight and there will be no compensation for the material. Foreign seed is any seed which is difficult to distinguish from canola. This includes, but is not limited to, wild mustard seed. Foreign seed is deducted from the weight in addition to dockage.

Damage Grade	Discount/Ton	Heat Damage Grade	Discount/Ton
2.0 % or less	-	0.1% or less	-
2.1 to 3.0	1.20	0.2 to 1.0	2.00
3.1 to 4.0	2.40	1.1 to 1.5	4.00
4.1 to 5.0	3.60	1.6 to 2.0	6.00
5.1 to 6.0	4.80		
6.1 to 7.0	6.00		
7.1 to 8.0	7.60		
8.1 to 9.0	9.20		
9.1 to 10.0	11.20		

Distinctively Green Discount	Discount/Ton	Other	Discount/Ton
2.0% or less	-	Musty	4.00
2.1 to 6.0	2.40	Sour	4.00
6.1 to 10.0	4.80	Heating	4.00
10.1 to 15.0	8.00	Weevily	4.00
Over 15%, discount at buyer's discretion			

Erucic Acid: The erucic acid content in the canola oil must be 2.0% or less. Oil containing greater than 2.0% is subject to rejection or discount at the buyer's discretion. Grade appeals to be determine by gas chromatography.

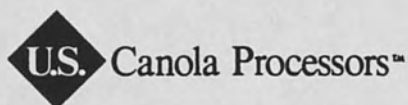
Glucosinolate: Glucosinolate content of the meal must be 30 micro moles/gram or less. Glucosinolate content in the canola meal in excess of 30 micron moles per gram is subject to rejection or discount at buyer's discretion. Grade appeals to be determined by gas chromatography.

All discounts and grading fees subject to change without notice.

Revised 11/9/89.

Figure 10
Canola Meal Product Data Sheet

Product Data Sheet



CANOLA MEAL

U.S. Canola Processors, a joint venture between Calgene, Inc., an agricultural biotechnology company, and Central Soya Company, Inc., has available Canola Meal at the Chattanooga multi-purpose facility.

Canola Meal shall be the product of the solid residue of canola seed containing not more than 30 micromoles of glucosinolates. This residue results from the processing of commercial canola seed by an expeller-solvent and/or solvent extraction method. Standard specifications are as follows:

<u>Characteristic</u>	<u>Specification</u>
Protein.Minimum 35.0%
Fat.Minimum 1.0%
Fiber.Maximum 14.0%
MoistureMaximum 12.0%
Glucosinolate, micromoles per gram sample. . .	.Maximum 30

Effective 11/14/89

A Joint Venture between Calgene, Inc. and Central Soya Co., Inc.

Figure 11
 Canola Frying Shortening Product Data Sheet

Product Data Sheet



U.S. Canola Processors™

CANOLA FRYING SHORTENING

DESCRIPTION

U.S. Canola Processors lightly hydrogenated canola shortening is designed to be a fluid shortening at room temperature for handling convenience while still having excellent fryer stability.

APPLICATIONS

Canola frying shortening is especially suited for light frying in snack food and institutional applications, and in baking applications.

<u>Analytical Test</u>	<u>Specifications</u>	<u>Typical Values</u>
Color (Lovibond)	1.5 Red maximum	1.0 Red
Free Fatty Acid	0.05% maximum	0.025%
Peroxide Value meq/kg	1.0 maximum	0-0.1
Moisture (%)	0.1 maximum	0.03
Iodine Value	87-93	90
Flavor	Bland	Bland, free from any off odor

TYPICAL COMPOSITION DATA

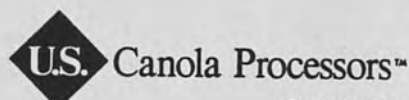
Capillary Melting Point	72-76 F.	Average Fatty Acid Composition:	
AOM (hrs to 100 P.V.)	70 minimum		
Viscosity @ 130 F.	16.6 cP	Saturated	9.5
Density/Specific Gravity @ 130 F.	.876 g/cm ³	Monounsaturated	75.0
Weight per Gallon @ 130 F.	7.3 pounds	Polyunsaturated	15.5
Smoke Point	450-460 F.		
Flash Point	625-635 F.		
Fire Point	650-660 F.		

This information is presented for your consideration in belief that it is accurate and reliable; however, U.S. Canola Processors makes no warranty as to the use or sale of this product in combination with other materials, or in the operation of any process where such use or sale or process operation is not in conformance with its product specifications or product use recommendations.

A Joint Venture between Calgene, Inc. and Central Soya Co., Inc.

Figure 12
Canola Salad Oil Product Data Sheet

Product Data Sheet



CANOLA SALAD OIL

DESCRIPTION

U.S. Canola Processors canola salad oil is a liquid vegetable oil which has a bland flavor and remains clear at refrigerated temperatures.

APPLICATIONS

Canola salad oil can be used in the preparation of salad dressing, mayonnaise, and sauces. It can also used for light frying; and in the baking industry for breads, doughnuts, and pancake mixes.

<u>Analytical Test</u>	<u>Specification</u>	<u>Typical Values</u>
Color (Lovibond)	1.5 maximum	1.0
Free Fatty Acid	0.05% maximum	0.025%
Peroxide Value meq/kg	1.0 max. as received	0-0.1
AOM (hrs to 100 P.V.) (without stabilizer)	12 minimum	15
Cold Test (clear and brilliant @ 32 F.)	15 hrs. minimum	20-24 hours
Flavor	Bland	Bland, free from any off odor
Moisture	0.1% maximum	0.05%
Erucic Acid	2.0% maximum	0.5%

TYPICAL COMPOSITION DATA

Iodine Value	105-120	Average Fatty Acid Composition:	
Viscosity @ 70 F.	60 cP	Saturates	7.0
@100 F.	28 cP	Monounsaturates	62.0
@130 F.	15 cP	Polyunsaturates	31.0
Density/Specific Gravity			
@ 70 F.	0.918 g/cm ³		
@100 F.	0.906		
Weight per Gallon @ 60 F.	7.7 pounds		
Smoke Point	450-460 F.		
Flash Point	625-635 F.		
Fire Point	650-660 F.		

