45

AN ECONOMIC PROFILE OF THE ONTARIO SOYBEAN INDUSTRY

by Karl D. Meilke

School of Agricultural Economics and Extension Education
Ontario Agricultural College
University of Guelph

December 1984 AEEE/84/9

AN ECONOMIC PROFILE OF THE ONTARIO SOYBEAN INDUSTRY

Karl D. Meilke

School of Agricultural Economics and Extension Education
Ontario Agricultural College
University of Guelph

ISSN 0229-6217

December 1984

AEEE/84/9

PREFACE

The purpose of this paper is to present an overview of the Ontario soybean industry as it evolved between the early 1970's and early in 1983. In addition, projections of the growth potential of the Ontario soybean industry over the next five to ten years are analyzed and discussed. Most of the data and information contained in the report are taken from published sources. Nevertheless, to the best of the author's knowledge no single report contains information on the production, marketing and processing of Ontario soybeans, as well as its relationship to the international oilseed and products market. As such this report should be of interest to all participants in the Ontario soybean industry.

The preparation of this study was funded by the Ontario office of the Ontario Regional Development Branch, Agriculture Canada and was completed in March 1983. Following completion of the report funds were provided by the Ontario Ministry of Agriculture and Food, through its research contract with the University of Guelph, to publish the study. Some minor updating of the study was undertaken during the summer of 1984, but the report basically describes the industry as it existed early in 1983.

Special thanks are due Dr. John Meek (Agriculture Canada) who developed the broad outline of this study and made many useful observations on its content. As well, Dr. John Groenewegen (Agriculture Canada) and Dr. Murray MacGregor (University of Guelph) reviewed the manuscript and provided numerous useful comments prior to its publication. The author is, however, responsible for any remaining errors of fact or interpretation.

Karl Meilke
October 1984

EXECUTIVE SUMMARY

1. Soybeans represent over 50 percent of total world oilseed production and close to 80 percent of world trade in oilseeds.

2. World soybean meal trade accounts for more than 70 percent of total protein meal trade, but the market share of soybean oil is less than 30 percent. This is due to the relatively low oil content of soybeans and the importance of tropical vegetable oils in world trade.

3. Canada is a net exporter of oilseeds and oilseed products, with the value of net exports equaling 365 million dollars in 1982. Canada was, however, both a gross ($242.3 million) and a net ($85.5 million) importer of oilseed products in 1982.

4. Measured in terms of farm cash receipts soybeans are one of Ontario's most important crops. Between 1975 and 1981 soybeans share of Ontario farm cash receipts increased from 5.1 to 9.4 percent.

5. Soybean production in Ontario increased from 0.217 million bushels in 1941, to 10.4 million bushels in 1970, to a record 31.2 million bushels in 1982 as a result of both area and yield increases. Under favorable economic and weather conditions Ontario soybean production could reach 45 million bushels by the early 1990's, based on 1.2 million acres harvested and an average yield of 38 bushels per acre.

6. Historically, soybean production in Ontario has been located in the five most Southern counties. However, production outside the five traditional counties is expanding rapidly from 1.8 percent of total production in 1972, to 12.1 percent in 1981, to 23.3 percent in 1983.

7. Over 30 percent of the farms growing soybeans, in the five traditional soybean producing counties, planted more than 78 acres of soybeans in 1981.

8. The variable costs of producing soybeans in Southern Ontario and the United States, on a per acre basis, are very similar. In 1980, total variable costs of production in Southern Ontario were estimated to be $95.33/acre and in the United States $97.26/acre.

9. Average soybean yields in Ontario are projected to increase to 38-40 bushels per acre by 1990.

10. Soybean prices in Ontario generally follow world price trends as established on the Chicago futures market.

11. On average, soybean prices increase from their harvest low in September, to their peak in the following July or August. However,

this price pattern is not consistent from one year to the next which creates marketing problems for soybean producers.

12. Soybean producers can choose from a wide variety of marketing alternatives, represented by, but not restricted to, (a) cash sales, (b) fixed price forward contracts, (c) deferred pricing, basis or option contracts, (d) hedging and (e) replacing physical soybeans with a long position in the futures market. However, for producers to benefit from the selection of marketing options available, research and educational programs are needed to help producers select the marketing strategy that best fits their financial and risk bearing situation.

13. On average, simple hold and store strategies for marketing soybeans were not very successful in increasing the price producers could receive for their corn. More sophisticated marketing strategies, such as those analyzed by Martin and Hope, however, have the potential to increase producers returns. More research on farmer marketing strategies is clearly warranted.

14. Ontario has three soybean crushing plants with an estimated crushing capacity of 47 million bushels per year. This should provide sufficient crushing capacity for the near future.

15. In 1982/83, 40.2 percent of the soybeans crushed in Ontario were imported, with nearly all of these imports coming from the United States. Canada does, however, export small quantities of soybeans, primarily to Asia for human food consumption.

16. The demand for high protein feed supplements has grown rapidly over the 1970's. Between 1970/71 and 1982/83 the domestic demand for soybean meal nearly doubled, while the demand for canola meal increased by two and one-half times. The demand for canola meal has expanded, relative to soybean meal over the 1970's, until in 1982/83 about one tonne of canola meal was fed for every 3 tonnes of soybean meal.

17. In 1982/83, about one-third of Canada's soybean meal demand was imported, with about one-half of the imports going into Western Canada. Consequently, it appears that there is still some opportunity to increase soybean crushings to gain the value-added, even if the soybeans must be imported.

18. The demand for canola oil in Canada has grown rapidly over the 1970's, and as a result the demand for soybean oil has been dampened. In 1970/71, soybean oils share of the total vegetable oil market was 40.7 percent and canola oils 28.4 percent; by 1981/82 the shares were 33.2 and 51.4 percent, respectively. This change has occurred as a result of improvements made in canola oil, and because it normally sells for 1-2 cents/pound less than soybean oil.

19. As a result of expansions in soybean crushing capacity, and competition from canola oil, Canada is presently a net exporter of soybean oil.

20. It has been proposed that the freight rates on canola oil and canola meal, moving east from Thunder Bay be increased from minimum compensatory rates to commercial rates. If this happens there will probably be an increase in canola crushing capacity in Ontario and a decrease in soybean crushing.

21. The United States, Brazil and Argentina are the world's major exporters of soybeans, while the European Community and Japan are the major importers.

22. Brazilian soybean production has recently stabilized around 15 million metric tonnes (mmt) and their long-run production potential is estimated at 20 mmt. Most of the Brazilian soybean crop is crushed domestically. If soybean production reaches 20 mmt, soybean meal exports may reach 10 mmt and soybean oil exports 1.3 mmt.

23. Argentina, currently the world's second largest soybean exporter, is beginning to crush a larger proportion of its crop domestically and its exports of soybean meal and oil will expand at the expense of soybean exports.

24. Japan is the largest single country importer of soybeans. The domestic demand for soybean meal and soybean oil has, however, grown only modestly since the late 1970's.

25. Both Brazil and Argentina follow policies designed to encourage exports of soybean meal and oil instead of soybeans. These policies raise the price of soybeans and lower the price of oil and meal, thus making it more difficult for an unsubsidized processing industry, such as Canada's, to compete on the world market.

TABLE OF CONTENTS

TABLE OF CONTENTS continued

LIST OF TABLES

LIST OF TABLES continued

LIST OF TABLES continued

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.1 The Role of Soybeans and Soybean Products in the World Oilseeds Market

Soybeans are but one of a number of oilseeds produced in the world. Soybeans are, however, by far the most important oilseed averaging over fifty percent of total world production between 1980/81 and 1983/84 (table 1.1). Cottonseed, peanuts, sunflowerseed and rapeseed are also important oilseeds but their shares of world production are small in comparison with soybeans.

The dominant role of soybeans is even more apparent when attention is focused on world oilseed trade. Since 1980/81 soybeans have been responsible for close to 80 percent of world trade in oilseeds. Rapeseed, recently the second most important oilseed in world trade had a market share of only 8.1 percent in 1983/84. Of the remaining oilseeds only sunflowerseed has recently had a share of world oilseeds trade in excess of five percent.

Turning to the world protein meal market the dominance of soybean meal is even more apparent than for oilseeds, with a production share greater than 60 percent (table 1.2). This is largely due to the fact that soybeans contain a high percentage of meal relative to oil. Cottonseed meal and rapeseed meal, together with soybean meal, account for about 80 percent of the world's protein meal production.

Soybean meal is by far the most important protein meal traded with a market share of over 70 percent. Fish meal is the second most important protein meal exported, but its market share is less than ten percent. Excluding soybean meal and fish meal the other seven protein meals mentioned in table 1.2 share the remaining 20 percent of world trade in fairly even proportions.

Soybeans role in the world vegetable and marine oils market is much smaller than for oilseeds and protein meals. This is largely due to the fact that (1) soybeans yield a small amount of oil relative to meal, and (2) tropical vegetable oils (palm, coconut, palm kernel) are a major factor in the world vegetable oil market. In fact, the three tropical vegetable oils accounted for 22.2 percent of vegetable oil production and 41.2 percent of exports in 1983/84, compared to soybeans 30.2 and 26.5 percent, respectively. Consequently, production and trade in vegetable oils includes a far larger number of important commodities and is influenced much less by variations in soybean production and trade than are the oilseed and protein meal markets.

The remainder of this report deals almost exclusively with soybeans and its products. The reader should keep in mind, however, that soybeans and its products are a part of a larger oilseed and products complex. While soybeans are the dominant oilseed in world production, and trade, the soybean market has been in the past, and will continue in the future to be influenced by developments in other oilseed markets. This will come as no surprise to Canadian readers who have watched the

TABLE 1.1: Major Oilseeds: World Supply and Exports, 1980/81 to 1983/84, mmt

	1980/81		1981/82		1982/83		1983/84 p/	
	Quantity	Percent	Quantity	Percent	Quantity	Percent	Quantity	Percent
Production:								
Soybean	80.9	52.1	86.0	50.6	93.3	52.2	79.7	48.5
Cottonseed	25.6	16.5	28.2	16.6	27.3	15.3	27.2	16.5
Peanut	16.1	10.4	19.9	11.7	17.6	9.8	18.9	11.5
Sunflowerseed	13.1	8.4	14.7	8.7	16.5	9.2	15.5	9.4
Rapeseed	11.1	7.1	12.4	7.3	15.1	8.5	14.6	8.9
Flaxseed	2.1	1.4	2.1	1.2	2.6	1.5	2.3	1.4
Copra	5.0	3.2	4.7	2.8	4.5	2.5	4.3	2.6
Palm Kernel	1.5	1.0	1.9	1.1	1.8	1.0	2.0	1.2
Total	155.5	100.0	169.9	100.0	178.8	100.0	164.5	100.0
Exports:								
Soybean	24.5	78.4	29.6	82.2	28.5	81.9	25.3	78.3
Cottonseed	.2	0.6	.1	0.3	.1	0.3	.2	0.6
Peanut	1.2	3.8	1.0	2.8	1.0	2.9	1.1	3.4
Sunflowerseed	1.9	6.1	2.1	5.8	1.9	5.4	1.9	5.9
Rapeseed	2.3	7.3	2.1	5.8	2.4	6.9	2.6	8.1
Flaxseed	.6	1.9	.5	1.4	.5	1.4	.7	2.2
Copra	.4	1.3	.5	1.4	.3	0.9	.3	0.9
Palm Kernel	.2	0.6	.1	0.3	.1	0.3	.2	0.6
Total	31.4	100.0	36.1	100.0	34.8	100.0	32.2	100.0

p/ Preliminary

Source: U.S.D.A. Oilseeds and Products. Foreign Agriculture Circular, FOP7-84, July 1984.

TABLE 1.2: Major Protein Meals: World Supply and Exports, 1980/81 to 1983/84, mmt

	1980/81		1981/82		1982/83		1983/84 p/	
	Quantity	Percent	Quantity	Percent	Quantity	Percent	Quantity	Percent
Production:								
Soybean	57.0	62.9	59.5	61.5	61.5	61.9	57.9	60.5
Cottonseed	9.7	10.7	10.3	10.7	9.9	10.0	10.0	10.4
Rapeseed	6.2	6.8	7.3	7.6	8.5	8.6	8.3	8.7
Sunflowerseed	5.4	6.0	5.8	6.0	6.7	6.8	6.1	6.4
Fish	4.9	5.4	5.2	5.4	4.8	4.8	5.1	5.3
Peanut	3.8	4.2	4.9	5.1	4.3	4.3	4.5	4.7
Copra	1.6	1.8	1.6	1.6	1.4	1.4	1.4	1.5
Linseed	1.3	1.4	1.2	1.2	1.3	1.3	1.4	1.5
Palm Kernel	.7	0.8	.9	0.9	.9	0.9	1.0	1.0
Total	90.6	100.0	96.6	100.0	99.3	100.0	95.7	100.0
Exports:								
Soybean	19.8	73.7	20.7	72.4	23.2	74.4	21.2	72.3
Cottonseed	.8	3.0	.8	2.8	.7	2.3	.7	2.4
Rapeseed	.8	3.0	.8	2.8	.7	2.3	1.0	3.4
Sunflowerseed	.7	2.6	.9	3.1	1.3	4.2	1.2	4.1
Fish	2.0	7.4	2.6	9.1	2.2	7.1	2.4	8.2
Peanut	.7	2.6	.6	2.1	.6	1.9	.5	1.7
Copra	1.0	3.7	1.0	3.5	1.0	3.2	.9	3.1
Linseed	.6	2.2	.6	2.1	.7	2.3	.7	2.4
Palm Kernel	.5	1.8	.6	2.1	.7	2.3	.7	2.4
Total	26.9	100.0	28.7	100.0	31.1	100.0	29.3	100.0

p/ Preliminary

Source: U.S.D.A. Oilseeds and Products. Foreign Agriculture Circular, FOP 7-84, July 1984.

TABLE 1.3: Major Vegetable and Marine Oils: World Supply and Exports, 1980/81 to 1983/84, mmt

	1980/81		1981/82		1982/83		1983/84 p/	
	Quantity	Percent	Quantity	Percent	Quantity	Percent	Quantity	Percent
Production:								
Soybean	12.9	32.3	13.6	30.7	13.1	31.0	13.1	30.2
Palm	5.2	13.0	5.6	14.1	5.4	12.8	6.3	14.5
Sunflowerseed	4.7	11.8	5.8	11.9	5.5	13.2	5.5	12.7
Rapeseed	4.0	10.0	5.3	10.8	5.1	12.1	5.3	12.2
Cottonseed	3.2	8.0	3.3	8.2	3.2	7.5	3.4	7.8
Peanut	2.8	7.0	3.2	8.4	3.1	7.3	3.3	7.6
Coconut	2.9	7.3	2.6	6.8	2.5	5.9	2.5	5.8
Olive	1.9	4.7	1.9	3.0	1.8	4.3	1.4	3.2
Fish	1.1	2.7	1.1	3.0	1.1	2.5	1.1	2.5
Palm Kernel	.6	1.5	.8	1.6	.8	1.8	.8	1.9
Linseed	.7	1.7	.7	1.4	.7	1.6	.7	1.6
Total	40.1	100.0	44.1	100.0	43.0	100.0	43.5	100.0
Exports:								
Soybean	3.4	27.0	3.7	27.1	3.6	26.4	3.6	26.5
Palm	3.4	27.0	4.0	29.4	3.9	28.6	4.0	29.4
Sunflowerseed	1.2	9.5	1.5	9.0	1.4	10.7	1.5	11.0
Rapeseed	.8	6.3	.8	6.0	.8	5.7	1.0	7.4
Cottonseed	.4	3.2	.4	3.8	.4	2.9	.3	2.2
Peanut	.3	2.4	.4	3.0	.4	2.9	.3	2.2
Coconut	1.3	10.3	1.3	9.0	1.3	9.3	1.1	8.1
Olive	.3	2.4	.3	1.5	.3	2.1	.3	2.2
Fish	.8	6.3	.8	6.0	.8	5.7	.7	5.1
Palm Kernel	.4	3.2	.5	3.0	.5	3.6	.5	3.7
Linseed	.3	2.4	.3	2.2	.3	2.1	.3	2.2
Total	12.6	100.0	14.0	100.0	14.0	100.0	13.6	100.0

p/ Preliminary

Source: U.S.D.A. Oilseeds and Products. Foreign Agriculture Circular, FOP 7-84, July 1984.

development of the Canadian canola industry.

1.2 The Importance of Soybeans in Canada and Ontario

Since 1970 Canada has been a net exporter of oilseeds and oilseed products with the value of net exports peaking at 527.7 million dollars in 1979 (table 1.4). This overall figure fails to reveal, however, that Canada is not only an important exporter of oilseeds, primarily canola, but also imports significant quantities of oilseeds, mainly soybeans. In recent years gross imports of oilseeds have averaged over 200 million dollars while gross exports have varied between 650-860 million dollars. Canada is a net importer of oilseed products (oil and meal) but the value of this trade has declined from 125-160 million dollars between 1974 and 1979 to 60-85 million dollars between 1980 and 1982.

Much of the improvement in Canada's oilseed trade has resulted from increased canola production and crushing in Western Canada (Griffith and Meilke). However, increases in soybean production in Ontario have also been important in reducing Eastern Canada's dependence on imported soybeans and soybean products. Table 1.5 shows that Canada's current trade deficit in soybeans, of 73.0 million dollars, is down from its peak of 106.9 million dollars in 1980. In terms of soybean products, Canada has been a net exporter of soybean oil since 1980, with soybean meal imports averaging slightly more than 100 million dollars since 1978. Between 1970 and 1979 Canada's trade deficit in soybeans and soybean products quadrupled, increasing from 54.5 to 227.2 million dollars. Since 1979 the trade deficit has averaged 179 million dollars, down 21.2 percent from its peak. Consequently, soybeans and its products are important import replacing commodities from a national viewpoint. Since nearly all of Canada's soybeans are grown in Ontario it is of interest to consider their importance in the province.

Table 1.6 shows that in 1960 soybeans accounted for 4.0 percent of Ontario's farm cash receipts. By 1981, soybeans share of farm cash receipts had increased to 9.4 percent, nearly double its share in 1975 of 5.1 percent.

The enhanced importance of soybeans in Ontario has resulted from both area and yield increases. Between the early 1960's and early 1980's the area planted to soybeans increased from 220,000 to 900,000 acres and yields advanced from less than 25 to more than 35 bushels per acre. This major increase in Ontario's soybean supply has been matched by growth in the use of soybeans. Soybean crushings nearly doubled between 1968/69 and 1982/83, and because of the increase in domestic supply this was accomplished with no increase in soybean imports. While still a net importer of soybeans, exports of soybeans, mainly for human consumption, have increased from about 30,000 metric tonnes (mt) early in the 1970's to around 100,000 mt in the early 1980's. Net imports of soybeans in 1983/84 are forecast to total only 195,000 mt, the lowest level since 199,000 mt were imported in 1977/78.

The picture painted by the preceding discussion is of a vibrant, rapidly growing industry which in less than twenty years has advanced from rather minor status to one of the most important cash crops in Ontario, and one of the more important import replacing crops in Canada.

TABLE 1.4: Canada's Trade in Oilseeds and Oilseed Products, 1970-1982

Calendar Year	Imports			Exports			Net Exports		
	Oilseeds	Oilseed Products	Total	Oilseeds	Oilseed Products	Total	Oilseeds	Oilseed Products	Total
	million dollars								
1970	67.5	78.7	146.2	146.6	30.4	177.0	79.1	-48.3	30.8
1971	67.0	72.1	139.1	226.6	33.7	260.3	159.6	-38.4	121.2
1972	55.4	80.9	136.3	212.8	30.3	243.1	157.4	-50.6	106.8
1973	78.7	118.2	196.9	369.4	43.9	413.3	290.7	-74.3	216.4
1974	131.3	194.6	325.9	380.5	44.9	425.4	249.2	-149.7	99.5
1975	131.7	181.2	312.9	336.3	34.1	370.4	204.6	-147.1	57.5
1976	131.0	190.5	321.5	283.3	48.5	331.8	152.3	-142.0	10.3
1977	147.1	226.7	373.8	440.7	101.9	542.6	293.6	-124.7	168.9
1978	154.0	264.2	418.2	543.7	115.0	653.2	389.7	-154.7	235.0
1979	176.3	299.5	475.8	862.7	140.7	1003.4	686.4	-158.7	527.7
1980	200.3	267.8	468.1	645.4	202.9	848.3	445.1	-64.9	380.2
1981	238.7	267.0	505.7	797.9	206.4	1004.3	559.2	-60.6	498.6
1982	196.6	242.3	438.9	647.4	156.8	804.2	450.8	-85.5	365.3

Source: Agriculture Canada. Selected Agricultural Statistics for Canada and the Provinces 1981 and Canada's Trade in Agricultural Products 1980, 1981 and 1982.

TABLE 1.5: Canada's Trade in Soybeans and Soybean Products, 1970-1983

Calendar Year	Soybeans			Soybean Oil			Soybean Meal			Soybeans and Products		
	Imports	Exports	Net Imports	Imports	Exports	Net Imports	Imports	Exports	Net Imports	Imports	Exports	Net Imports
	Million Dollars											
1970	47.0	3.1	43.9	6.6	6.5	0.1	25.9	15.4	10.5	79.5	25.0	54.5
1971	49.6	4.1	45.5	7.2	14.5	-7.3	21.3	11.4	9.9	78.1	30.0	48.1
1972	39.1	5.7	33.4	4.7	8.5	-3.8	26.3	9.4	16.9	70.1	23.6	46.5
1973	50.4	6.3	44.1	8.3	1.2	7.1	46.4	19.1	27.3	105.1	26.6	78.5
1974	90.5	3.5	87.0	24.8	5.7	19.1	50.9	17.6	33.3	166.2	26.8	139.4
1975	86.2	3.1	83.1	14.4	1.4	13.0	54.2	9.4	44.8	154.8	13.9	140.9
1976	86.0	6.6	79.4	14.2	0.0	14.2	70.0	11.3	58.7	170.2	17.9	152.3
1977	98.9	11.1	87.8	17.2	0.0	17.2	90.3	10.7	79.6	206.4	21.8	184.6
1978	91.2	24.5	66.7	19.1	0.7	18.4	103.1	12.4	90.7	213.4	37.6	175.8
1979	107.8	14.9	92.9	16.8	7.0	9.8	131.3	6.8	124.5	255.9	28.7	227.2
1980	141.9	35.0	106.9	8.5	9.8	-1.3	112.9	25.6	87.3	263.3	70.4	192.9
1981	115.0	46.2	68.8	2.9	6.9	-4.0	119.5	18.1	101.4	237.4	71.2	166.2
1982	128.1	43.5	84.6	2.4	16.9	-14.5	107.8	10.9	96.9	238.3	71.3	167.0
1983	95.9	22.9	73.0	3.7	7.3	-3.7	126.4	5.6	120.9	226.0	35.8	190.2

Source: Statistics Canada. Imports Merchandise Trade. Cat. No. 65-203, Annual, Ottawa.
Statistics Canada. Exports Merchandise Trade. Cat. No. 65-202, Annual, Ottawa.

TABLE 1.6: Ontario Farm Cash Receipts by Commodity, Selected Years

	1960		1965		1970		1975		1981	
	$'000	Percent	$'000	Percent	$'000	Percent	$'000	Percent	$'000	Percent
Corn	9949	4.0	24775	8.4	49214	11.0	148114	16.8	346004	19.9
Wheat	15284	6.1	16951	5.7	23371	5.2	82689	9.4	134178	7.7
Oats	4024	1.6	3785	1.3	1878	0.4	2637	0.3	2781	0.2
Barley	686	0.3	1735	0.6	3412	0.8	7395	0.8	14797	0.8
Soybeans	10035	4.0	14120	4.8	23732	5.3	44925	5.1	163810	9.4
Potatoes	17983	7.2	23268	7.9	21852	4.9	34754	3.9	44631	2.6
Fruits	23528	9.5	29576	10.0	41185	9.2	63851	7.2	90000	5.2
Vegetables	43467	17.5	56435	19.1	77443	17.2	158688	17.9	215002	12.3
Tobacco	91697	36.9	84105	28.4	147313	32.8	186429	21.1	361845	20.8
Other Crops	31923	12.9	40938	13.8	59657	13.2	154130	17.5	366836	21.1
Total Crops	248576	100.0	295688	100.0	449057	100.0	883612	100.0	1739884	100.0

Source: O.M.A.F. Agricultural Statistics for Ontario 1981. Toronto.

In addition, soybeans provide a major protein source, in the form of soybean meal, for Ontario's three billion dollar livestock industry.

The growth of Ontario's soybean industry, from its small scale in the early 1960's, to its present size presents challenges as well as opportunities for those involved in the industry. For many cash crop farmers the financial viability of their enterprises are directly related to soybean prices and their marketing ability. In addition, the Ontario grain trade is becoming increasingly integrated into the international oilseeds market and adopting an export orientation, particularly for soybean oil, rather than the traditional import orientation. This increased openness to the international market, which evolved over the 1970's, occurred at a time of rapidly expanding world trade in oilseeds, and generally favorable price relationships. However, the early 1980's have been characterized by a decline in world grain and oilseed trade and declining commodity prices. Many commentators feel the world grain and oilseed markets have entered a period of general oversupply, and if this is true it will have serious implications for Ontario's soybean industry.

1.3 Objectives

The objective of this study is to describe the evolution of the Ontario soybean industry over the decade of the 1970's and to provide a profile of the industry as it exists in the early 1980's. This overview of the soybean industry will include an assessment of (1) Ontario's soybean production potential; (2) the marketing of soybeans in Ontario; (3) Ontario's soybean processing industry; and, (4) the international market for soybeans. Following from this description of the industry will be an analysis of the opportunities and constraints facing Ontario's soybean industry over the next decade.

1.4 Outline of the Study

Chapter two deals with Ontario soybean production in terms of (a) its geographical distribution; (b) its cost of production in comparison with the United States; (c) the number and size of farms producing soybeans; and, (d) the trend in soybean yields in comparison with the United States.

Chapter three is concerned with the marketing of Ontario soybeans and products. It includes a detailed discussion of the disposition of Ontario soybeans and a description of soybean price patterns.

Chapter four is concerned with the processing of Ontario soybeans and provides a general description of the processing industry.

Chapter five deals with the international market for soybeans. In this chapter the supply and demand characteristics of the major participants in the international soybean market are analyzed.

In chapters six and seven the information and analyses contained in the report is summarized and opportunities and constraints to the expansion of the Ontario soybean industry are identified.

CHAPTER 2

ONTARIO SOYBEAN PRODUCTION

2.1 Soybean Production

Soybean production in Ontario has expanded rapidly since WWII from less than 217,000 bushels in 1941 to a record 31,171,000 bushels in 1982 (figure 2.1). The area planted to soybeans also rose rapidly, from less than 11,000 acres in 1941, to 142,000 acres in 1950. By the mid 1950's the area planted to soybeans had stabilized at around 250,000 acres, but following a sharp drop in plantings between 1960 and 1961 soybean acreage increased in every year for the next twelve. This impressive expansion in soybean area from 212,000 acres in 1961 to 470,000 acres in 1973 resulted from two primary factors: (1) plant breeding activities which made available varieties better suited for Ontario's climate; and, (2) by a growing demand for high protein meals, such as soybean meal, by the livestock industry. Between 1973 and 1976 Ontario's soybean area declined by 100,000 acres but then expanded to over 700,000 acres in 1978 (table 2.1). Soybean area between 1978 and 1981 averaged slightly less than 690,000 acres but expanded by more than 30 percent in 1982 to 900,000 acres. This expansion occurred primarily as a result of severe winter kill in the winter wheat crop in 1982, but the area planted to soybeans has remained at the higher level in 1983 and 1984.

It seems unlikely that the rapid expansion in the soybean growing area which occurred between 1961 and 1984 will be repeated in the future, because of limitations on the quantity of land suitable for growing soybeans. Production will continue to expand, but in the future economic forces will play a much larger role in soybean planting decisions than in the 1960's and 1970's.

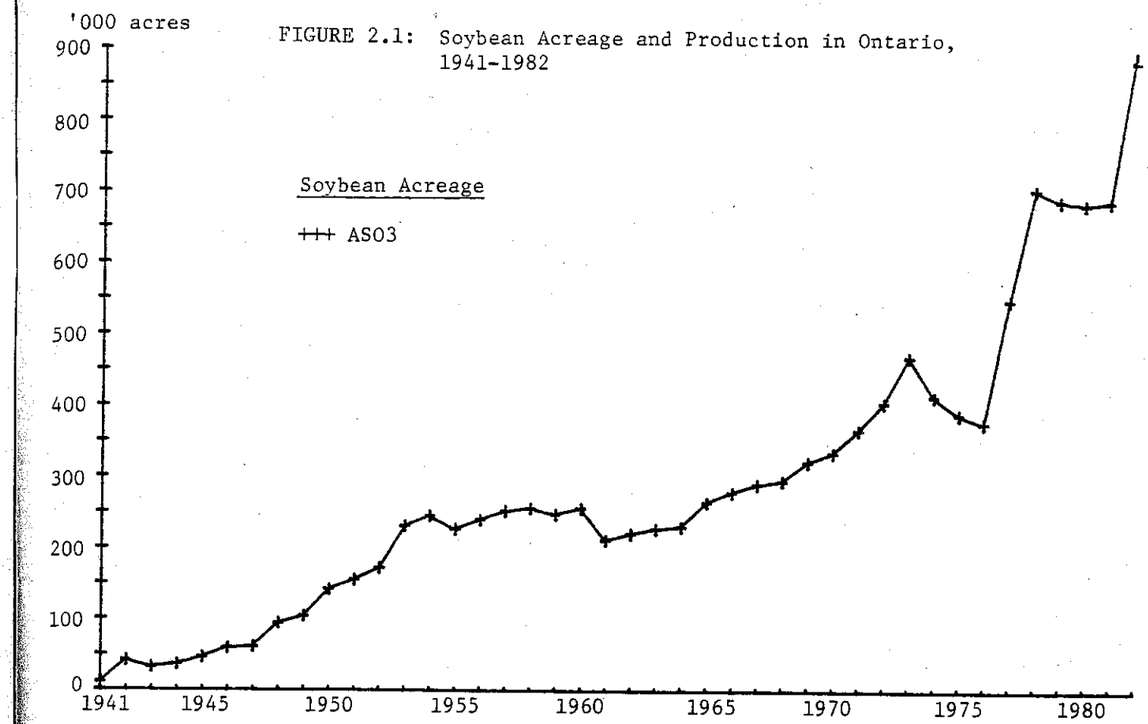
Soybeans compete most directly with grain corn for land and the price of soybeans relative to corn is a key factor in determining which crop a farmer will grow. Table 2.2 compares changes in the price of soybeans, relative to the price of corn, with changes in soybean area for crop years 1970/71 through 1983/84.[1/] Several features of Ontario's soybean area response are apparent from table 2.2. First, for soybean/corn price ratios below 2.3 the average percentage change in soybean area was -2.2 percent. Second, for soybean/corn price ratios above 3.0 the average percentage change, in soybean area, was 30.8 percent, and for price ratios above 2.3, 16.0 percent. Third, there have been two major increases in soybean area since 1970, the first occurring between 1976 and 1978 (up 86.6%) and the second between 1981 and 1982 (up 30.6%). In both cases the area planted to soybeans remained close to the new higher level following the major area increase, even if prices subsequently declined.

The above observations with regard to Ontario soybean area response are confirmed by the estimated relationshps in equation (2.1),

---

1/ Soybeans are planted in the spring, and planting decisions are based to a large extent on price relationships at that time, consequently harvested area in year t is a function of prices in year t-1.

FIGURE 2.1: Soybean Acreage and Production in Ontario, 1941-1982



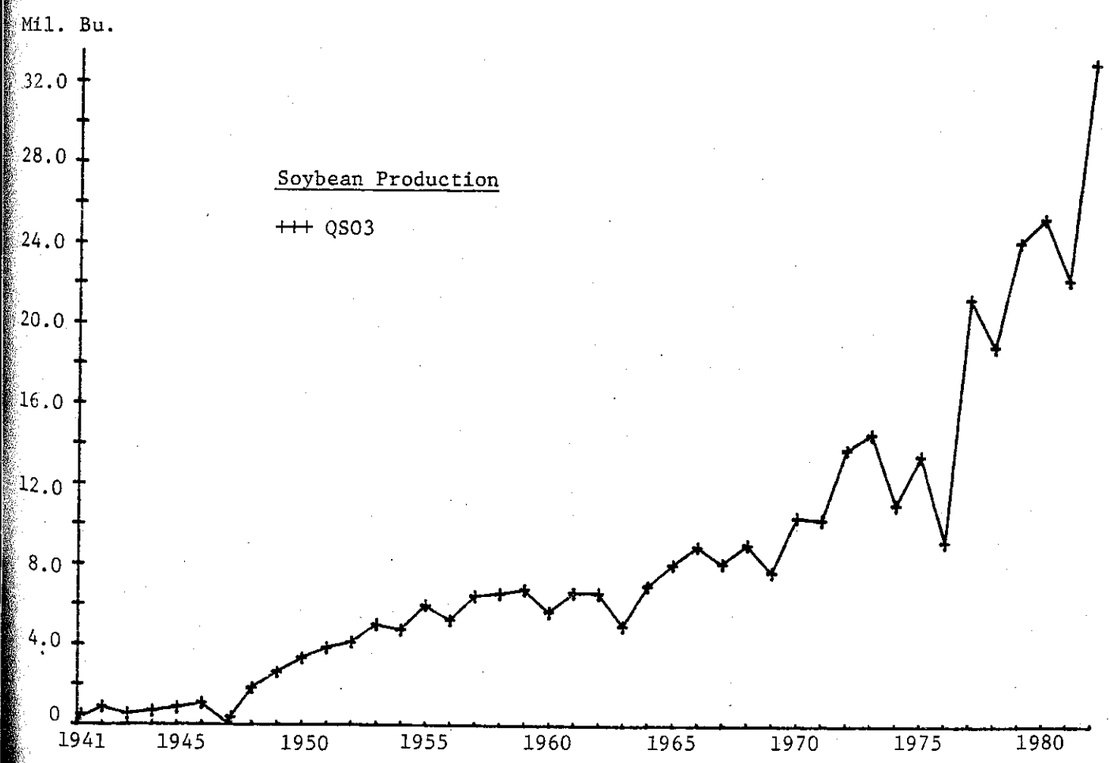


TABLE 2.1: Ontario Soybean Area, Yield, Production, Average Farm Price and Farm Value, 1970/71 to 1983/84

Crop Year	Area ('000 acres)	Yield (bu./acre)	Production (mil. bu.)	Ave. Farm Price ($/bu.)	Farm Value (mil. dol.)
1970/71	335.0	31.0	10.385	2.78	28.870
1971/72	367.2	28.0	10.281	2.96	30.432
1972/73	405.0	34.0	13.770	3.90	53.703
1973/74	470.0	31.0	14.570	5.45	79.407
1974/75	415.0	27.0	11.050	6.34	70.057
1975/76	390.0	35.0	13.478	4.92	66.312
1976/77	377.8	24.0	9.200	7.05	64.860
1977/78	550.0	39.0	21.310	6.54	139.367
1978/79	705.0	27.0	18.944	7.64	144.675
1979/80	690.0	35.0	24.150	7.12	171.948
1980/81	685.0	37.0	25.345	8.53	216.193
1981/82	689.1	32.0	22.297	7.13	158.978
1982/83	900.0	35.0	31.171	6.80	212.000
1983/84 p/	900.0	29.0	26.507	9.40	249.200

p/ Preliminary

Source: O.M.A.F. Agricultural Statistics for Ontario, 1981. Toronto.
O.M.A.F. Monthly Crop and Livestock Report. No. 624, December 1983, Toronto.

TABLE 2.2: Ontario Soybean/Corn Price Ratios and Soybean Production, 1970/71 to 1983/84

Crop Year	Average Farm Price of Corn ($/bu.)	Average Farm Price of Soybeans ($/bu.)	Soybean Price / Corn Price	Percentage Change in Soybean Acreage (Percent)
1970/71	1.36	2.78	2.04	
1971/72	1.15	2.96	2.57	+9.6
1972/73	1.63	3.90	2.39	+10.3
1973/74	2.53	5.45	2.15	+16.0
1974/75	3.03	6.34	2.09	-11.7
1975/76	2.52	4.92	1.95	-6.0
1976/77	2.12	7.05	3.32	-3.1
1977/78	2.15	6.54	3.04	+45.5
1978/79	2.79	7.64	2.74	+28.2
1979/80	3.03	7.12	2.35	-2.1
1980/81	3.84	8.53	2.22	-0.7
1981/82	2.87	7.13	2.48	+0.1
1982/83	2.84	6.80	2.39	+30.6
1983/84	3.80	9.40	2.47	+0.0

Source: O.M.A.F. Agricultural Statistics of Ontario, 1981. Toronto.
O.M.A.F. Monthly Crop and Livestock Report. No. 624, December 1983, Toronto.

ASO3 = -1427.5 + 114.6 FPSO2(-1)/FPCO2(-1) (2.1)
t-value (-1.93) (2.34)
elasticity [0.48]

+ 18.2 Trend + 0.60 ASO3(-1)
(1.57) (2.42)

R^2 = 0.92 D.W. = 1.94 Sample Period = 1971/72 to 1983/84

where, ASO3 is the soybean acreage ('000), FPSO2 is the annual average farm price of soybeans ($/bu.), FPCO2 is the annual average farm price of grain corn ($/bu.), Trend is a linear time trend variable with 1970/71 = 70, 1971/72 = 71, etc., and the notation (-1) is used to indicate that a variable is lagged one year. Student t-values are given in parentheses, and short-run elasticities in square brackets below the estimated coefficients. The coefficient of determination (R^2) and Durbin-Watson (D.W.) statistic are also given.

Equation (2.1) indicates that a one percent increase (decrease) in the soybean/corn price ratio will lead to a 0.48 percent increase (decrease) in soybean area in the next crop year. The long-run elasticity, from equation (2.1), is 1.2 indicating a sustained one percent change in the price ratio will lead to a 1.2 percent change, in the same direction, in soybean area (Nerlove, 1958).

Using equation (2.1) to project soybean acreage requires making an assumption with regard to the price of soybeans relative to corn. Between 1970/71 and 1983/84 the average soybean/corn price ratio was 2.44. Using this figure and starting from an estimated 1984 soybean area of 1.03 million acres results in a 1990 area estimate of 1.4 million acres. However, it seems unlikely that the trend increase in soybean area over the remainder of the 1980's will be as rapid as during the 1971 to 1984 period when acreage expanded by 180.5 percent. To see how much impact the trend variable has on the area estimate its value was fixed at its 1984 level and a new estimate derived. Eliminating the trend results in a 1990 area estimate of 1.2 million acres. This is probably a more reasonable soybean area estimate than the higher figure. In fact, it may take a more favorable soybean/corn price ratio to meet this area estimate than that used in the projections.

Soybean production in Ontario has increased not only because of area increases but also as a result of yield improvements. Soybean yields in the early 1950's averaged slightly more than 23 bushels per acre. By the early 1970's average yields had increased to 31 bushels per acre, and by the early 1980's to nearly 35 bushels per acre. The analysis of Ontario soybean yield increases contained in sections 2.5 and 2.6 indicates that average soybean yields may reach 38-40 bushels per acre by the end of the decade.

Based on the yield and area estimates given above; and, given the right economic environment plus good growing conditions a 45 million bushel soybean crop is a possibility sometime this decade.

2.2 Spatial Distribution of Production

All of Canada's soybean production is located in Ontario, and within Ontario the five most southern counties (Essex, Kent, Lambton, Middlesex, Elgin) have traditionally contained more than 90 percent of the soybean crop (table 2.3). However, production outside the traditional area has expanded from 255,000 (1.8% of total production) bushels in 1972 to 2,708,000 bushels (12.1% of total production) in 1981.[2/] In fact, in 1981, 41 Ontario counties produced ten or more acres of soybeans (table 2.4).

That soybeans are an important crop in the traditional growing area is amply demonstrated in table 2.4. In 1981, soybean acreage as a percent of the total cropland in Essex, Kent and Lambton counties was 45.0, 35.4 and 39.7 percent, respectively. In Elgin and Middlesex counties the percentages were not as large at 16.5 and 8.9 percent, respectively.

Outside of the traditional growing area no county had more than 5 percent of its total cropland in soybeans. In four counties, however, between 3 and 5 percent of the total cropland was planted to soybeans, namely, Brant (3.1 percent), Haldimand-Norfolk (4.6 percent), Hamilton-Wentworth (3.2 percent) and Prince Edward (4.1 percent).

2.3 Number of Farm Production Units and Trends in Their Size

Information on the number of farms growing soybeans, and the percent of crop farmers in each Ontario county that grew soybeans in 1976 and 1981, is contained in tables 2.4 and 2.5. In the traditional soybean production area a majority of crop farmers (57.7 percent) grew soybeans in 1981, up from 46.9 percent in 1976. In 1976 only seven counties reported more than one percent of the crop farmers having grown soybeans, but by 1981, 35 counties reported that at least one percent of the crop farmers had produced soybeans. In fact, by 1981, more than four percent of the crop farmers in 15 counties grew soybeans.

The average area planted to soybeans varies widely across counties (table 2.5). In Lambton county the average soybean grower planted 80.3 acres of soybeans in 1981, up from 54.5 acres in 1976, while in the five traditional soybean growing counties the average farm contained 72.4 acres of soybeans, in 1981, up 32.3 percent from 1976. Outside the traditional soybean production area the average soybean area was over 50.0 acres per crop farm in Brant (59.6 acres), Halton (66.5 acres), Prince Edward (57.6 acres), Wellington (56.3 acres) and York (64.6 acres) counties. Soybean plantings per crop farm in other counties ranged between 20 and 40 acres.

Table 2.6 gives a rough indication of the size distribution of farms growing soybeans in the traditional producing counties. Thirty-one percent of the farms in the traditional production area grew more than 78 acres of soybeans, and 14.2 percent grew more than 128 acres. Only three percent of the farms grew less than 7 acres of soybeans.

2/ The traditional soybean production area includes Essex, Kent, Lambton, Middlesex and Elgin counties.