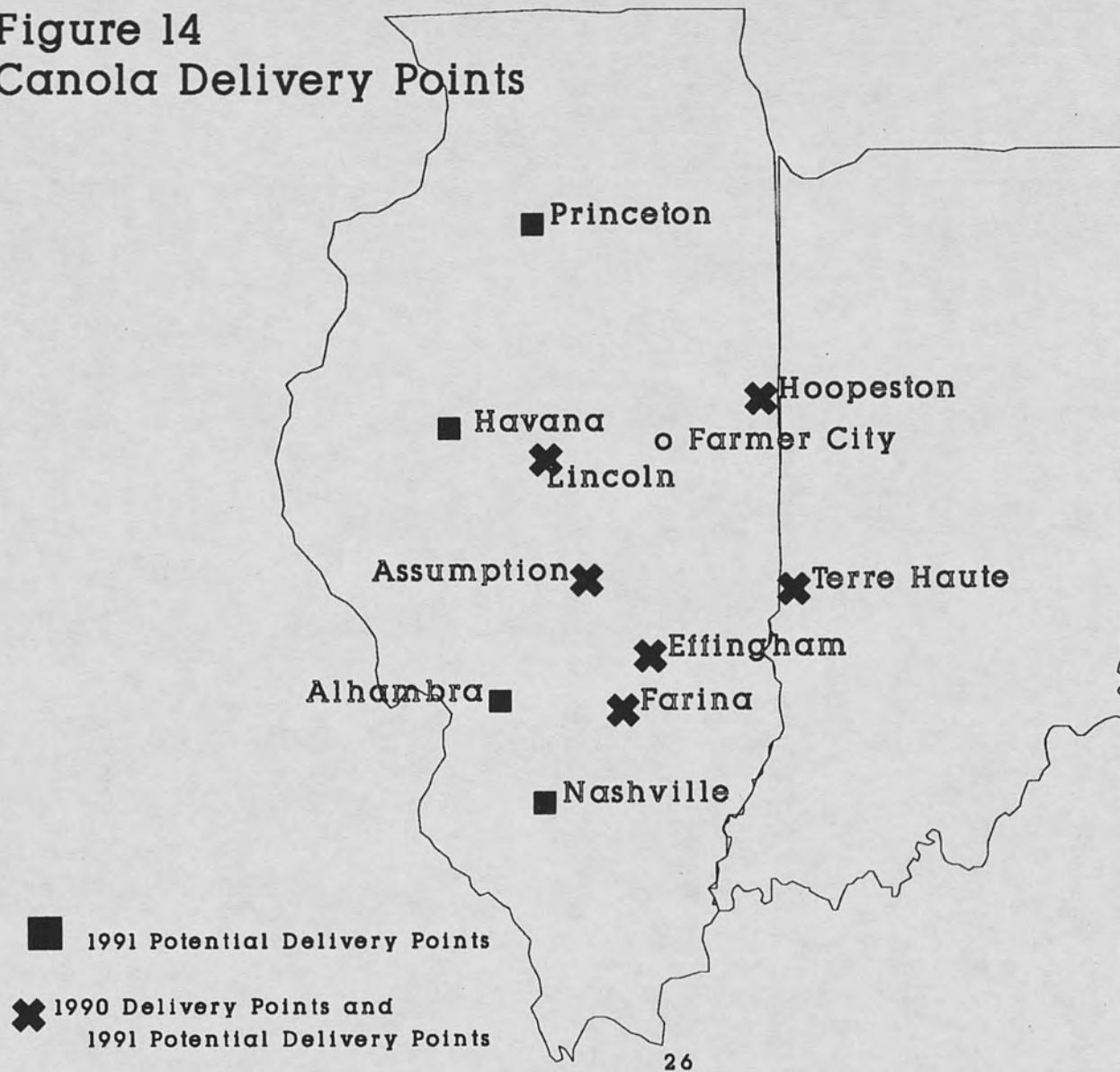
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A Joint Venture between Calgene, Inc. and Central Soya Co., Inc.

**Figure 13
King Farm -- Costs of 1989/90 Canola Production Season**

	CANOLA	WHEAT
Seed	\$ 18.00/acre	\$11.00/acre
Tillage	\$ 15.00	comparable
Fertilizer	\$ 60.00	comparable
Nitrogen		
Potash		
Sulphur		
Phosphorus		
Pest Control/Herbicides	\$ 0.00	comparable
Harvest	\$ 25.00	comparable
Total Costs/acre	\$118.00	\$111.00
Return/acre	\$204.40	\$138.00
Profit/acre	\$86.40	\$27.00

Figure 14
Canola Delivery Points



PRIVATE STRATEGIES, PUBLIC POLICIES & FOOD SYSTEM PERFORMANCE

Working Paper Series

Purpose: The NE-165 Working Paper Series provides access to and facilitates research on food and agricultural marketing questions. It is intended to be a publication vehicle for interim and completed research efforts of high quality. A working paper can take many forms. It may be a paper that was delivered at a conference or symposium but not published. It may be a research report that ultimately appears in full or abbreviated form as a journal article or chapter in a book. Using the working paper series enables a researcher to distribute the report more quickly and in more extensive detail to key research users. A working paper may also be an end product in itself, for example, papers that collate data, report descriptive results, explore new research methodologies, or stimulate thought on research questions.

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