TABLE 2.3: Ontario Soybean Production by County, 1972 to 1981, '000 bushels

County	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Elgin	730	811	605	560	725	1666	1827	2414	2346	1776
Essex	4730	4234	3194	3850	2644	5082	4992	6118	6123	4434
Kent	4547	5348	3988	4797	3178	6762	6150	7296	7749	5384
Lambton	3125	3383	2706	3520	2173	4620	4250	5610	6264	6564
Middlesex	383	528	325	390	355	870	920	1500	1530	1431
Traditional Production Area	13515	14304	10818	13117	9075	1900	18139	22938	24012	19509
Percent of Total	98.2	98.2	93.8	97.3	98.7	89.2	95.7	95.0	94.8	87.9
Haldimand-Norfolk	111	95	104	161	58	174	225	409	462	582
Other	144	171	578	200	67	2136	580	803	871	2126
Total Outside Traditional Area	255	266	682	361	125	2310	805	1212	1333	2708
Percent of Total	1.8	1.8	6.2	2.7	1.3	10.8	4.3	5.0	5.2	12.1
Provincial Total Production	13770	14570	11050	13478	9200	21310	18844	24150	25345	22297

Source: O.M.A.F. Agricultural Statistics of Ontario, 1981. Toronto.

TABLE 2.4: Soybean Production as a Percent of Total Cropland, in Ontario, by County, 1976 and 1981

	Percent of Total Cropland in Soybeans		Percent of all Crop Farmers Growing Soybeans	
	1976	1981	1976	1981
Brant	0.2	3.1	1.0	6.4
Bruce	0	0.3	0	1.2
Dufferin	0	0.1	0	0.7
Dundas	*	1.3	0.3	4.0
Durham	0.1	1.3	0.7	3.0
Elgin	10.1	16.5	27.3	39.3
Essex	33.5	45.0	60.8	69.0
Frontenac	0	0.1	0	0.8
Glengarry	0.2	0.4	0.9	2.3
Grenville	0	0.7	0	3.2
Grey	*	0.1	*	0.5
Haldimand-Norfolk	1.0	4.6	3.5	10.8
Halton	0.6	2.1	0.3	3.1
Hamilton-Wentworth	0.2	3.2	0.7	5.7
Hastings	*	0.5	0.1	2.2
Huron	1.0	2.0	0.6	7.4
Kent	23.9	35.4	63.0	76.0
Lambton	23.9	39.7	57.1	75.4
Lanark	0	0.8	0	1.8
Leeds	*	0.3	0.4	1.6

TABLE 2.4 continued

	Percent of Total Cropland in Soybeans		Percent of all Crop Farmers Growing Soybeans	
	1976	1981	1976	1981
Lennox & Addington	0.1	0.3	0.1	1.3
Middlesex	3.2	8.9	9.5	24.2
Niagara	0.3	1.4	0.8	2.2
Northumberland	*	0.9	0.2	4.2
Ottawa-Carleton	*	0.6	0.1	2.3
Oxford	0.1	1.6	0.4	4.7
Peel	*	1.3	0.2	3.6
Perth	0.1	1.0	0.2	3.2
Peterborough	*	*	0.1	0.8
Prescott	*	0.2	0.1	1.4
Prince Edward	0.1	4.1	0.8	10.0
Rainy River	0	*	0	0.7
Renfrew	0	*	0	0.4
Russell	0.1	0.4	0.2	2.3
Simcoe	*	1.7	0.1	4.2
Stormont	*	0.8	0.1	3.9
Toronto	0	1.3	0	2.7
Victoria	*	0.9	0.1	2.2
Waterloo	*	0.5	0.2	1.6
Wellington	0.1	0.7	0.2	1.6
York	0.1	0.3	0.5	4.7

Sources: O.M.A.F. Agricultural Statistics for Ontario 1981. Toronto.
Statistics Canada. Census of Canada, Agriculture: Ontario. Cat. No. 96-806 (Bul. 12-2), Ottawa.

TABLE 2.5: Soybean Production in Ontario, by County, 1976 and 1981[1/]

County	Soybean Area (Acres)		Number of Farms Growing Soybeans		Average Soybean Acreage per Farm	
	1976	1981	1976	1981	1976	1981
Brant	359	4411	12	74	29.9	59.6
Bruce	0	1247	0	33	0	37.8
Dufferin	0	178	0	8	0	22.2
Dundas	23	1474	3	36	7.7	40.9
Elgin	28685	49322	593	787	48.4	62.7
Essex	108804	147798	1927	2092	56.5	70.6
Frontenac	0	78	0	7	0	11.1
Glengarry	197	411	8	21	24.6	19.6
Grenville	0	399	0	21	0	19.0
Grey	1	348	1	17	1	20.5
Haldimand-Norfolk	3597	18783	130	404	27.7	46.5
Halton	47	1728	3	26	15.7	66.5
Hamilton-Wentworth	263	3820	10	80	26.3	47.8
Hastings	6	684	2	32	3.0	21.4
Huron	528	10947	22	258	24.0	42.4
Kent	116703	179465	2057	2380	56.7	75.4
Lambton	97233	182346	1783	2270	54.5	80.3
Lanark	0	748	0	20	0	37.4
Leeds	32	310	4	17	8.0	18.2
Lennox & Addington	70	308	1	11	70.0	28.0
Middlesex	14640	43354	336	792	43.6	54.7
Niagara	569	2650	25	73	22.8	36.3

TABLE 2.5 continued

County	Soybean Area (acres)		Number of Farms Growing Soybeans		Average Soybean Acreage per Farm	
	1976	1981	1976	1981	1976	1981
Northumberland	57	1562	4	67	14.3	23.3
Ottawa-Carleton	25	1129	1	43	25.0	26.2
Oxford	398	5685	12	119	33.2	47.8
Peel	35	1233	2	30	17.5	41.4
Perth	240	3918	7	96	34.3	40.8
Peterborough	10	380	1	11	10.0	34.5
Prescott	5	245	1	13	5.0	18.8
Prince Edward	56	4263	6	74	9.3	57.6
Rainy River	0	26	0	3	0	8.7
Renfrew	0	73	0	6	0	12.2
Russell	40	280	1	13	40.0	21.5
Simcoe	7	6262	3	129	2.3	48.5
Stormont	1	687	1	28	1.0	24.5
Toronto	0	84	0	3	0	28.0
Victoria	2	1318	1	36	2.0	36.6
Waterloo	17	887	3	27	5.7	32.9
Wellington	255	2704	6	48	42.5	56.3
York	231	4523	7	70	33.0	64.6

1/ Counties with less than ten acres of soybeans in 1981 are omitted.

Sources: O.M.A.F. Agricultural Statistics for Ontario 1981. Toronto.

Statistics Canada. Census of Canada, Agriculture: Ontario. Cat. No. 96-806 (Bul. 12-2), Ottawa.

TABLE 2.6: Distribution of Farms Growing Soybeans in 1981, by Size, for Selected Counties

Farm Size (acres)	County						
	Elgin	Essex	Kent	Lambton	Middlesex	Total	Percent
	(Number of Farms)						
1-7	20	117	43	57	30	267	3.2
8-32	262	676	572	525	311	2346	28.2
33-77	298	716	934	892	291	3131	37.6
78-127	121	278	469	434	96	1398	16.8
128 & over	86	305	362	362	64	1179	14.2
	787	2092	2380	2270	792	8321	100.0

Source: O.M.A.F. Agricultural Statistics of Ontario 1981. Toronto.

2.4 Costs-of-Production

Fisher (1981) recently completed a study of soybean production costs in Ontario. Table 2.7 summarizes his findings and also provides a comparison with cost-of-production estimates prepared in 1957-59 and 1973-74 with the data collected in 1980. Fisher (1981) found that 29.0 percent of the cost of growing soybeans could be attributed to operating costs and 71 percent to fixed costs, the major item of which is the imputed cost of land rent; which, in 1980, accounted for more than 50 percent of total costs. Within the operating cost category, the cost of seed, fertilizer and spray was estimated to account for 16.7 percent of total costs, and 58.3 percent of total variable costs.

Total operating costs increased by 366.7 percent between 1957-59 and 1973-74, and another 218 percent between 1973-74 and 1980.[3/] Over the same time periods the fixed costs of production were estimated to increase by 319 percent and 245 percent, respectively.

It is of some interest to compare the costs of producing soybeans in Ontario with its major competitor the United States. Since Ontario's soybean prices are determined primarily by developments in the United States (see section 3.1) higher variable costs in Ontario are likely to be reflected in lower land prices and/or lower returns to capital, management and labor. In table 2.8 a comparison of soybean production costs in the United States with costs estimated for Elgin, Essex and Kent counties are presented.[4/] All costs are expressed on a per acre basis and United States prices are converted to a Canadian dollar equivalent by multiplying each price by the (C/US) dollar exchange rate. From table 2.8 it is clear that there are significant differences in costs for particular production items, however, the total variable costs of production in the two countries are extremely close, $95.33 in Canada and $97.26 in the United States.

Fixed costs, excluding land, are estimated to be considerably lower in Canada than in the United States, as is the implicit land rent. Not too much should be made of this difference, however, since the cost estimates were prepared by different researchers, undoubtedly using different assumptions with regard to depreciation allowances, and for the allocation of joint overhead costs. Similarly the land charge depends on the productivity of the land being considered. Nevertheless, having recognized the measurement problems, from a cost standpoint it appears that soybean production not only has a comparative cost advantage in Southern Ontario, but total production costs in Southern Ontario and the U.S. are essentially the same.

3/ These cost-of-production figures incorporate both input price changes and changes in the quantities of inputs used. For example, the use of fertilizer increased from 57 kg/ha in 1957-59 to 122 kg/ha in 1980.

4/ The cost figures for Ontario in tables 2.7 and 2.8 differ because the figures in table 2.7 represent the results of surveying 74 soybean producers throughout Ontario, while those in table 2.7 are estimated costs of production for three specific counties.

TABLE 2.7: Trends in Soybean Production Costs and Input Use, Ontario, 1957-1959, 1973-1974, and 1980

Cost factor	1957-1959		1973-1974		1980	
Number of farms	338		34		74	
Hectares per farm	8		54		31	
Yield, t/ha	1.88		2.08		2.48	
Fertilizer, kg/ha	57		142		122	
Labor, h/ha	18.3		5.9		5.9	
Tractor, h/ha	13.8		4.7		4.0	
	dollars per hectare and percentage of total					
	$	%	$	%	$	%
Labor:						
Hired, operating	-	-	2	0.6	2	0.3
Operator, fixed	17	17.7	20	6.3	25	3.3
Total	17	17.7	22	6.9	27	3.6
Tractor and machinery:						
Operating	8	8.3	15	4.7	30	4.0
Fixed	17	17.7	37	11.6	72	9.5
Total	25	26.0	52	16.3	102	13.5
Materials, operating:						
Seed	7	7.3	22	6.9	47	6.2
Fertilizer	5	5.2	17	5.3	32	4.3
Sprays	1	1.0	15	4.7	47	6.2
Other	2	2.1	-	-	7	0.9
Total	15	15.6	54	16.9	133	17.6
Other costs:						
Custom, operating	2	2.1	3	0.9	21	2.9
Land use, fixed	34	35.4	158	49.5	403	53.3
Storage, fixed	1	1.1	5	1.6	..	..
Allow. to mgt., fixed	..	..	..	..	39	5.1
Misc., operating	2	2.1	25	7.9	30	4.0
Total	39	40.7	191	59.9	493	65.3
TOTAL OPERATING	27	28.0	99	31.0	216	29.0
TOTAL FIXED	69	72.0	220	69.0	539	71.0
TOTAL, ALL COSTS	96	100.0	319	100.0	755	100.0

Source: Fisher, G. A., The Economics of Soybean Production in Ontario, 1980. Economics Branch, O.M.A.F., Toronto.

Note: - = nil.
.. = not available.

TABLE 2.8: Estimated Soybean Production Costs Ontario and the United States, 1980

	Ontario (C$/acre)	United States (US$/acre)	United States (C$/acre)
Variable Costs:			
Seed	13.01	8.60	10.06
Fertilizer	18.41	9.60	11.23
Chemicals	25.76	18.31	21.42
Fuel, lubrication and repairs	11.92	23.50	27.50
Custom work	5.26	3.02	3.53
Labour	10.11	16.24	19.00
Interest on operating capital	6.22	3.87	4.52
Marketing board fee	.84	NI	NI
Crop insurance	3.80	NI	NI
Total Variable Costs	95.33	83.14	97.26
Fixed Costs: (Excluding Land)			
Machinery ownership	29.80	42.91	50.20
Management allowance	13.22	13.61	15.92
Overhead	6.48	10.06	11.77
Total Fixed Costs (excluding land)	49.50	66.58	77.89
Land	120.73	135.06	158.02
Total Costs (including land)	265.56	284.78	333.17

NI = Not included

Sources: O.M.A.F. Soybeans: Updated Cost of Production, per hectare, Southern Ontario, 1980. Agdex 141/821, 1981, Toronto.

U.S.D.A. (1981). Costs of Producing Selected Crops in the United States - 1978, 1979, 1980 and Projections for 1981. Prepared by E.S.C.S. for the Committee on Agriculture, Nutrition and Forestry, U.S. Senate, Washington, D.C.

2.5 Ontario Soybean Yields

Table 2.9 presents data on the average soybean yields in Ontario, Kent County, the United States, and for seven individual States. Over the eleven year period ending in 1982 Ontario's average soybean yield was 32.4 bushels per acre, or 13.3 percent higher than the average yield in the United States of 28.6 bushels/acre. Ontario's average yield is also considerably above the average yield in four major Northern United States soybean producing states, namely, Michigan, Minnesota, Ohio and Wisconsin, and only 8.7 percent less than in Iowa, normally one of the top soybean yielding areas in the United States. Average yields in Kent County are similar to the top producing states of Iowa and Illinois.

A regression of soybean yields against a linear time trend for aggregate U.S., Ontario and Kent County data indicates no statistically significant trend in these series, over the 1972-1982 period (table 2.10).[5/] There are, however, significant trends in the yields for selected states, particularly Wisconsin, Indiana, Michigan, Minnesota and Ohio where soybean yields have been increasing by 0.79 to 0.95 bushels/acre/year. Whether these trends represent a long-run or short-run phenomena is unclear but they certainly bear watching. Nevertheless the comparison of U.S. and Ontario soybean yields suggests that Ontario yields are higher than in many areas of the United States and Southern Ontario yields approach those in the top soybean yielding states.

2.6 Expected Changes in Soybean Production Technology

Dr. D. J. Hume a crop scientist at the University of Guelph expects Ontario soybean yield increases to average 0.5 bushels/year over the next ten years. Yield increases of this magnitude, if realized, would push average Ontario soybean yields to 38-40 bushels/acre by the end of the decade.[6/]

Dr. Hume predicts soybean yields will advance at a fairly moderate, steady rate, over the next few years as a result of developments in four main areas. First, plant breeding designed to select higher yielding, earlier maturing, soybean varieties; as well as varieties with a tolerance to white mold disease. Second, refinements in weed control, primarily through the development of herbicides which are not as dependent on environmental conditions as those presently in use. Third, improvements in planting, primarily moving to narrower rows; and, the development of planters, for use in narrow rows, with increased depth control and reduced seed damage. Fourth, improvements in the nitrogen fixation ability of soybeans which will improve yields following the first planting, and reduce the need for the use of innoculants.

5/ The growth in Ontario soybean yields may have been arrested by the rapid expansion of soybean production into lower yielding areas of the province. However, this should not be an important factor explaining the lack of trend in Kent County yields.

6/ The trend analysis in table 2.10 provides support for an estimate of around 38 bushels per acre.

TABLE 2.9: United States and Ontario Soybean Yields

bushels/acre

	All Ontario	Kent County	U.S.	Michigan	Minnesota	Wisconsin	Indiana	Iowa	Illinois	Ohio
1972	34.0	34.9	27.8	26.0	28.0	28.0	29.5	36.0	34.5	26.5
1973	31.0	37.4	27.7	24.0	29.0	25.0	31.5	34.0	31.5	25.0
1974	27.0	28.9	23.2	21.0	21.0	20.0	25.0	28.0	24.0	25.0
1975	35.0	39.0	28.9	26.0	27.0	25.5	33.5	34.0	36.0	33.0
1976	24.0	27.0	26.1	20.5	22.0	22.0	34.0	31.0	33.0	33.0
1977	39.0	46.0	30.6	30.0	35.5	35.0	37.0	35.5	38.0	35.5
1978	27.0	30.0	29.4	24.0	36.0	32.0	34.5	37.5	33.5	33.0
1979	35.0	38.0	32.1	30.0	32.0	34.0	36.0	37.5	39.0	35.5
1980	37.0	41.0	26.4	32.0	32.0	33.0	36.0	39.0	33.5	36.0
1981	32.0	30.0	30.1	30.0	32.0	33.0	33.0	40.0	38.0	28.5
1982 p/	35.0	NA	32.2	31.0	36.0	31.0	40.0	37.5	39.0	37.0
Average	32.4	35.2	28.6	26.8	30.0	28.9	33.6	35.5	34.5	31.6

p/ Preliminary

Source: U.S.D.A. Agricultural Statistics. Various issues, Washington, D.C.

O.M.A.F. Agricultural Statistics for Ontario. Various issues, Toronto.

TABLE 2.10: Estimated Trend in Soybean Yields, Canada and the United States, bushels/acre

Region	Constant	Coefficient For [a/] D74 [b/]	Trend	R^2	Time Period
Ontario	2.96		0.38 (0.84)	0.07	1972-1982
Kent County	26.59		0.11 (0.16)	0.00	1972-1981
United States	3.56	-4.84 (-2.24)	0.33 (1.68)	0.58	1972-1982
Michigan	-38.68		0.85 (2.88)	0.48	1972-1982
Minnesota	-30.18	-7.34 (-1.72)	0.79 (2.04)	0.56	1972-1982
Wisconsin	-34.59	-7.10 (-1.76)	0.83 (2.27)	0.59	1972-1982
Indiana	-18.4	-7.24 (-3.31)	0.68 (3.44)	0.80	1972-1982
Iowa	-5.04	-6.44 (-2.76)	0.53 (2.51)	0.71	1972-1982
Illinois	-2.01	-9.99 (-3.85)	0.48 (2.06)	0.76	1972-1982
Ohio	-41.5		0.95 (2.87)	0.48	1972-1982

a/ t-values are given in parentheses below the estimated coefficients.

b/ A dummy variable is included in some of the equations to account for the very poor yields in 1974.

The yield achievements suggested by Dr. Hume are of course dependent on continued research and development by both the public and private sectors.

CHAPTER 3

ONTARIO SOYBEAN MARKETING

3.1 Institutional Structure

Off-farm sales of Ontario soybeans come under the jurisdiction of the Ontario Soya-Bean Growers' Marketing Board. Although the Board does not engage in actual handling and marketing of soybeans, the crop is sold under terms and conditions negotiated annually between the Board and dealers and crushers (Jaeger, 1977). The objective of the soybean marketing agreement is to guarantee that crushers pay at least as much for Ontario soybeans as for imported United States soybeans.

As a result of the agreement, and the proximity of the giant United States market, changes in U.S. soybean prices (PS04), adjusted for exchange rate (ER34) differences are fully reflected in the Canadian price (PS02). Figure 3.1 shows the U.S. soybean price, converted to Canadian dollars, and the price of Chatham soybeans. As is clear from figure 3.1 both prices move closely together. Figure 3.2 is a plot of the difference between the two price series which shows that Canadian beans are almost always priced below U.S. beans and that the discount has increased from less than ten dollars per ton, between 1968 and 1975, to twenty dollars per ton by the end of the 1970's. The increase in the spread between the two price series has been caused primarily by an increase in handling fees for Ontario middlemen (Jaeger; 1973, 1977).

The results of regressing quarterly Chatham soybean prices on exchange rate adjusted U.S. prices, and a linear time (Time) trend, confirms the close correlation between the two price series which is obvious from figure 3.1 (equation 3.1).

$$
\begin{array}{lllll}
\text{PS02} & = 14.75 & + 0.996\ \text{PS04*ER34} & - 0.37\ \text{Time} & \\
\text{t-values} & (2.49) & (53.71) & (-3.33) & \\
 & + 21.76\ \text{D733} & & & \\
 & (5.38) & & & (3.1)
\end{array}
$$

$R^2 = .991$ D.W. = 2.00 RHO = 0.564

Sample period 1968(1) - 1981(4)

Equation (3.1) shows that for every $1.00 change in the U.S. soybean price the Chatham price changes by $0.996. The coefficient on the time trend variable is negative indicating that Chatham prices have been declining relative to U.S. prices over time. Equation (3.1) is corrected for first order autocorrelation with an estimated RHO value of 0.56. The observation for the third quarter of 1973 (D733) was dummied out of the equation because of the U.S. soybean embargo which occurred during that quarter.

FIGURE 3.1: Comparison of Canadian (PSO2) and United States (PSO4*ER34) Soybean Prices, 1968(1) - 1982(3)

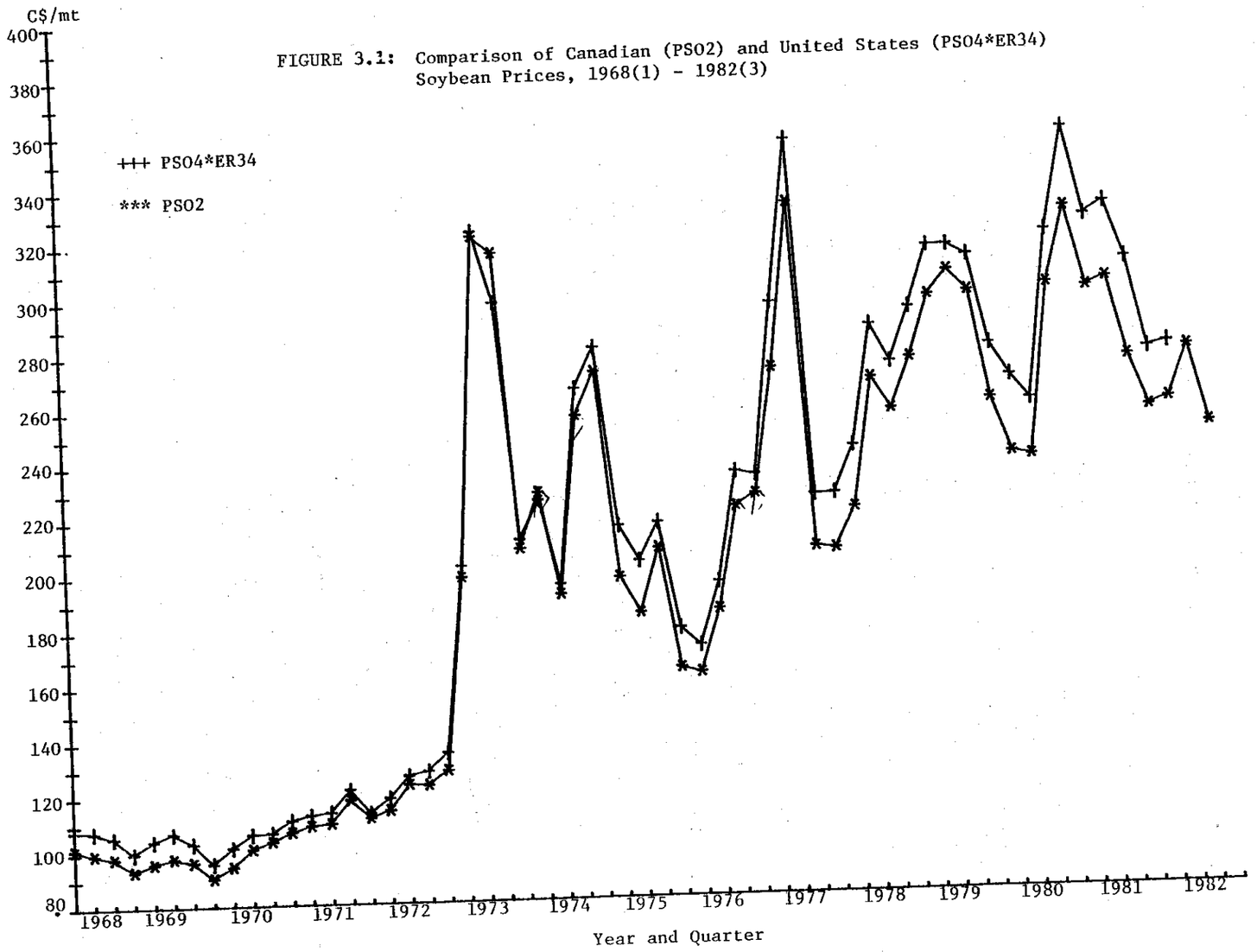
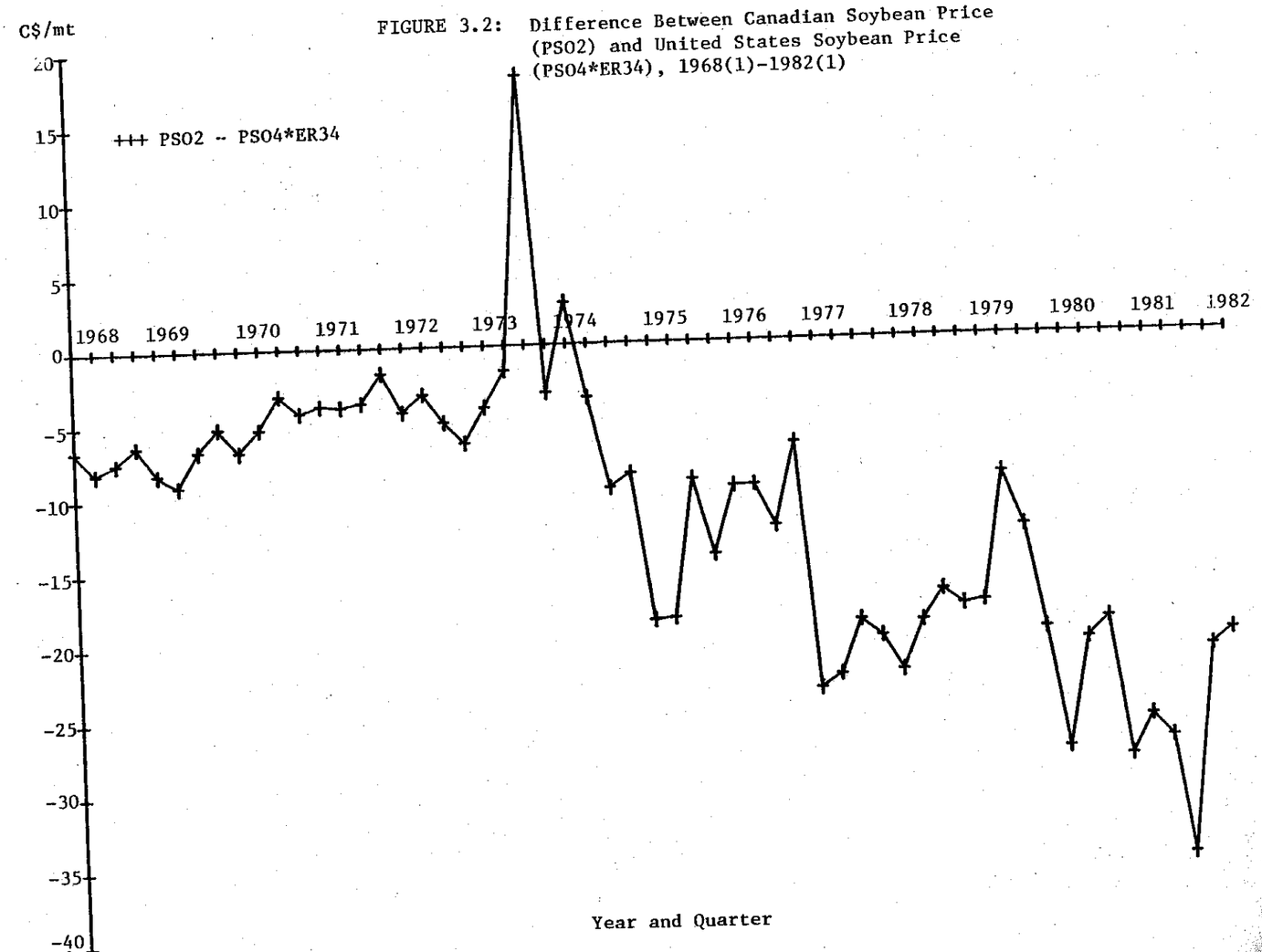


FIGURE 3.2: Difference Between Canadian Soybean Price (PSO2) and United States Soybean Price (PSO4*ER34), 1968(1)-1982(1)



3.2 Soybean Domestic Demand and Trade

Until 1980 Canada's three soybean crushers were located in the Toronto-Hamilton area and had a combined rated crushing capacity of approximately 920,000 mt per year.[7/] Between 1968/69 and 1978/79 soybean crushings varied from 547,000 mt in 1968/69, to 743,000 mt in 1978/79, and averaged 657,000 mt over the eleven year period (table 3.1).

Early in 1980 Maple Leaf Mills closed its small Toronto crushing plant and opened a new integrated crushing plant, jointly owned with Lever Brothers, in Windsor, Ontario. The opening of this new plant increased Ontario's soybean crushing capacity by forty percent to 1,280,000 mt per year. In 1982/83, 1,043,000 mt of soybeans were crushed.

Development of the Ontario crushing industry was aided by the fact that Canadian soybean oil and meal could be exported to the United Kingdom, before it joined the European Community at the British Preferential tariff rate, while U.S. exports were charged the higher most favored nation's tariff. Thus, it was more profitable for some U.S. soybeans to be crushed in Canada, and the products, now classified as Canadian, shipped to the United Kingdom. In addition, some protection for the domestic crushing industry is afforded by the tariff on imported soybean oil.

Ontario's crushing capacity exceeds its domestic soybean production and Canada has a long history as a net importer of soybeans. From 1968/69 through 1976/77 soybean net imports averaged 351,000 mt, with nearly all of the imports originating in the United States (table 3.2). Net imports declined to average 305,000 mt/year between 1978/79 and 1982/83, and are forecast to decline below 200,000 mt in 1983/84, even though soybean crushing capacity increased substantially in 1980. If crushing capacity had remained at its pre-1980 level, Ontario would be self-sufficient in soybean production.

Although a traditional net importer of soybeans Canada has always exported some soybeans. In fact, in 1980/81, 140,000 mt of soybeans were exported. Table 3.3 shows Canada's exports of soybeans by country of destination. In the early 1970's almost all of the soybean exports were to the United Kingdom, but by 1975 this market had disappeared. It was replaced to a large extent by sales to Asia (Hong Kong, Singapore, Japan, Malaysia) and more recently to the USSR. Nearly all of the soybeans exported to Asia are used in human food products.

Prior to 1980 exports of Ontario soybeans to the United States were insignificant, but in 1980, 6.9 percent, and in 1981, 7.4 percent of Ontario's soybean exports were to the United States. While this may seem a little like shipping "coal to Newcastle"; some soybeans are moving from Southwestern Ontario to processors in Ohio. Prior to 1980 this was impossible because of the 60¢/bushel import duty on soybeans shipped to the United States. This tariff was removed as a result of the "Tokyo" round of GATT negotiations on January 1, 1980, thus adding another marketing option for some Southern Ontario farmers.

7/ Estimated crushing capacity is based on 350 work days.

TABLE 3.1: Canada, Supply and Disposition of Soybeans, 1968/69 to 1983/84, '000 mt.

Crop Year Beginning Aug. 1	Carry-in	Imports	Production	Total Supply	Crush	Exports	Residual	Carry-out[a/]
1968/69	NA	340	245	626	547	30	49	NA
1969/70	NA	473	210	729	645	30	54	NA
1970/71	NA	428	283	795	637	22	136	NA
1971/72	NA	403	280	781	634	38	55	54
1972/73	54	299	376	729	612	30	63	24
1973/74	24	340	397	761	642	30	51	38
1974/75	38	346	299	683	634	8	14	27
1975/76	27	370	367	764	724	22	-12	30
1976/77	30	392	251	673	686	24	-70	33
1977/78	33	263	580	876	728	64	52	32
1978/79	32	350	516	898	743	91	27	37
1979/80	37	423	657	1117	938	54	66	59
1980/81	59	395	690	1144	930	140	35	39
1981/82	39	424	607	1070	962	83	-24	49
1982/83	49	419	857	1325	1043	117	100	65
1983/84[p/]	65	250	721	1036	945	55	NA	NA

NA = not available

a/ Stocks at crushing plant

p/ Preliminary

Source: Statistics Canada. Grains and Oilseeds Review. Cat. No. 22-201, Ottawa, and unpublished data.

TABLE 3.2: Canada, Imports of Soybeans by Country of Origin, 1970 to 1981

Country	Calendar Year (metric tonnes)											
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
United States	442382	424604	308478	231755	390765	385084	418907	317935	324369	350991	476505	373880
Switzerland	22	0	0	0	0	0	0	0	0	0	0	0
Hong Kong	8	27	5	13	0	4	17	6	18	44	51	75
China	0	31	6	21	20	13	0	9	57	51	22	0
West Germany	0	0	0	0	2	1	0	0	0	0	0	0
Japan	0	0	0	2	3	4	0	8	0	0	0	7
United Kingdom	0	0	0	0	0	0	0	8	0	0	0	0
Singapore	0	0	0	0	0	0	0	0	0	2	0	0
Taiwan	0	0	0	0	0	0	0	0	0	0	2	0
Chile	0	0	0	0	0	0	0	0	0	4	0	0
Total	442412	424661	308488	231791	390790	385106	418924	317971	324445	350991	476505	373880

Source: Statistics Canada. Imports Merchandise Trade. Cat. No. 65-203, Annual, Ottawa.

TABLE 3.3: Canada, Soybean Exports by Country of Destination, 1970 to 1981

Country	Calendar Year (metric tonnes)											
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
United Kingdom	26692	33020	40533	20419	4162	30	0	0	0	0	0	0
West Germany	1205	14	0	1	562	226	159	0	0	0	1	7
Netherlands	0	96	163	146	18	0	0	3941	5463	609	361	1042
Sweden	625	850	713	0	0	0	0	0	0	0	0	0
Switzerland	50	30	73	0	0	0	0	0	0	0	0	0
USSR	0	0	5	0	0	0	0	0	0	0	19309	27025
Jamaica	0	2	2	2	4	4	0	0	0	0	0	0
United States	3	17	25	275	22	46	351	95	30	593	6560	8880
France	0	0	0	0	64	490	73	75	8749	195	331	108
Spain	0	0	0	0	0	214	0	8885	0	0	0	18
Hong Kong	0	0	0	91	957	2192	5110	6502	14291	7875	11893	13328
Singapore	0	0	0	0	0	1021	9665	3222	13027	26416	27554	13162
Japan	0	0	0	5449	3903	3205	10609	10976	35302	6498	20848	49360
Malaysia	0	0	0	0	0	0	209	227	1744	394	1481	2222
Total	28577	34035	41380	27470	13140	8874	28580	38110	84513	46919	95739	119984

Source: Statistics Canada. Exports Merchandise Trade. Cat. No. 65-202, Annual, Ottawa.

3.3 Soybean Meal Domestic Demand and Trade

Canadian domestic demand for soybean meal increased rapidly from about 600,000 mt in the early 1970's to over one million metric tonnes by the early 1980's (table 3.4). During the 1970's domestic demand expanded more rapidly than domestic supply and net imports grew rapidly, from around 100,000 mt in 1970/71 to a record 438,968 mt in 1978/79. With the opening of the Windsor oilseed crushing plant net imports have declined to around 350,000 mt/year.

Until Canada lost its trade preference for soybean meal shipped to the United Kingdom, soybean meal exports were running around 150,000 mt per year; but since the mid 1970's exports of soybean meal have fallen to about 50,000 mt annually (table 3.5). In recent years Cuba and Ireland have been the largest importers of Canadian soybean meal. Canada's imports of soybean meal are almost totally from the U.S. (table 3.6).

Although soybean meal is the largest source of protein meal in Canada the consumption of rapeseed meal has increased dramatically, from less than 100,000 mt during the late 1960's to nearly 400,000 mt in 1981/82 (table 3.7). The consumption of both soybean meal and rapeseed meal responds to three main factors: (a) the production of livestock; (b) the price of feed relative to the price of livestock; and, (c) the price of soybean meal relative to the price of rapeseed meal. Econometric estimates of the demand for soybean meal show the direct price elasticity to be -0.8 and the cross price elasticity with respect to the rapeseed meal price to be 0.5 (Griffith and Meilke, 1982).

The price of soybean meal (PSM2) in Toronto (44 percent protein) follows the price of soybean meal established in the United States (PSM4) adjusted for exchange rate (ER34) variations. This is illustrated in figure 3.3 where the two price series are plotted, and in figure 3.4 where the difference beween the two prices is graphed. Soybean meal prices in Toronto have risen from roughly a $15/mt premium vis-a-vis soybean meal prices in Decatur, in the late 1960's and early 1970's, to approximately a $25-$30 per tonne premium in the early 1980's.

The close correlation between the two price series is confirmed by equation (3.2), where the Toronto price is regressed on the Decatur price, a linear trend (Time) and a dummy variable (D733) for the third quarter of 1973.

$$\begin{array}{lllll} PSM2 = & -7.37 & + 0.98\ PSM4*ER34 & + 0.48\ Time & \\ \text{t-values} & (-2.55) & (64.79) & (7.17) & \\ & + 82.47\ D733 & & & (3.2) \\ & (16.48) & & & \end{array}$$

$R^2 = .997$ D.W. = 1.42 Sample 1968(1) - 1981(4)

Equation (2) shows that for a $1.00 increase in the U.S. soybean meal price the Toronto price increases by $0.98. Over time the Toronto

TABLE 3.4: Canada, Supply and Disposition of Soybean Meal, 1970/71 to 1982/83. (metric tonnes)

Crop Year Beginning Aug. 1	Beginning Stocks	Production	Imports	Total Supply	Domestic Demand	Exports	Ending Inventory
1970/71	14050	498203	226665	738918	618445	111614	8859
1971/72	8859	493827	207650	710336	574196	123209	12930
1972/73	12930	482969	219873	715772	580037	118067	17667
1973/74	17667	503364	232976	754007	644936	94008	14983
1974/75	14983	499187	271147	785317	696001	83526	5790
1975/76	5790	569471	343811	919072	840386	69334	9352
1976/77	9352	540693	339241	889286	806533	51333	31420
1977/78	31420	566618	376337	974375	919663	45563	9149
1978/79	9149	576669	480286	1066104	1013032	41318	11754
1979/80	11754	738280	439107	1189141	1126513	42691	19937
1980/81	19937	731702	368735	1120374	1035901	74088	10385
1981/82	10385	757470	406314	1174169	1111057	48713	14399
1982/83	14399	832574	393474	1240447	1206739	19228	14480

Source: Statistics Canada. Grain Trade of Canada. Cat. No. 22-201 and Grains and Oilseeds Review. Cat. No. 22-007, Ottawa.

TABLE 3.5: Canada, Soybean Meal Exports by Country of Destination, 1970 to 1981

Country	Calendar Year (metric tonnes)											
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
United Kingdom	150470	120992	87050	96223	102318	57270	59637	34333	41929	21581	24052	12741
Ireland	0	0	0	0	3790	0	2039	0	0	0	20186	11066
Belgium-Lux.	0	0	0	6680	0	0	0	0	0	0	0	0
Trinidad-Tobago	9	0	0	0	0	1	9	0	0	0	0	2
United States	311	4	1873	9924	9421	1723	987	718	1622	853	3411	2499
Guyana	41	0	7	0	0	0	3	0	0	0	0	0
Denmark	0	0	0	0	0	0	0	6748	2956	0	4609	0
West Germany	0	0	0	0	0	0	29	3790	0	0	0	0
Netherlands	0	0	0	0	0	0	0	0	1001	0	0	0
Hong Kong	0	0	0	0	0	0	0	0	800	163	109	0
Cuba	0	0	0	0	0	0	0	0	0	0	25946	24359
Total	150831	120996	88929	112827	115529	58994	62704	45589	48307	22597	78313	50667

Source: Statistics Canada. Exports Merchandise Trade. Cat. No. 62-202 Annual, Ottawa.

TABLE 3.6: Canada, Imports of Soybean Meal by Country of Origin, 1970 to 1981

	Calendar Year (metric tonnes)											
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
United States	243454	207783	222146	190677	277442	294343	348670	351298	412633	464559	403839	389765
West Germany	0	0	0	667	0	0	0	0	6	0	0	4
China	0	0	0	0	0	2	0	5	0	0	0	6
Hong Kong	0	0	0	0	0	0	31	2	0	0	0	0
Costa Rica	0	0	0	0	0	0	72	0	0	0	0	0
Nicaragua	0	0	0	0	0	0	0	0	20	0	0	0
Total	243454	207783	222146	191344	277442	294345	348773	351304	412658	464559	403839	389765

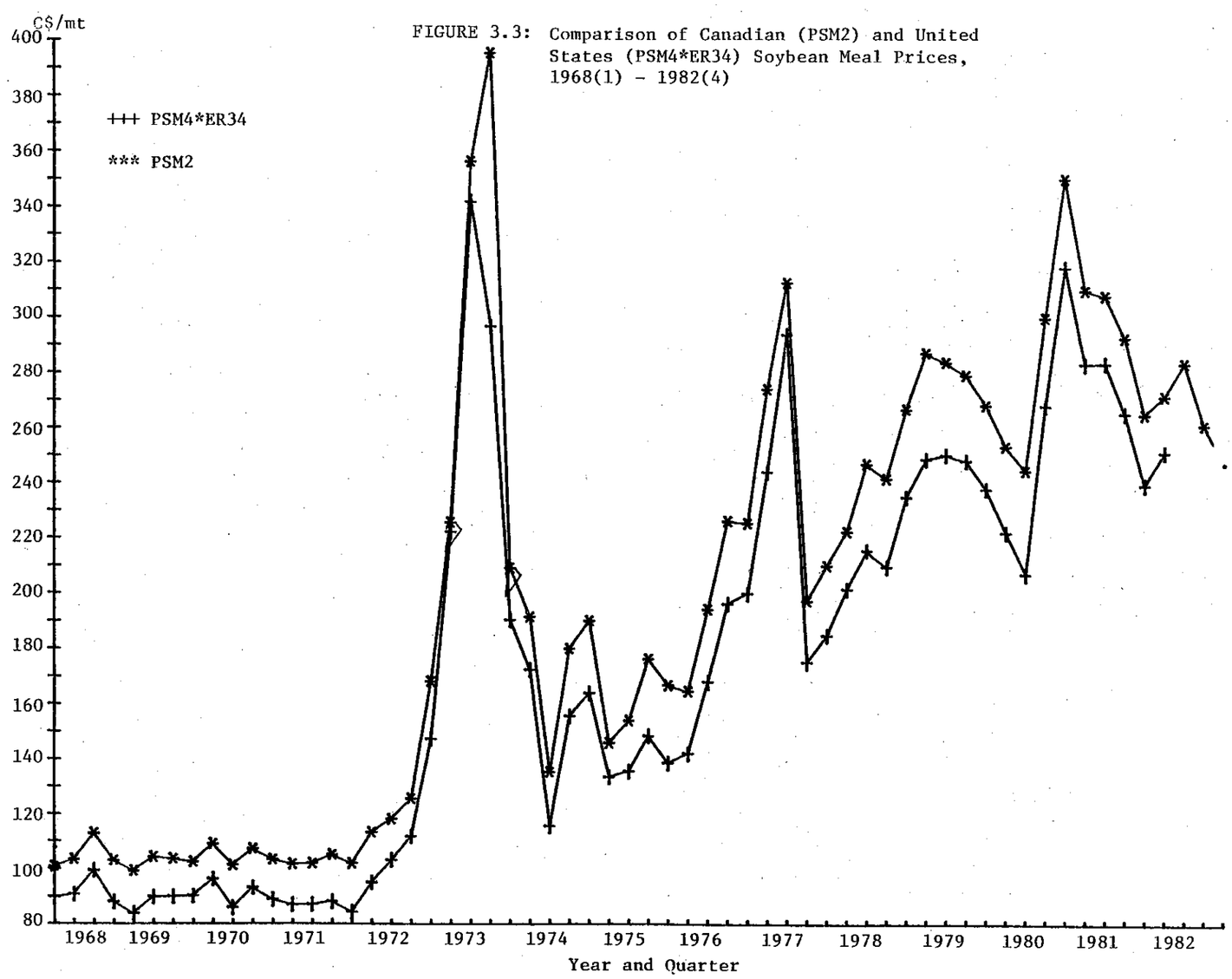
Source: Statistics Canada. Imports Merchandise Trade. Cat. No. 65-203 Annual, Ottawa.

TABLE 3.7: Canada, Rapeseed Meal Supply and Disposition, 1970/71 to 1982/83, '000 mt.

Crop Year Beginning Aug. 1	Supply			Disappearance		
	Beginning Stock	Production	Total Supply	Exports	Domestic Demand	Ending Stock
1970/71	2.7	112.8	115.5	0	110.5	5.0
1971/72	5.0	162.6	167.6	0	164.4	3.2
1972/73	3.2	204.2	207.4	19.5	183.3	4.6
1973/74	4.6	193.9	198.5	47.6	148.0	2.9
1974/75	2.9	157.8	160.7	10.7	149.7	.3
1975/76	.3	197.4	197.7	30.0	160.6	7.1
1976/77	7.1	314.9	322.0	107.1	203.4	11.5
1977/78	11.5	357.5	369.0	156.3	202.4	10.3
1978/79	10.4	416.7	427.1	169.7	239.7	17.7
1979/80	17.7	520.8	538.5	176.3	352.6	9.6
1980/81	9.6	573.6	583.2	204.0	357.9	21.3
1981/82	21.3	551.1	572.4	162.1	398.8	11.5
1982/83	11.5	521.7	533.2	114.5	392.2	26.5

Sources: Statistics Canada. Grain and Oilseeds Review. Cat. No. 22-007, Ottawa.
Statistics Canada. Oils and Fats. Cat. No. 32-006, Ottawa.

FIGURE 3.3: Comparison of Canadian (PSM2) and United States (PSM4*ER34) Soybean Meal Prices, 1968(1) - 1982(4)



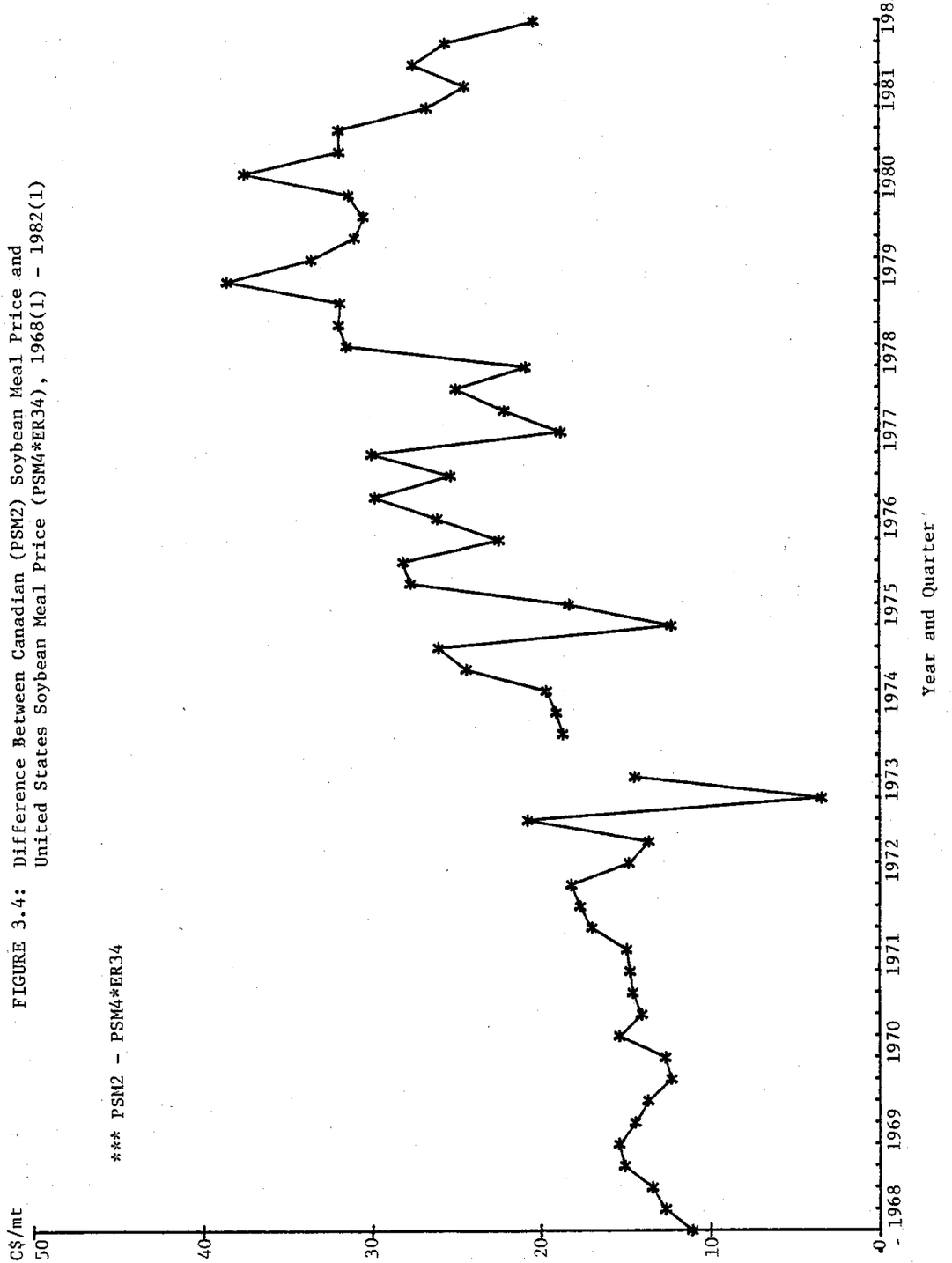


FIGURE 3.4: Difference Between Canadian (PSM2) Soybean Meal Price and United States Soybean Meal Price (PSM4*ER34), 1968(1) - 1982(1)

price has increased relative to the U.S. price by approximately $0.48/mt/quarter.

3.4 Soybean Oil Domestic Demand and Trade

Late in the 1960's Canada was a minor net exporter of soybean oil but during most of the 1970's it was a small net importer (table 3.8). With the opening of the Windsor crushing plant the situation changed again and in 1981/82 net exports equalled 13,625 mt and in 1982/83 20,306 mt. Canada's imports of soybean oil are totally from the United States and its exports involve small quantities to a sizeable number of countries (table 3.9).

Currently, soybean oil and rapeseed oil are the two major edible oils consumed in Canada (table 3.10). In fact, soybean and rapeseed oils share of the total vegetable oil market has expanded from 55.7 percent in 1960, to 69.1 percent in 1970, to 84.6 percent in 1981. Although the domestic demand for soybean oil has increased from roughly 100,000 mt in the early 1970's to 150,000 mt in the early 1980's its market share has declined from well above 40 percent in the 1960's to 33.2 percent in 1981/82. The increase in the market share for rapeseed oil has been dramatic, rising from less than 10 percent in the early 1960's to more than 50 percent by the late 1980's.

Griffith and Meilke (1982) report that the demand for total vegetable oil in Canada is quite responsive to changes in real income, with an estimated elasticity of 1.2. Conversely, total vegetable oil demand is very price inelastic with an estimated direct price elasticity of -0.2. The direct price elasticities for the individual vegetable oils are somewhat more elastic than the demand for total vegetable oil. Meilke and Griffith (1981) estimate the direct price elasticities for soybean and rapeseed oil to be -.42 and -.70, respectively. The cross price elasticity of demand for soybean oil with repect to a change in the price of rapeseed oil was estimated to be 0.25 and the cross price elasticity of rapeseed oil demand with respect to the soybean oil price 0.52.

The price of soybean oil is presumed to follow the price of soybean oil established on the Chicago futures market. However, no publicly reported soybean oil price is available after 1975 so it is impossible to quantify the relationship.

3.5 Tariff Structure

In recent years, Canada has adopted a policy of free entry for oilseeds and meals, and Most Favored Nations tariffs of 10 and 17.5 percent on crude and refined edible oils, respectively. As a result of the "Tokyo Round" of trade negotiations these tariffs will drop to 7.5 percent on crude oil and 15 percent on refined oil by January 1, 1987. The tariff reductions are scheduled to be phased in, declining by 0.5 cents/pound on January first of each year, beginning on January 1, 1983. Discussions are currently underway which may result in an acceleration of the Tokyo Round tariff reductions.

TABLE 3.8: Canada, Supply and Disposition of Soybean Oil, 1970/71 to 1982/83, (metric tonnes)

Crop Year Beginning Aug. 1	Beginning Stocks	Production	Imports	Total Supply	Domestic Demand	Exports	Ending Inventory
1970/71	3679	109917	24086	137682	103052	30880	3750
1971/72	3750	109433	19519	132702	82854	46128	3720
1972/73	3720	99124	16459	119303	103388	12547	3367
1973/74	3367	109168	33395	145930	135867	4943	5121
1974/75	5121	108344	19578	133043	124460	5588	2995
1975/76	2995	122695	30810	156500	148298	1044	7158
1976/77	7158	115617	26705	149480	144122	0	5358
1977/78	5358	123611	28050	157019	151656	1429	3934
1978/79	3934	129024	26084	159042	152911	1794	4337
1979/80	4337	157049	29080	190466	168910	9039	12517
1980/81	12517	158931	7608	179056	149021	18653	11382
1981/82	11382	164297	3648	179327	148909	17273	13145
1982/83	13145	179316	4773	197234	160029	25079	12126

Source: Statistics Canada. Grain Trade of Canada. Cat. No. 22-201 and Grains and Oilseeds Review. Cat. No. 22-007, Ottawa.

TABLE 3.9: Canada, Soybean Oil Exports by Country of Destination, 1970 to 1981

	Calendar Year (metric tonnes)											
Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
United Kingdom	21348	44220	31297	3311	7779	1961	0	0	0	787	0	0
Bahamas	0	3	8	4	0	0	0	0	0	0	0	0
United States	15	7	0	45	369	93	0	23	0	6	63	5399
West Germany	0	0	0	0	0	14	0	0	0	0	0	0
Jamaica	0	0	0	0	0	5	0	0	0	0	0	0
Leew.-Wind. Is.	0	0	0	0	1	1	0	0	0	0	3	6
Netherlands	0	0	0	0	0	0	0	0	1406	3004	2402	2542
Morocco	0	0	0	0	0	0	0	0	0	2911	11640	2980
Australia	0	0	0	0	0	0	0	0	0	0	31	0
Venezuela	0	0	0	0	0	0	0	0	0	2916	0	0
Barbados	0	0	0	0	0	0	0	0	0	2	2	0
Trinidad-Tobago	0	0	0	0	0	0	0	0	0	0	0	0
Total	21363	44230	31305	3360	8149	2074	0	23	1406	9626	14140	10927

TABLE 3.10: Canada, Market Shares of Various Vegetable Oils, Crop Year, 1960-61 to 1981-82

Crop Year Beginning Aug. 1	Coconut Oil	Corn Oil	Cotton Seed Oil	Palm[a/] Kernel Oil	Palm[a/] Oil	Peanut Oil	Rapeseed Oil	Soybean Oil	Sunflower Seed Oil	Other Oils
						(percent)				
1960/61	14.1	NA	12.8		10.7	1.3	4.4	51.3	1.3	4.2
1961/62	16.8	NA	10.1		13.4	4.1	5.9	43.3	.6	5.8
1962/63	12.8	NA	10.0	1.7	6.8	5.4	10.3	46.0	2.3	4.6
1963/64	10.4	NA	10.5	2.1	4.6	4.8	8.2	53.1	1.3	5.1
1964/65	10.5	4.4	10.5	2.2	5.1	2.1	10.2	51.5	2.0	1.5
1965/66	9.4	4.3	11.2	2.6	4.6	4.3	16.1	42.2	1.1	4.2
1966/67	8.9	3.3	2.5	2.1	5.7	6.7	21.6	41.9	1.1	6.2
1967/68	9.3	3.0	1.9	1.9	3.9	5.8	21.7	39.0	10.2	3.2
1968/69	8.2	3.8	3.1	3.4	6.3	4.0	24.9	36.1	9.5	0.5
1969/70	8.1	2.4	5.4	1.4	3.9	2.5	28.2	42.0	5.8	0.5
1970/71	8.6	3.0	4.5	2.6	4.8	3.5	28.4	40.7	3.4	0.5
1971/72	9.9	3.7	3.3	1.5	8.2	2.7	34.6	30.1	5.4	0.5
1972/73	9.1	1.5	3.3	2.2	9.3	2.2	32.8	34.3	4.4	0.8
1973/74	6.0	3.1	3.1	1.4	3.7	2.4	31.0	43.9	3.5	1.9
1974/75	7.4	3.2	3.6	1.4	8.9	1.9	30.0	40.6	1.2	1.8
1975/76	7.6	3.8	2.0	2.4	15.1	1.7	25.7	38.8	2.3	0.6
1976/77	7.7	4.0	1.4	2.1	11.1	1.9	33.6	36.9	b/	0.7
1977/78	5.8	4.2	1.1	1.4	5.4	1.6	43.7	36.0	b/	0.7
1978/79	5.3	4.7	1.1	2.2	5.0	1.4	42.7	36.9	b/	0.6
1979/80	5.0	3.8	1.1	1.9	4.1	1.1	44.5	37.8	b/	0.7
1980/81	5.0	3.4	0.6	2.1	4.7	1.0	50.0	32.0	b/	1.1
1981/82	4.8	3.3	0.8	2.1	2.5	0.7	51.4	33.2	b/	1.0

NA - Data Not Available prior to 1964.

a/ Palm kernel oil and palm oil reported together prior to 1962.
b/ Domestic production not reported.

Canada gives commonwealth preferences to other commonwealth nations, and in early 1977 Canada implemented Generalized System of Preference (GSP) concessions to some 170 LDCs on a wide range of products. Crude or crude degummed coconut, cottonseed, palm, palm kernel and peanut oils enter Canada duty free under the GSP scheme. Vegetable oils from the above five commodities, other than crude or crude degummed, face GSP tariffs of 12.5 percent.

3.6 Soybean Marketing

During the 1950's and 1960's the prices of most North American grain crops were very stable. Farmers normally sold their soybeans for cash at harvest (more than 50 percent of the soybeans were marketed prior to January 1) or stored for sale at a later date, in effect speculating in the hope of positive price changes. Because price varied little over the course of the crop year there was little risk of large losses and similarly little hope of large profits from storage activities. All of this changed in 1972/73, however, when prices increased from $114/mt in October to over $400/mt in June.

Following 1972/73, prices within a crop year were considerably more variable than previously, and differences in the price received in two different months could mean thousands of dollars to an individual farmer. The marketing system responded to the increased price variability by offering several alternative methods of pricing soybeans.

To analyze the different pricing methods it is necessary to understand that the price a local Ontario producer receives for soybeans can be decomposed into two portions: (a) the price of soybeans on the Chicago futures market; and, (b) the local "basis", where the basis is simply the difference between the current cash price and the nearby futures price. Both of these components of price vary throughout the year and different marketing strategies have different implications with regard to the degree of price risk an individual producer must assume. A brief description of some of the more common marketing methods are given below.[8/]

Spot or cash sale is the traditional method of marketing agricultural commodities. With this method the producer either sells his soybeans at harvest or stores them at home, or in a commercial elevator, for sale at a later date. With this selling method the producer assumes all of the risk of a price decline or a change in the local basis.

Fixed price forward contracts are sales contracts where a producer agrees to deliver a specific quantity of soybeans, for a specific price, at some future date. This type of marketing arrangement is often made prior to planting. the buyer assumes all of the price risk, although he will offset this risk by making an opposite transaction in the futures market.

8/ This discussion is based largely on the work of Martin and Hope (1983).

Deferred pricing, basis or option contracts are contracts for delivery of a specific quantity of soybeans for either current or future delivery. The basis is established at the time the contract is signed, but the price level is established at some later date, as specified in the contract. Buyers will normally pay a portion of the commodity's value when the commodity is delivered. With this marketing method the seller has eliminated the basis risk but must still assume the price risk.

Hedging on the Chicago futures market is a method by which producers can protect themselves from price risk. They are, however, still subject to basis risk. Hedging involves selling a futures contract equal to the long position held in the cash market. The long position in the futures market is offset when the cash grain is sold. While protecting the producer from price declines, hedging also prevents a producer from benefiting from price increases.

Replacing physical soybeans with a long futures position is a marketing alternative which allows a producer to "lock in" the basis while still speculating on possible price changes. This strategy involves selling cash grain and replacing it with a long position in the futures market. This strategy has several attractive features (a) the producer receives cash for his soybeans when they are sold, which can then be used to pay off debt or invested; (b) he has no physical storage costs; and, (c) he can still benefit from positive price changes. On the negative side the producer will have to meet margin calls if the market price declines and he cannot benefit from improvements in the basis.

There are undoubtedly other marketing alternatives and strategies which a producer can use; and, new alternatives which will be introduced in the future. However, for producers to benefit from the selection of marketing options available, research and educational programs are needed which will help a producer to select a marketing strategy that fits his particular financial and risk bearing situation. Research of this type, an example of which is the analysis by Martin and Hope (1983) for corn, has been given a top priority by the Ontario Agricultural Economics Research Coordinating Committee (1983) for several years, but financial support has been inadequate to mount a major research program.

3.7 Seasonality of Ontario Soybean Prices

Table 3.11 shows the monthly price for Ontario soybeans for crop years 1970/71 through 1981/82. Statistics Canada in compiling supply and disposition data for Ontario soybeans use August 1 as the beginning of the crop year but in general no new crop soybeans are available for sale until September. For this reason September is considered the first month of the crop year in analyzing the seasonal price patterns for soybeans.

In a perfect market, with production occurring in the fall and consumption spread out over the year prices should increase, from their harvest lows, by enough to cover the cost of storage from the harvest period until the time of sale. Unfortunately, the soybean market is not a perfect market because future supply and demand conditions are not

TABLE 3.11: Monthly Soybean Prices, Ontario, 1970/71 to 1981/82, ($/mt) a/

Crop Year	Month											
	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
1970/71	102.15	106.92	107.66	105.09	108.03	108.77	108.77	105.09	108.40	114.64	121.62	119.78
1971/72	112.07	113.17	109.86	110.23	109.13	112.80	119.78	124.19	123.46	121.25	122.72	125.30
1972/73	119.78	114.27	125.66	144.03	157.26	208.70	227.08	237.36	324.08	402.71	341.35	382.13
1973/74	222.30	204.66	203.56	214.58	222.67	236.63	224.14	196.21	189.97	185.55	235.89	263.09
1974/75	267.13	297.99	266.02	249.12	217.15	185.92	185.19	193.64	177.10	179.31	199.52	219.36
1975/76	200.62	175.27	159.84	154.69	160.20	162.41	160.94	160.94	176.74	213.85	224.50	212.01
1976/77	227.81	210.91	221.20	243.98	248.39	260.51	304.61	344.66	347.60	299.83	224.87	207.49
1977/78	185.63	187.43	211.64	215.75	209.95	205.98	243.13	259.88	273.40	266.61	256.72	257.86
1978/79	250.90	273.58	270.43	276.95	277.73	303.40	306.70	297.29	295.20	321.21	308.36	292.65
1979/80	290.22	263.02	255.38	255.24	233.64	247.84	233.05	228.91	238.93	242.56	285.61	293.57
1980/81	317.98	319.01	347.64	313.15	305.2	297.05	290.76	306.49	304.08	291.22	287.99	280.59
1981/82	248.47	255.85	253.47	251.48	257.21	255.86	256.09	272.4	277.27	275.84	274.80	244.46

Source: Statistics Canada. Grains and Oilseeds Review. Cat. No. 22-007, Ottawa.

a/ Producer price of soybeans, Chatham, Ontario.

known with certainty. This is particularly true in the case of Brazil, and more recently Argentinian, production which is harvested in March and April.

The seasonality of soybean prices is highlighted in table 3.12 where the monthly prices are expressed as a percent of the simple (unweighted) average crop year price. Looking at the average figures for the past twelve years it is clear that prices tend to increase over the crop year, from a low of 88.3 percent of the average price in September to 109.4 percent of the average price in August. In comparing the average seasonality over the twelve year period with that for the past five years it appears that there has been a reduction in seasonality. Prices have not been as low at harvest time, 96.0 percent versus 88.3 percent, nor as high at the end of the crop year, 105.8 percent in July compared with 108.6 percent. In fact, in the 5 year averages prices in August decline from the seasonal high in July.

The indices of seasonal averages tend to obscure the fact that price patterns between years vary greatly. For example, in 1972/73 prices rose from 51.6 percent of the average in September to 173.6 percent in June, dropping only slightly to 164.7 percent in August. In 1974/75, nearly the exact opposite happened, when the crop year's highest price occurred in October and the lowest price occured in May, at 80.6 percent of the crop year average. These examples should highlight the fact that a farmer hoping to market his soybeans for the season's highest price faces a difficult task.

Due to the seasonality in soybean prices farmers use various marketing strategies in an attempt to obtain the highest price for their crop (see section 3.6). One of the most common strategies is to store soybeans, at harvest, for sale at a later date. Fisher (1981) found that prior to the 1970's Ontario farmers typically marketed more than one-half of their soybean crop between September 1 and December 31. Between the years 1970/71 and 1981/82 the percent of the soybean crop marketed in the first four months of the crop year dropped to 41.9 percent, and over the most recent five year period (1977/78-1981/82) the percentage has declined even further to 38.2 percent (table 3.13). Clearly, farmers are delaying to a larger extent the sale of their soybeans in the hope of benefitting from seasonal price increases.

The profitability of holding soybeans from harvest for sale at a later date depends on (a) the price change between harvest and the date of sale; (b) the physical cost of storing soybeans; and, (c) the opportunity cost of the money tied up in soybean inventories. In order to judge the profitability of storing soybeans three different marketing alternatives are compared in table 3.14.[9/] The strategies involve delaying the sale of soybeans (1) until December; (2) until March; and (3) until May.

Over the past twelve years price changes between October and December have averaged $1.02/mt (table 3.14). In three years (1972/73,

---

9/ Physical storage costs are assumed to be $0.73/mt/month (2¢/bu/month) and the opportunity cost of capital equal to the bank lending rate on prime business loans.

TABLE 3.12: Seasonality of Ontario Soybean Prices, 1970/71 to 1981/82

Crop Year	Monthly Price as a Percent of the Crop Year Average Price											
	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
1970/71	93.1	97.4	98.1	95.7	98.4	99.1	99.1	95.7	98.8	104.4	110.8	109.2
1971/72	96.6	97.6	94.7	95.0	94.1	97.2	103.2	107.1	106.4	104.5	105.8	108.0
1972/73	51.6	49.3	54.2	62.1	67.8	89.9	97.9	102.3	139.7	173.6	147.1	164.7
1973/74	102.6	94.5	94.0	99.1	102.8	109.2	103.5	90.6	87.7	85.7	108.9	121.5
1974/75	121.5	135.6	121.0	113.3	98.8	84.6	84.2	88.1	80.6	81.6	90.8	99.8
1975/76	111.3	97.3	88.7	85.8	88.9	90.1	89.3	89.3	98.1	118.7	124.6	117.6
1976/77	87.0	80.6	84.5	93.2	94.9	99.5	116.3	131.6	132.8	114.5	85.9	79.2
1977/78	80.3	81.1	91.5	93.3	90.8	89.1	105.2	112.4	118.3	115.3	111.0	111.5
1978/79	86.7	94.5	93.4	95.7	95.9	104.8	105.9	102.7	102.0	110.9	106.5	101.1
1979/80	113.5	102.9	99.9	99.8	91.4	96.9	91.1	89.5	93.4	94.9	111.7	114.8
1980/81	104.2	104.5	113.9	102.6	100.0	97.4	95.3	100.4	99.7	95.4	94.4	92.0
1981/82	95.4	98.3	97.4	96.6	98.8	98.3	98.4	104.6	106.5	106.0	105.6	93.9
Average (70/71-81/82)	88.3	94.5	94.3	94.3	93.5	96.3	99.1	101.2	105.3	108.8	108.6	109.4
Average (77/78-81/82)	96.0	96.3	99.2	97.6	95.4	97.3	99.2	101.9	104.0	104.5	105.8	102.7

TABLE 3.13: Percent of Ontario Soybeans Marketed by Month and Crop Year, 1970/71 to 1981/82

Crop Year	Month											
	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
1970/71	1.9	30.9	20.3	7.9	4.6	3.2	5.1	4.4	9.6	8.2	3.3	0.5
1971/72	1.3	30.1	25.5	5.8	4.9	5.2	8.8	7.1	3.9	4.1	2.1	1.1
1972/73	0.5	22.9	18.4	13.4	24.2	6.6	4.8	2.8	2.9	2.0	1.0	0.6
1973/74	1.4	14.7	4.0	6.9	12.7	9.5	4.6	8.1	9.5	15.1	8.5	4.8
1974/75	4.4	22.3	9.7	3.7	6.6	2.2	4.4	6.0	7.1	10.4	14.1	9.0
1975/76	3.1	12.0	5.0	4.5	6.8	8.0	8.2	14.2	12.5	15.8	4.8	5.0
1976/77	4.1	15.7	13.4	6.8	12.8	17.6	11.0	8.6	3.3	4.0	1.0	1.6
1977/78	0.5	14.4	9.4	5.8	12.1	7.4	16.4	10.8	10.5	4.9	5.3	2.4
1978/79	1.0	28.3	9.3	6.5	15.6	9.2	3.9	4.7	6.4	7.4	4.4	3.1
1979/80	1.9	14.3	10.1	6.6	7.4	4.7	7.6	9.2	9.6	9.6	11.1	7.9
1980/81	7.0	26.4	11.4	2.7	11.4	3.5	4.3	8.4	5.5	4.3	8.2	6.8
1981/82	5.1	12.8	9.8	8.1	17.1	5.7	10.1	12.9	4.6	3.6	4.4	5.7
12 year ave.	2.7	20.4	12.2	6.6	11.4	6.9	7.4	8.1	7.2	7.4	5.7	4.0
5 year ave.	3.1	19.2	10.0	5.9	12.7	6.1	8.5	9.2	7.3	6.0	6.7	5.2

Source: Statistics Canada, unpublished data from Ontario Soya-bean Growers Marketing Board.

TABLE 3.14: Estimated Profitability of Storing Soybeans from October until December, March and May, 1970/71 to 1981/82

Crop Year Beginning Sept.	Alternative 1: Store until December			Alternative 2: Store until March		
	Price Change Oct. to Dec.	Opportunity Cost of Storage ($/mt)	Net Gain or Loss	Price Change Oct. to March	Opportunity Cost of Storage ($/mt)	Net Gain or Loss
1970/71	-1.84	2.88	-4.72	1.84	7.20	-5.36
1971/72	-2.94	2.64	-5.58	6.61	6.59	.02
1972/73	29.76	2.60	27.16	112.80	6.51	106.29
1973/74	9.92	4.53	5.39	19.47	11.33	8.14
1974/75	-48.87	7.18	-56.05	-112.80	17.95	-130.75
1975/76	-20.58	4.30	-24.88	-14.33	10.75	-25.08
1976/77	33.07	5.07	28.00	93.70	12.67	81.03
1977/78	28.32	4.03	24.29	55.70	10.07	45.63
1978/79	3.37	6.47	-3.10	33.12	15.85	17.27
1979/80	-7.78	8.03	-15.81	-29.97	20.09	-50.06
1980/81	-5.86	8.16	-14.02	-28.25	20.39	-48.64
1981/82	-4.37	9.90	-14.27	0.24	24.76	-24.52
Average	1.02	5.48	-4.46	11.51	13.68	-2.17

TABLE 3.14 continued

Crop Year Beginning Sept.	Alternative 3: Store until May		
	Price Change Oct. to May	Opportunity Cost of Storage ($/mt)	Net Gain or Loss
1970/71	1.47	10.09	-8.62
1971/72	10.29	9.23	1.06
1972/73	209.81	9.11	200.70
1973/74	-14.70	15.86	-30.56
1974/75	-120.89	25.13	-146.02
1975/76	1.47	14.49	-13.02
1976/77	136.69	17.73	118.96
1977/78	85.97	14.09	71.88
1978/79	21.62	22.63	-1.01
1979/80	-24.09	28.12	-52.21
1980/81	-14.93	28.56	-43.49
1981/82	21.42	34.67	-13.25
Average	26.18	19.14	7.04

1976/77, 1977/78) there was a large positive price change between October and December, and in two years (1974/75, 1975/76) there was a sizeable decline in price. The average cost of holding soybeans was estimated to be $5.48/mt resulting in a net loss from soybean storage of $4.46. In fact, in only four of the twelve years did a hold and store strategy, between October and December, result in increased profitability.

Turning to alternative two, the average price change between October and March, of $11.51/mt is larger than the October-December price difference, but so are the storage costs at $13.68/mt. Consequently, this storage strategy also results in a net loss averaging $2.17/mt over the twelve years. This result is heavily influenced by one year, 1974/75, when the strategy resulted in a net loss of $130.75/mt.

Finally, the data for alternative three shows that the average price change between October and May was $26.18/mt and storage costs were $19.14/mt, for a net gain from storage of $7.04. However, storage was only profitable in four of the twelve years, although the gains in those years were substantial.

Tables 3.11 and 3.15 indicate that in most crop years the variation in price between months is substantial. In table 3.15 the coefficient of variation (COV) is seen to rise from 5.4 percent in 1970/71 and 1971/72 to a huge 45.7 percent in 1972/73.[10/] For crop years 1973/74 through 1977/78 the COV ranged between ten and twenty percent. Since 1978/79 the COV has fallen below ten percent. In dollar terms the range between the highest and lowest monthly price has varied from a low of $16/mt in 1971/72 to a high of $289/mt in 1972/73.

In table 3.15 several aspects of soybean price behavior are compared. In the first column is the simple average (unweighted) price over the crop year. This price represents the average return a farmer would have received if he marketed one-twelfth of his crop each month. In the second column is the crop year average price of soybeans, weighted by the percent of soybeans marketed each month. In general, the two price series are quite similar, only in 1972/73 is the unweighted average price substantially above the weighted average price.

If the difference between the highest and lowest monthly price is compared with the difference between the weighted average price and the lowest monthly price a measure of how successful Ontario farmers have been in selling at high prices emerges (table 3.16). Taking a ratio of the two price differences, calculated above, shows that producers generally sell more soybeans at low prices than at high prices. The difference between the weighted average price and the lowest monthly price is seldom more than 50 percent of the difference between the lowest and highest monthly average price. For example, in 1974/75 if all soybean sales had been made during the month with the highest average price (October) producers would have received a price $121/mt

---

10/ The coefficient of variation is a commonly used measure of variability. It is calculated as the standard deviation divided by the mean times 100.

TABLE 3.15: Average Soybean Price and Price Variation, Crop Year 1970/71 to 1981/82

Crop Year	Unweighted Average Price ($/mt)	Weighted Average Price ($/mt)	Price Range ($/mt)	Coef. of Variation (Percent)	Std. Dev. ($/mt)
1970/71	109.74	108.29	102-122	5.4	5.92
1971/72	117.00	114.35	109-125	5.4	6.30
1972/73	232.04	161.61	114-403	45.7	106.09
1973/74	216.60	212.25	185-263	10.3	22.30
1974/75	219.79	230.81	177-298	18.5	40.74
1975/76	180.17	179.54	155-225	14.1	25.38
1976/77	261.82	258.75	207-348	19.2	50.19
1977/78	231.17	230.72	186-273	13.7	31.71
1978/79	289.53	286.15	251-321	6.9	19.90
1979/80	255.66	254.59	229-293	9.0	22.98
1980/81	305.10	310.25	280-348	5.9	18.07
1981/82	260.27	259.18	244-277	4.4	11.55

TABLE 3.16: Comparison of Actual Producer Returns and Potential Returns, by Crop Year

Crop Year	Price difference ($/mt): Highest Month - Lowest Month (1)	Price difference ($/mt): Weighted Average Price - Lowest Month (2)	(2)/(1) Percent
1970/71	20.0	6.29	31.5
1971/72	16.0	5.35	33.4
1972/73	289.0	47.61	16.5
1973/74	78.0	27.00	34.6
1974/75	121.0	53.00	43.8
1975/76	70.0	24.54	35.0
1976/77	141.0	51.75	36.7
1977/78	87.0	44.72	51.4
1978/79	70.0	35.15	50.2
1979/80	64.0	25.59	40.0
1980/81	68.0	30.25	44.5
1981/82	33.0	15.18	46.0
Average	88.1	30.5	38.6

higher than for sales during the lowest price month (May). As it happened, the average price received by producers was only $53/mt above the lowest monthly price, or 43.8 percent of what was potentially possible. On average, over the twelve years, producers only received 38.6 percent of the potentially available return. While it is ridiculous to assume that all soybeans could be sold in a single month, even small increases in the percent of potential returns received by farmers could mean millions of dollars. This is particularly true because Ontario soybean prices are influenced only to a limited extent by the timing of Ontario soybean marketings. Prices for Ontario soybeans generally reflect the Chicago price of soybeans adjusted for exchange rates and transportation and handling charges (see section 3.1).

CHAPTER 4

ONTARIO SOYBEAN PROCESSING

4.1 Soybean Processing Capacity

There are three soybean processing plants in Ontario; Victory Soya Mills Ltd. in Toronto, Maple Leaf Monarch in Windsor and Canadian Vegetable Oil Processing (CVOP) in Hamilton. The combined crushing capacity of the three plants is approximately 3660 tonnes per day or 1.28 million tonnes per year, based on a 350 day year (Vinall).[11/] In 1982/83 production was 81.5 percent of rated capacity.

4.2 Technology Employed

The hexane (solvent) extraction process is used to process soybeans. Vinall (p. 24-25) describes the steps in the process as follows:

Cleaning	- removal of pods and sand.
Drying	- down to the optimum moisture content (10%).
Cracking	- passed between corrugated metals rolls each bean is broken into five or six pieces.
Dehulling	- the cracked beans are passed over air flotation tables and the "lighter" hulls are separated from the meats.
Cooking	- the cracked meats are cooked in order to destroy the cell structure, and become pliable.
Flaking	- the cooked meats are then passed between large steel rolls resulting in flakes about 0.01 inches thick.
Extraction	- the flakes are then conveyed to an extractor where they are placed in beds over which hexane is pumped. The hexane percolates down through the bed and exits at the bottom through a perforated mesh screen. As the hexane passes through the bed it dissolves (removes) the oil from the surface of the flakes to form a mixture called miscella which drains from the meal.

11/ CVOP normally crushes 350 days per year, Victory Soya 340 days per year and Maple Leaf Monarch 330 to 340 days per year.

The Miscella - is pumped through a filter and then into an evaporator where the temperatures are raised above the hexane boiling point causing the solvent to vaporize.

The Hexane - vapours are then cooled, condensed and put back into the process.

The Oil - is then stripped of hexane through the use of live steam, dried, cooled, hydrated (water added) and pumped through a centrifuge to separate phosphatides from the oil. The oil is then ready for delivery to the refinery.

The Phosphatides - are then dried and converted to lecithin.

The Meal - containing 35% hexane is conveyed to kettles that raise the temperature above the boiling point of hexane. The solvent vaporizes and is caught, condensed and put back into the system. The meal is toasted, dried, cooled, and milled ready for shipment.

4.3 Investment Pattern

From the mid 1960's until 1980 Ontario's soybean crushing capacity was 920,000 tonnes. In early 1980 Maple Leaf Mills closed its small Toronto crushing plant and opened a new crushing facility, jointly owned with Lever Brothers, in Windsor, Ontario. With the opening of this plant Ontario's soybean crushing capacity increased by nearly forty percent to 1.28 million metric tonnes. The cost of the Maple Leaf Monarch crushing facility was in excess of 60 million dollars.

In March of 1983 Canadian Vegetable Oil Processing opened a crushing plant capable of crushing 600 tonnes of soft seed per day at a cost of 20 million dollars, four million of which was provided by the government.

Early in 1983 only one of Ontario's oilseed crushers was considering an expansion of its soybean crushing capacity. The other two companies had no plans for expansion, but investment decisions regarding new or increased capacity, for either soft seed or soybean processing, may change depending on economic conditions and the profitability of oilseed crushing.

4.4 Institutional Structure

All three of Ontario's oilseed crushers are affiliated with large publicly owned corporations. Victory Soya Mills is owned by Central-Soya (United States); CVOP is a division of Canada Packers; and Maple Leaf Monarch is jointly owned by Maple Leaf Mills and Lever Brothers. Lever Brothers is in turn a subsidiary of Unilever which is

headquartered in the United Kingdom.

The three Ontario crushing plants employed about 380 people in 1982 and in 1980 generated a value added from their manufacturing operations of $40.9 million, or 47.6 percent of the value added from oilseed manufacturing in Canada (Statistics Canada, 1981).

Maple Leaf Monarch and Canada Packers are both involved in oilseed refining and feed manufacturing as well as soybean processing. Victory Soya Mills refines some soybean oil for inedible use but not for edible purposes. Spokesmen for all of the oilseed processing firms remarked that sales to refiners and feed manufacturers, owned by or affiliated with their parent companies, are handled on an arms-length basis.

4.5 Performance of the Processing Industry

Soybean processing results in two end products, soybean oil and soybean meal, which are produced in relatively fixed proportions; approximately 78.4 percent meal and 17.0 percent oil. The major uses of soybean oil are for margarine, shortening and salad oil. Soybean meal, which is sold containing either 44 or 48 percent protein is used primarily in animal feeds (including pet foods). In addition to the major uses of soybeans, oil and meal, there are a host of less important end uses. Figure 4.1 taken from Vinall (p. 26) shows that a large number of products are derived from soybeans.

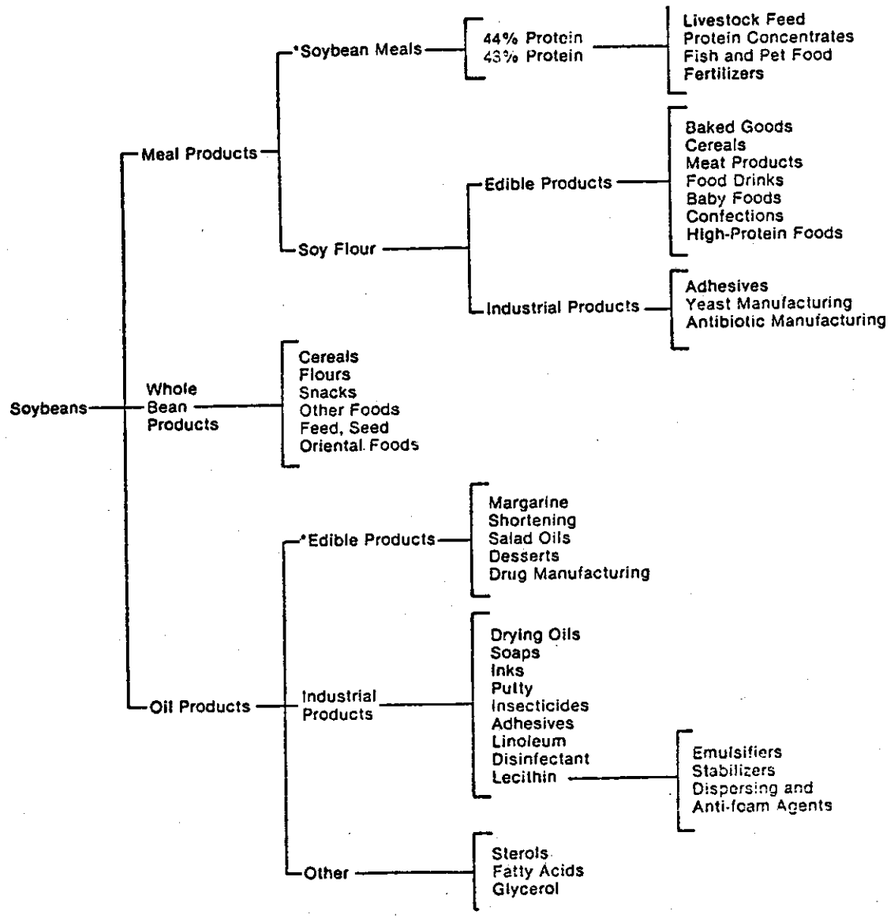
The Ontario soybean processing industry is currently geared towards the use of domestically produced soybeans to supply the domestic demand for soybean meal and soybean oil. Soybeans continue to be imported from the United States to augment the domestic supply but as Ontario production has grown imports of soybeans have declined. In fact, net imports of soybeans divided by total crush has fallen from 75.5 percent in 1963/64 to 28.9 percent in 1982/83; and, in 1983/84 net imports are forecast to decline to around 20 percent of soybean crush.

During the 1960's and early 1970's Canada was normally a small net exporter of soybean oil. From 1972/73 through 1979/80 Canada became a net importer of soybean oil with net imports as a percent of total domestic demand peaking at 20.1 percent in 1975/76. In 1980/81 Canada again became a net exporter of soybean oil with net exports equal to 12.7 percent of domestic demand in 1982/83. Industry spokesmen have cited increasing difficulty in selling soybean oil domestically because of competition from domestically produced canola oil whose price is normally discounted one or two cents a pound from the price of soybean oil.

Soybean meal is produced in Ontario containing either 44 or 48 percent protein. While sales of the two protein levels of soybean meal depends on market conditions, sales of 48 percent protein meal have been growing at the expense of 44 percent protein meal. Generally over 50 percent of the soybean meal produced is of the high protein variety.

In the early 1960's Canada was a small net exporter of soybean meal. However, since 1966/67 Canada has imported substantial quantities of soybean meal. Net imports of soybean meal peaked at 43.3 percent of

FIGURE 4.1: Soybeans and Their Products



Source: Vinall, G.H. (1982). "The Processing and Marketing of Oilseeds in Ontario." Notes on Agriculture 18(1):24-27.

total domestic demand in 1978/79. Since 1978/79 net trade as a percent of domestic demand has declined, equaling 31.0 percent in 1982/83.

In recent years slightly less than 50 percent of Canada's soybean meal imports have gone to Western Canada, table 4.1 (Industry, Trade and Commerce). There is little chance of soybean meal produced in Ontario replacing these imports because the Western Canadian market can be served more cheaply and efficiently by soybean processors in the United States midwest. About one-third of Canada's soybean meal imports come into Ontario, although it is impossible to know if the soybean meal is actually consumed in Ontario. While some parts of the Eastern Canadian soybean meal market can probably be served more efficiently from the United States, than from Toronto, it appears that there is still some room to replace imported soybean meal with additional soybean crushing, so as to capture the value added, even if the soybeans must be imported.

4.6 Financial Performance

Direct information on the profitability of Ontario's soybean processors is not available because they are parts of much larger corporate entities. Some indirect evidence on profitability could be obtained by looking at crushing margins (the value of soybean meal and oil products less the cost of soybeans) in Ontario and the United States. This procedure is hampered, however, by the fact that there is no publicly reported price for soybean oil in Canada. Balfour and Guthrie provide a private estimate of the Toronto soybean oil price for both Canadian and United States soybean oil, on a weekly basis, but they do not summarize this data and are unable to provide it over a long time period. Based on fragmented evidence, however, it seems clear that crushing margins in Ontario are considerably higher than in Central Illinois, the location for which United States crushing margins are calculated. This is probably not very surprising and crushing margins in less surplus regions of the United States may also be higher than in Central Illinois.

The major costs involved in oilseed processing are the cost of the seed, energy, labour and the opportunity cost of capital. Because Ontario's soybean crushers are located in large metropolitan areas they face higher property taxes and opportunity costs for capital than their rural based counterparts in the United States. Ontario soybean crushers may also face higher energy and labour costs than in the U.S.

Ontario's soybean crushing plants are of approximately the same size as the average crushing plant in the United States. Spokesmen for all three of Ontario's crushers are emphatic in stating that their plants are as technically efficient as plants of comparable size in the United States. They recognize, however, that there are economies of size in oilseed crushing and that plants with the capacity to crush 2,000 or more tonnes per day could do so more cheaply than plants with a capacity of 1,200 tonnes per day. Velde using 1977 data for the U.S. estimated that processing costs per short ton would decline by $1.66/ton as a plant's processing capacity increased from 1,200 to 2,000 short tons per day.

Finally, in assessing the profitability of Ontario's oilseed

TABLE 4.1: Imports of Soybean Meal by Province

	1977		1978		1979		1980		1981	
	Tonnes	'000 of $	Tonnes	'000 of $	Tonnes	'000 of $	Tonnes	'000 of $	Tonnes	'000 of $
Nova Scotia	2913	679	130	32	64	58	23	5	156	48
New Brunswick	779	2418	9729	2998	11401	3981	5881	2053	3039	1244
Quebec	99456	26329	103390	28260	101246	30393	60437	17675	49977	15455
Ontario	84149	21713	114857	28222	153275	43402	139072	39083	148543	45935
Manitoba	68543	16507	86357	19517	95377	24942	94145	25165	90873	26453
Saskatchewan	20127	5235	20806	5022	33915	9776	25640	7706	56917	17264
Alberta	38634	9564	46306	11501	49976	13168	47224	12621	22499	6694
British Columbia	29681	7861	31083	7501	19303	5563	31216	8694	17756	6426
TOTAL	351300	90306	412658	103053	464557	131283	403638	113003	389762	119518

Source: Dept. of Industry, Trade and Commerce (1981). Fats and Oils in Canada, Grain Marketing Office, Ottawa

crushing industry it is important to keep in mind several key features of the market's structure. First, one of the responsibilities of the Ontario Soybean Growers Marketing Board is to ensure that Ontario crushers pay a price for Ontario soybeans equivalent to the price of imported soybeans. Second, soybeans and soybean meal can be imported from the United States free of duty. Third, imported crude soybean oil is subject to a duty, but data from Balfour Guthrie indicates that it is not uncommon for Canadian soybean oil to sell at a discount from the price of imported U.S. soybean oil. The above facts show that the price Ontario soybean crushers pay for soybeans is monitored by the marketing board, and the price they can charge for soybean meal and oil is constrained by the price of imports from the U.S., consequently the scope for undue price or profit enhancement appears rather limited.

4.7 Major Changes in the Processing Industry

Ontario's current soybean crushing capacity should be sufficient to crush all of the domestically produced soybeans until the end of the decade. Consequently, at the prsent time there would seem to be little incentive for a major expansion of soybean crushing capacity. Any new investment in oilseed crushing facilities is likely to be for soft seeds, in fact, CVOP has recently made a major investment in canola crushing capacity. The success of this undertaking appears to hinge on two factors. First, the development of an Ontario canola producing sector; and, second, changes in canola freight rates along the lines suggested by the Federal government during the discussion of the Crows Nest Pass freight rates.[12/] The federal proposal was for canola, canola oil and canola meal to move east from Thunder Bay at commercially determined freight rates. This would represent a change from the present situation where canola oil and canola meal are shipped east of Thunder Bay at minimum compensatory rates while canola seed moves at commercial rates. The freight rate change for canola oil and meal was proposed to take place on August 1, 1983, but as of September 1, 1984 no action has been taken on this proposal. If the freight rate changes are implemented it will result in increased crushing of canola in Eastern Canada and probably an increase in canola crushing capacity. This would likely lead to less soybean crushing.

12/ Crop scientists feel Ontario has the potential to grow 25,000 acres of spring canola. The introduction of winter canola will require considerable plant breeding research before it becomes commercially feasible to grow.

CHAPTER 5

THE INTERNATIONAL SOYBEAN MARKET

5.1 Major Competitors

The world's major soybean producing countries are the United States, Brazil, China and Argentina (table 5.1). In recent years these four countries have produced close to 95 percent of the world's total soybean output. On the export side the U.S. clearly dominates trade with a market share in excess of eighty percent. Brazil and Argentina are the only other significant soybean exporters with Argentina recently surpassing Brazil as the second leading exporter. China, a large producer of soybeans is a small net importer of beans.

Trade on the import side is not as concentrated as are exports. The European Community is a large importer of soybeans, with imports running 10-12 mmt in recent years, or 40-45 percent of total imports. Japan is the largest single country importer, with imports ranging between 4.1 and 4.8 mmt since 1978/79. Spain and the USSR are smaller but significant importers.

In the next three sections more detailed information is provided with respect to the trade performance of the U.S., Brazil, Argentina, the EC and Japan.

5.2 Cost of Production of Competitors

A detailed comparison of cost of production data for the U.S. and Canada was given in section 2.4 and it is not repeated here.

For Brazil and Argentina the author was unable to find any detailed cost of production information. Thompson (1975) estimated that in 1975 production costs in Brazil, excluding the return to land and management, was $2.70-$2.95/bushel compared with costs of $2.20-$2.45/bushel in the United States. Costs to move the soybeans into export position were, however, estimated to be four times greater in Brazil than in the United States.

It should be noted that the international competitiveness of both Brazilian and Argentine soybeans are extremely dependent on the macro-economic and trade policies followed in these countries. With domestic inflation rates in the range of 50 to 100 percent the exchange rate must be constantly adjusted in order to keep exported products competitive on the world market. More is said on this matter in sections 5.3 and 5.4.

Soybean yields in Brazil are well below yields in the United States and Canada (table 5.2). Argentine soybean yields are approximately one-third higher than in Brazil and are as good as average yields in the United States.

A linear trend (Trend) fit to the yield data indicates a significant trend in yields for both Brazil (YLDS06) and Argentina

TABLE 5.1: World Soybean Production and Trade, 1978/79 to 1983/84, ('000 mt)[a/]

	78/79	79/80	80/81	81/82	82/83[b/]	83/84[c/]
Production						
United States	50859	61722	48772	54435	60677	43421
Brazil	10240	15156	15200	12835	14750	15200
China	7565	7460	7940	9325	9030	9760
Argentina	3700	3600	3500	4150	4000	6000
Other	5091	5771	5379	5552	5908	6136
Total	77455	93709	80791	86297	94365	80517
Exports						
United States	20117	23818	19712	25285	24634	20684
Brazil	638	1154	1798	858	1320	1300
Argentina	2791	2309	2700	1876	1417	2400
E.C.-10	352	270	171	224	149	116
Other	781	713	963	1080	1052	869
Total	24679	28264	25344	29323	28572	25369
Imports						
E.C.-10	12169	12895	10177	12355	11798	9950
Japan	4132	4165	4213	4486	4871	4700
Spain	2237	3100	2790	3196	3040	2800
USSR	1765	1470	1476	1485	992	1100
Other	5534	6596	7807	7760	7351	7113
Total	25837	28226	26463	29282	28052	25663

a/ For Northern hemisphere countries, marketing years begin in the first year shown, and Southern hemisphere countries begin in the second year. Argentina and Brazil are converted to an October-September basis.

b/ Preliminary.

c/ Estimated June 1984.

Source: U.S.D.A. Foreign Agriculture Circular, Oilseeds and Products. FOP 6-84, F.A.S., June 1984.

TABLE 5.2: Soybean Yields, Brazil and Argentina, 1970 to 1982, (bushels/acre)

Year	Brazil	Argentina
1970	17.0	15.4
1971	18.0	24.4
1972	19.2	17.1
1973	20.6	25.8
1974	22.8	21.4
1975	25.2	20.2
1976	26.0	23.8
1977	26.3	31.5
1978	18.2	32.1
1979	18.4	34.4
1980	25.7	26.4
1981	26.7	29.9
1982	23.3	31.1
Average (1978-1982)	22.5	30.8

Source: U.S.D.A. Foreign Agriculture Circular, Oilseeds and Products. FOP 6-81, F.A.S., March 1981, and FOP 7-84, F.A.S., July 1984.

(YLDSOAR), (equations 5.1 and 5.2).

$$\begin{array}{lrrl} \text{YLDS06} & = -15.99 & + 0.508\ \text{Trend} & \\ \text{t-value} & (-0.89) & (2.13) & (5.1) \end{array}$$

$R^2 = 0.29$ D.W. = 1.25 Sample = 1970-1982

$$\begin{array}{lrrl} \text{YLDSOAR} & = -63.93 & + 1.19\ \text{Trend} & \\ \text{t-value} & (-2.90) & (4.25) & (5.2) \end{array}$$

$R^2 = 0.60$ D.W. = 2.13 Sample = 1970-1982

In Brazil yields have been increasing by 0.51 bushels/acre per year while the estimated increase in Argentina is 1.19 bushels/acre per year. Examination of the data indicates, however, that yields have not advanced in either country since the late 1970's.

5.3 Recent and Expected Trends in Production for Major Soybean Exporters and Importers

5.3.1 United States[13]

Soybean production in the U.S. increased from 30.7 mmt in 1970/71 to a record production of 61.5 mmt in 1979/80 (table 5.3). Soybean production in the 1980's has been erratic, varying from 42.6 to 59.6 mmt. Most of the production increase since the early 1970's has been due to area increases since average yields have been relatively stable.

Soybean area in the U.S. has been trending upward, with an estimated trend of 1.697 million acres/year, over the period 1963 to 1976; after allowing for the impacts of price changes (Griffith and Meilke, 1982). The price of soybeans and corn relative to input prices; and, U.S. agricultural programs are the most important factors influencing soybean planting decisions. Griffith and Meilke (1982, p. 33) estimate the direct price elasticity of soybean area with respect to the lagged price of soybeans to be 0.50 and the cross elasticity with respect to the lagged price of corn to be -0.30. Changes in the U.S. soybean loan rate (minimum price), and in the weighted support price for corn were also estimated to influence soybean acreage with estimated elasticities of 0.07 and -0.15, respectively (Gallagher, 1978).

A simple linear trend fit to production data (QS04) from 1970/71 to 1982/83 (equation 5.3) shows a trend increase in production of 2.547 mmt per year.

13/ For more information on the U.S. oilseed sector see Houck, Ryan and Subotnik (1972) and Griffith and Meilke (1980).

TABLE 5.3: United States, Soybean Supply and Disposition, 1970/71 to 1983/84, '000 mt.

Crop Year Beginning Sept. 1	Supply			Disappearance			
	Beginning Stock	Production	Total Supply	Exports	Crush	Feed, Seed, Waste	Ending Stock
1970/71	6259.6	30671.9	36931.4	11811.5	20683.8	1741.8	2694.3
1971/72	2694.3	32005.4	34699.8	11348.9	19622.4	1769.0	1959.5
1972/73	1959.5	34590.9	36550.4	13036.2	19649.6	2231.7	1632.9
1973/74	1632.9	42102.4	43735.3	14669.2	22343.9	2068.4	4643.8
1974/75	4653.9	33094.0	37747.9	11457.7	19078.1	2177.2	5034.9
1975/76	5034.9	42102.4	47137.2	15104.6	23541.4	1823.4	6667.8
1976/77	6667.8	35080.8	41748.6	15349.5	21500.2	2095.6	2803.2
1977/78	2803.2	47953.7	50756.9	19050.8	25228.8	2231.7	4381.7
1978/79	4381.7	50865.8	55247.5	20112.3	27705.4	2694.3	4735.5
1979/80	4735.5	61534.2	66324.1	23813.6	30563.0	2204.5	9743.2
1980/81	9743.2	48933.5	58676.6	19704.0	27759.8	2694.3	8518.5
1981/82	8518.5	54131.6	62650.1	25283.2	28032.0	2422.2	6912.7
1982/83	6912.7	59601.9	66514.6	24630.0	30154.8	2340.5	9389.5
1983/84[a/]	9389.3	42646.7	52036.0	20683.8	26399.0	2095.6	2857.6

a/ Forecast

Source: U.S.D.A. Fats and Oils Situation. E.R.S., August 1984.

$$QS04 = -143406.0 + 2468.1\ \text{Trend} \quad (5.3)$$
$$\text{t-value} \quad (-4.92) \quad (6.44)$$

$R^2 = 0.79$ D.W. = 2.50 Sample = 1970/71 to 1982/83

The percentage increase in exports of soybeans, by the U.S. has been larger than the percentage increase in production, expanding from less than 12.0 mmt in the early 1970's to roughly 25.0 mmt by the early 1980's.

Equation (5.4) shows that fluctuations in U.S. soybean production (QS04) are reflected in soybean exports (EXS04), for every one tonne change in production exports move in the same direction by 0.29 tonnes. In addition, after accounting for fluctuations in exports resulting from supply fluctuations, exports have been trending upward by nearly 0.50 mmt per year.

$$EXS04 = -33453.9 + 498.5\ \text{Trend} + 0.29\ QS04 \quad (5.4)$$
$$\text{t-value} \quad (-7.78) \quad (2.58) \quad (4.19)$$

$R^2 = 0.95$ D.W. = 2.06 Sample = 1970/71 - 1982/83

Continued expansion of U.S. soybean exports will be influenced by four major factors: (a) the rate of increase in livestock output in soybean importing nations; (b) the price of soybean meal relative to the domestic price of cereals in the EC; (c) the value of the U.S. dollar in relation to the value of the currencies of the major importers; and, (d) the quantity of soybeans exported by Brazil and Argentina.

Growth in U.S. production of soybean meal and soybean oil (tables 5.4 and 5.5) has been considerably slower than the growth in soybean production. Since 1977/78 the production of soybean meal has ranged between 20.4 and 24.6 mmt and the production of soybean oil between 4.7 and 5.5 mmt.

Exports of soybean meal and oil have increased since 1970/71, but they peaked in 1979/80. Soybean oil exports declined 38.7 percent, between 1979/80 and 1983/84. Linear trends fit to the export data, from 1970/71 to 1982/83, show a trend increase in soybean meal (EXSM4) and soybean oil (EXSL4) exports of 0.25 mmt/year and 0.037 mmt/year, respectively (equations 5.6 and 5.7).

$$EXSM4 = -13942.8 + 251.8\ \text{Trend} \quad (5.6)$$
$$\text{t-value} \quad (-3.99) \quad (5.47)$$

$R^2 = 0.73$ D.W. = 1.90 Sample = 1970/71 - 1982/83

$$EXSL4 = -2038.3 + 36.9\ \text{Trend} \quad (5.7)$$
$$\text{t-value} \quad (-1.81) \quad (2.50)$$

$R^2 = 0.36$ D.W. = 1.26 Sample = 1970/71 - 1982/83

TABLE 5.4: United States, Soybean Meal Supply and Disposition, 1970/71 to 1983/84, '000 mt.

Beginning Oct. 1	Supply			Disappearance		
	Beginning Stock	Production	Total Supply	Exports	Domestic Demand	Ending Stock
1970/71	124.3	16361.1	16485.4	4135.9	12161.7	132.4
1971/72	132.4	15443.9	15576.4	3451.8	11893.2	174.2
1972/73	174.2	15158.2	15332.3	4304.6	10814.6	166.0
1973/74	166.0	17848.0	18014.0	5033.1	12488.3	459.9
1974/75	459.9	15151.8	15611.7	3900.0	11340.7	324.8
1975/76	324.8	18827.7	19152.5	4667.5	14108.5	322.1
1976/77	322.1	16772.0	17094.1	4135.9	12701.5	206.8
1977/78	206.8	20463.4	20670.2	5515.7	14934.1	220.4
1978/79	220.4	22093.6	22314.0	5996.5	16075.3	242.2
1979/80	242.2	24589.2	24831.4	7195.8	17430.7	205.0
1980/81	205.0	22055.5	22260.5	6154.3	15958.3	147.9
1981/82	147.9	22347.6	22495.5	6266.8	16069.9	158.7
1982/83	158.7	24234.5	24383.2	6449.2	17514.1	430.0
1983/84	430.0	20403.5	20833.5	4853.4	15739.7	240.4

Source: U.S.D.A. Fats and Oil Situation. E.R.S., August 1984.

TABLE 5.5: United States, Soybean Oil Supply and Disposition, 1970/71 to 1983/84, '000 mt.

Crop Year Beginning Oct. 1	Supply			Disappearance		
	Beginning Stock	Production	Total Supply	Exports	Domestic Demand	Ending Stock
1970/71	246.3	3748.9	3995.2	790.2	2854.5	350.6
1971/72	350.6	3579.8	3930.4	634.1	2940.2	356.1
1972/73	356.1	3402.4	3758.5	483.1	3041.3	234.1
1973/74	234.1	4080.1	4314.1	650.9	3303.1	360.2
1974/75	360.2	3345.2	3705.4	466.3	2984.6	254.5
1975/76	254.5	4368.1	4622.6	442.7	3612.4	567.4
1976/77	567.4	3890.9	4458.4	701.7	3406.9	349.7
1977/78	349.7	4666.6	5016.3	933.0	3752.6	330.7
1978/79	330.7	5136.0	5466.7	1058.7	4056.0	352.0
1979/80	352.0	5490.7	5842.7	1220.2	4073.7	548.8
1980/81	548.8	5112.0	5660.8	739.8	4133.6	787.4
1981/82	787.4	4980.0	5767.4	942.1	4325.0	500.3
1982/83	500.3	5461.2	5961.5	918.5	4471.1	572.0
1983/84	572.0	4859.8	5431.8	748.4	4354.5	328.8

Source: U.S.D.A. Fats and Oils Situation, E.R.S., August 1984.

5.3.2 Brazil[14]

Starting in the mid-1960's Brazil began an aggressive export development program. The goals of the program were: (a) to moderate the inflation rate; (b) to diversify exports; (c) to increase value-added processing; and, (d) to maximize foreign exchange earnings. One of the commodities benefitting from this program was soybeans. Soybean production rose from 1.5 mmt in 1970/71 to 15.2 mmt in 1981/82 (table 5.6).

Several factors account for this dramatic growth in Brazilian soybean production. First, climatic conditions in southern Brazil are such that it is possible to double crop wheat and soybeans. The high support price for wheat has substantially increased wheat area and spurred double cropping. Between 50 and 70 percent of soybean area in the largest producing areas was double cropped with wheat in 1975 (Reynolds, 1976, p. 23). Second, soybeans may have become more attractive to Brazilian farmers as a nitrogen fixing legume because of import controls on nitrogen fertilizer. Since Brazil has only a small, relatively high-cost nitrogen fertilizer industry, the squeeze on fertilizer supplies has made soybeans a relatively cheaper crop to cultivate. Third, both Brazilian coffee policy and frosts have contributed to soybean expansion. In the 1960's, when there was considerable excess coffee supplies, the government paid farmers to take out old coffee trees and plant other crops. In the State of Parana especially, much of this excess land was planted to soybeans. When the severe frost of July 1975 killed over 15 percent of the coffee trees and severely damaged all the rest in Parana, many of these released hectares also went into soybeans. Fourth, Brazilian soybeans tend to have a comparatively higher oil content (18.5-19.5 percent) than U.S. beans (17.7 percent). Thus, in 1973 and 1974 when vegetable oil prices in world markets rose to unprecedented levels, Brazilian soybean cultivation became more profitable. As Thompson (1979) states, "There is simply no other crop or beef which can compete with soybeans on a profit per hectare basis." Finally, Brazil has a rapidly growing poultry industry, so the domestic demand for protein feed supplements has increased markedly.

Soybean planting occurs in Brazil in October and November with harvest beginning in late February. Minimum producer prices are guaranteed by the government, $3.75 U.S. for 1983 crop soybeans, but in most years market prices have been well above the guaranteed price. Brazilian producers also receive government subsidized credit to meet a portion of their production and marketing costs.

The oilseed processing industry has also benefitted from substantial credit subsidization and the oilseed processing industry now has the capacity to crush 23-25 mmt of soybeans, eventhough domestic production has never exceeded 16 mmt. As a result of the excess crushing capacity Brazil imports some soybeans, 1.3 mmt in 1982/83, mainly from Paraguay and Argentina.

14/ The material in this section is based on Williams (1981), Griffith and Meilke (1980), Thompson (1979) and U.S.D.A. (1982).

TABLE 5.6: Brazil, Soybean Supply and Disposition, 1970/71 to 1982/83, '000 mt.

Crop Year Beginning February 1[a/]	Supply				Disappearance			
	Beginning Stock	Production	Imports	Total Supply	Exports	Crush	Feed, Seed, Waste	Ending Stock
1970/71	142	1509	0	1651	290	932	169	260
1971/72	260	2077	1	2338	230	1700	275	133
1972/73	133	3666	5	3804	1023	2132	360	289
1973/74	289	5012	5	5306	1788	2714	510	294
1974/75	294	7876	6	8176	2862	4302	600	412
1975/76	412	9892	0	10304	3516	5516	689	583
1976/77	583	11227	0	11810	3328	6374	748	1360
1977/78	1360	12513	0	13873	2581	8661	825	1806
1978/79	1806	9541	89	11436	659	8882	838	1057
1979/80	1057	10240	253	11550	638	9094	895	923
1980/81	923	15156	474	16253	1533	13009	620	1091
1981/82	1091	15200	991	17282	1502	13796	NA	NA
1982/83	NA	12835	1252	NA	810	12728	NA	NA

a/ April 1 until 1975/76

Source: U.S.D.A. Foreign Agriculture Circular, Oilseeds and Products. FOP 6-84, F.A.S., June 1984.

In the past Brazil has used a complex array of non-tariff measures to influence the size and composition of its soybean and products trade. These measures have included quantitative export restrictions, export taxes, import taxes, an overvalued exchange rate and valued added taxes. The primary purpose of these measures was to protect domestic price ceilings on soybean oil and meal and to encourage the export of soybean products rather than raw soybeans. In early 1982 all quantitative controls on exports were eliminated, as were duties and special foreign exchange taxes on imports of soybeans, meal and oil for domestic consumption. The differential value added tax continued to favor product exports over the export of unprocessed soybeans. The value added tax was 13 percent on soybeans, 11.1 percent on meal and 8 percent on oil (U.S.D.A., 1982).

The Brazilian policies designed to expand crushing capacity and exports of soybean products have been very successful and Brazil is presently the world's largest exporter of soybean meal and oil (tables 5.7 and 5.8). Because of the emphasis on domestic soybean crushing, Brazilian exports of soybeans have declined from their peak in 1975/76 of 3.5 mmt, or 35.5 percent of total production, to 0.81 mmt in 1982/83, or 6.3 percent of production. Soybean meal exports on the other hand have expanded from 0.58 mmt in 1970/71 to a peak of 8.6 mmt in 1981/82 (table 5.8).

Soybean production in Brazil seems to have stabilized in recent years at around 15 mmt. Expansion of production from this base is unlikely to be rapid as Thompson (1979) has estimated Brazil's long run soybean production capacity at 20 mmt. Assuming a 20 mmt soybean crop, sometime this decade, and that 90 percent of it will be crushed implies an estimated soybean meal output of 13.8 mmt and a soybean oil output of 3.3 mmt. Not all of this potential production would be available for export as domestic demand has been increasing rapidly. If Brazilian soybean production reaches 20 mmt it is unlikely soybean meal exports would be much greater than 10 mmt and soybean oil exports much greater than 1.3 mmt.

5.3.3 Argentina[15/]

Soybean production in Argentina is expanding rapidly, much as it did in Brazil a decade earlier, and for many of the same reasons. The Argentine economy is heavily in debt, inflation is rampant, there are cash flow problems and an uncertain policy environment. However, in the midst of this soybean production has expanded from less than 0.50 mmt in 1975/76 to an estimated 4.1 mmt in 1982/83 (table 5.9).

Approximately 85 percent of the soybeans grown in Argentina are double cropped with wheat. They also compete with corn and cattle for land. It appears that the stage of very rapid growth in soybean production is nearing an end as the Argentine's are reaching the limits of the land base on which it is easy to grow soybeans.

15/ Information on the Argentinian soybean market was obtained from Alan Maurer, International Economics Division, U.S. Department of Agriculture. General but dated discussions of Argentine agriculture can be found in Reca (1980), Hutchison, et al. (1972) and Instituto Nacional De Tecnologia Agropecuaria (1972).

TABLE 5.7: Brazil, Soybean Meal Supply and Disposition, 1970/71 to 1982/83, '000 mt.

Crop Year Beginning February 1[a/]	Supply			Disappearance		
	Beginning Stock	Production	Total Supply	Exports	Domestic Demand	Ending Stock
1970/71	8	691	699	588	105	14
1971/72	14	1190	1204	990	190	24
1972/73	24	1578	1602	1506	64	32
1973/74	32	2035	2067	1373	653	41
1974/75	41	3337	3378	2396	915	67
1975/76	67	4279	4346	3450	810	86
1976/77	86	4945	5031	4078	847	106
1977/78	106	6616	6722	5329	1255	138
1978/79	138	6842	6980	5368	1461	151
1979/80	151	7040	7191	5038	1971	182
1980/81	182	9968	10150	6936	2595	619
1981/82	619	10607	11226	8562	2220	444
1982/83	444	9879	10323	7822	2007	494

a/ April 1 until 1975/76.

Source: U.S.D.A. Foreign Agriculture Circular, Oilseeds and Products. FOP 6-84, F.A.S., June 1984.

TABLE 5.8: Brazil, Soybean Oil Supply and Disposition, 1970/71 to 1982/83, '000 mt.

Crop Year Beginning February 1[a/]	Supply				Disappearance		
	Beginning Stock	Production	Imports	Total Supply	Exports	Domestic Demand	Ending Stock
1970/71	8	166	3	179	3	162	14
1971/72	14	306	1	323	7	291	25
1972/73	25	383	0	409	38	339	32
1973/74	32	529	0	561	82	435	44
1974/75	44	797	0	841	16	675	150
1975/76	150	1022	0	1172	320	702	150
1976/77	150	1180	0	1330	430	800	100
1977/78	100	1585	0	1685	560	1025	100
1978/79	100	1629	0	1729	522	1110	97
1979/80	97	1669	127	1893	459	1313	121
1980/81	121	2463	0	2584	809	1513	262
1981/82	262	2585	0	2847	1212	1474	161
1982/83	161	2392	22	2575	873	1521	181

a/ April 1 until 1975/76.

Source: U.S.D.A. Foreign Agriculture Circular, Oilseeds and Products. FOP 6-84, F.A.S., June 1984.

TABLE 5.9: Argentina, Soybean Supply and Disposition, 1970/71 to 1982/83

Beginning April	Supply			Disappearance			
	Beginning Stock	Production	Total Supply	Exports	Crush	Residual	Ending Stock
1970/71	26	27	53	0	21	3	29
1971/72	29	59	88	0	36	6	46
1972/73	46	78	124	0	46	13	65
1973/74	65	272	337	50	195	30	62
1974/75	62	496	558	76	281	30	171
1975/76	171	485	656	0	529	-91	218
1976/77	91	695	913	111	496	71	235
1977/78	218	1400	1635	623	589	136	287
1978/79	235	2700	2987	1969	686	185	147
1979/80	287	3700	3847	2776	639	205	227
1980/81	147	3600	3827	2726	720	177	204
1981/82	227	3500	3704	2190	1081	198	235
1982/83	204	4150	4385	2151	1907	220	107

Source: U.S.D.A. Foreign Agriculture Circular, Oilseeds and Products. FOP 5-84, F.A.S., May 1984.

Soybean processing has been slow to catch up with the increased soybean production and between 1976/77 and 1980/81 soybean crushing ranged between 0.5 mmt and 0.7 mmt. Because of this Argentina is the second largest soybean exporter in the world, exporting 135 percent more soybeans in 1982/83 than Brazil. However, trade policies are in place which will result in the expansion of the domestic processing industry. In early 1983, unprocessed soybeans were subject to a 25 percent export tax while oil and meal were subsidized by 10 percent. Consequently, the percent of soybeans crushed domestically is likely to reach 50 percent, up from 18 percent in 1980/81, in the very near future.

Exports of soybean meal were modest, ranging between 0.25 and 0.28 mmt, between 1976/77 and 1980/81 (table 5.10). However, by 1982/83 soybean meal exports were 1.2 mmt. Growth in domestic soybean meal consumption has been expanding, roughly doubling between 1973/74 and 1982/83. A similar picture emerges for soybean oil, but both exports and domestic demand are modest (table 5.11).

In the future, Argentine soybean production will expand, although not as fast as during the past 10 years. Increasingly soybeans will be processed domestically and Argentina's exportable surplus of soybean meal and oil will grow.

5.3.4 Japan[16/]

Japan is the single largest importer of soybeans in the world with an estimated import share of 10.8 percent in 1982/83. Imports have increased by 31 percent between 1970 and 1980 (table 5.12). A linear trend line shows Japanese imports (IMSO5) increasing by 0.11 mmt per year (equation 5.8).

IMSO5 = -4234.2 + 106.2 Trend
t-value (-3.76) (7.08)

R^2 = 0.82 D.W. = 1.56 Sample = 1970 - 1982

Japan produces relatively small and declining quantities of oilseeds; mainly, rapeseed, soybeans and peanuts. To appreciate the role of these oilseeds in the Japanese economy, and the policies which affect them, it is important to understand the context in which these products are produced and consumed.

Japan today is a highly developed industrial nation where agriculture contributes only a minor proportion of total national output. The area of agricultural land has declined from a peak of 15.1 million acres in 1961 to about 13.3 million acres in 1978. The area of orchards, permanent plantations and arable grasslands has increased considerably since 1960, while the area of ordinary upland fields (where oilseeds are grown) has dropped to about one-half its 1960 size.

16/ For more detailed accounts of Japanese agriculture, including the oilseed sector, see Saxon (1975, 1976), Roberts, Bain and Saxon (1980) and Griffith and Meilke (1980).

TABLE 5.10: Argentina, Soybean Meal Supply and Disposition, 1970/71 to 1982/83, '000 mt.

Crop Year Beginning April 1	Supply			Disappearance		
	Beginning Stock	Production	Total Supply	Exports	Domestic Demand	Ending Stock
1970/71	0	16	16	0	16	0
1971/72	0	27		0	26	1
1972/73	1	35	36	0	32	4
1973/74	4	150	154	14	127	13
1974/75	13	214	227	12	176	39
1975/76	39	406	445	158	274	13
1976/77	13	384	397	251	131	15
1977/78	15	455	470	325	141	4
1978/79	4	536	540	370	156	14
1979/80	14	499	513	260	244	9
1980/81	9	561	570	277	277	16
1981/82	16	838	854	591	241	22
1982/83	22	1500	1522	1209	261	52

Source: U.S.DA. Foreign Agriculture Circular, Oilseeds and Products. FOP 5-84, F.A.S., May 1984.

TABLE 5.11: Argentina, Soybean Oil Supply and Disposition, 1970/71 to 1982/83, '000 mt.

Crop Year Beginning April 1	Supply			Disappearance		
	Beginning Stock	Production	Total Supply	Exports	Domestic Demand	Ending Stock
1970/71	0	4	4	0	4	0
1971/72	0	6	6	0	6	0
1972/73	0	8	8	0	7	1
1973/74	1	29	30	22	5	3
1974/75	3	48	51	38	10	3
1975/76	3	92	95	20	67	8
1976/77	8	81	89	67	18	4
1977/78	4	96	100	64	33	3
1978/79	3	112	115	59	52	4
1979/80	4	106	110	102	4	4
1980/81	4	121	125	88	25	12
1981/82	12	183	195	84	103	8
1982/83	8	312	320	220	82	18

Source: U.S.D.A. Foreign Agriculture Circular, Oilseeds and Products. FOP 5-84, F.A.S., May 1984.

TABLE 5.12: Japan, Soybean Supply and Disposition, 1970 to 1983, '000 mt.

Calendar Year	Supply				Disappearance		
	Beginning	Production[a/]	Imports	Total Supply	Crush	Residual	Ending Stock
1970	178.0	126.0	3244.0	3528.0	2505	790.0	253.0
1971	253.0	122.0	3212.0	3587.0	2521	815.0	251.0
1972	251.0	127.0	3396.0	3774.0	2636	860.0	278.0
1973	278.0	118.0	3635.0	4031.0	2739	891.0	401.0
1974	401.0	133.0	3244.0	3778.0	2720	838.0	220.0
1975	220.0	126.0	3334.0	3680.0	2620	812.0	248.0
1976	248.0	110.0	3554.0	3912.0	2701	851.0	360.0
1977	360.0	111.0	3602.0	4073.0	2878	856.0	339.0
1978	339.0	190.0	4260.0	4789.0	3296	894.0	599.0
1979	599.0	190.0	4132.0	4921.0	3398	955.0	568.0
1980[b/]	568.0	192.0	4165.0	4925.0	3470	940.0	515.0
1981[b/]	515.0	174.0	4213.0	4902.0	3462	945.0	495.0
1982[b/]	495.0	212.0	4486.0	5193.0	3564	950.0	679.0
1983[b/]	679.0	226.0	4871.0	5776.0	3846	1090.0	840.0

a/ From crop harvested in the fall of previous year for calendar year data.
b/ Beginning in 1980 data are for the previous October/September crop year, i.e. (1979/80).

Source: U.S.D.A. Foreign Agriculture Circular, Oilseeds and Products. FOP 6-81, F.A.S., March 1981, and FOP 6-84, F.A.S., June 1984.

On the demand side, the rapid westernization of Japanese tastes and the rapid growth in income and standards of living has changed the Japanese diet considerably in the direction of animal products. Consumers are eating less cereal products including rice, and more meats, fruits, vegetables and vegetable oils.

The area planted to oilseeds has shown a continually declining trend over the past two decades. Soybean production has declined from 0.507 mmt in 1955/56 to slightly more than 0.200 mmt in 1983 (table 5.12). For all practical purposes Japan is totally dependent on imported soybeans for its soybean oil and meal requirements. Most of the domestically produced soybeans and about 20 percent of imported beans go into human food products.

Japan crushes enough soybeans to meet most of its requirements for soybean meal. Imports of soybean meal since 1979 have been running roughly 5-10 percent of total domestic demand (table 5.13). A linear trend line fit to the domestic demand (DSM5) data shows domestic demand expanding by 0.098 mmt per year, between 1970 and 1982 (equation 5.9).

$$\begin{array}{lrl} \text{DSM5} & = -5029.3 + & 98.5 \text{ Trend} \\ \text{t-value} & (-6.23) & (9.29) \end{array} \qquad (5.9)$$

$R^2 = 0.89$ D.W. = 0.79 Sample = 1970 - 1982

Consumption of all oils and fats in Japan rose from 3.8 kg/head/year in 1959 to 11.5 kg/head/year in 1974, and has continued its growth since then. Meilke and Griffith (1981) estimate the income elasticity of demand for all edible vegetable oils in Japan to be 0.8.

About 75 percent of Japanese soybean oil is used in cooking or salad oils with the market equally divided between home and institutional use. Most rapeseed oil is consumed in liquid form for home cooking with only a small proportion used in manufactured products such as margarine. The market share of soybean oil in Japan has declined from a peak of 35 percent in 1972 to 30 percent in 1978. The trend increase in the domestic demand for soybean oil (DSL5) was 0.021 mmt between 1970 and 1982 (equation 5.10).

$$\begin{array}{lrl} \text{DSL5} & = -1062.0 + & 21.0 \text{ Trend} \\ \text{t-value} & (-7.11) & (10.71) \end{array} \qquad (5.10)$$

$R^2 = 0.91$ D.W. = 1.66 Sample = 1970 - 1982

Meilke and Griffith (1981) estimate the direct price elasticity of Japanese soybean oil demand to be -0.23 and its cross price elasticity with respect to the price of rapeseed oil to be 0.13.

Imports of soybeans, rapeseed, soybean meal and rapeseed meal enter Japan duty free while crude soybean and rapeseed oil are subject to a fixed tariff of 17,000 yen/mt. Japanese imports of soybean oil are negligible.

TABLE 5.13: Japan, Soybean Meal Supply and Disposition, 1970 to 1983, '000 mt.

Calendar Year	Supply				Disappearance		
	Beginning Stock	Production	Imports	Total Supply	Exports	Domestic[a] Demand	Ending Stock
1970	78	1929	72	2079	14	1958	107
1971	107	1941	39	2087	20	1969	98
1972	98	2035	52	2185	4	2115	66
1973	66	2109	277	2452	9	2214	229
1974	229	2096	132	2457	3	2216	238
1975	238	1988	18	2244	48	2091	105
1976	105	2075	193	2373	2	2248	123
1977	123	2225	314	2662	1	2539	122
1978	122	2542	340	3004	1	2816	187
1979	187	2645	283	3115	1	2940	174
1980[b]	99	2704	262	3065	1	2985	79
1981[b]	79	2702	290	3071	0	2926	145
1982[b]	145	2778	103	3026	8	2931	87
1983[b]	87	2995	177	3259	0	3176	83

a/ Calculated as a residual, includes stock change and waste.
b/ Beginning in 1980 data are for the previous October/September crop year, i.e., 1979/80.

Source: U.S.D.A., Foreign Agricultural Circular, Oilseeds and Products. FOP 6-81, F.A.S., March 1981, and FOP 6-84, F.A.S., June 1984.

TABLE 5.14: Japan, Soybean Oil Supply and Disposition, 1970 to 1983, '000 mt.

Calendar Year	Supply			Disappearance		
	Beginning Stock	Production	Imports	Exports	Domestic[a/] Demand	Ending Stock
1970	15	443	4	14	426	22
1971	22	449	2	20	427	26
1972	26	475	1	4	473	25
1973	25	483	6	9	485	20
1974	20	493	20	3	510	20
1975	20	458	14	0	445	47
1976	47	485	12	2	512	30
1977	30	532	0	1	547	14
1978	14	598	0	1	594	17
1979	17	621	0	3	609	26
1980[b/]	26	625	0	19	623	9
1981[b/]	9	626	9	2	632	10
1982[b/]	10	633	58	2	686	13
1983[b/]	13	681	8	4	687	11

a/ Calculated as a residual, includes stock changes and waste.
b/ Beginning in 1980 data are for the previous October/September crop year, i.e. 1979/80.

Source: U.S.D.A. Foreign Agricultural Circular, Oilseeds and Products. FOP 6-81, F.A.S., March 1981, and FOP 6-84, F.A.S., June 1984.

5.3.5 European Community[17/]

There are a wide variety of oilseeds cultivated in the EC but in volume terms, rapeseed and olives constitute 90 percent of total production.[18/] The less than 10 percent of total EC oilseed production not accounted for by rapeseed and olives include linseed and sunflowerseed, with very small amounts of hempseed, cottonseed, soybeans, mustardseed, poppyseed, sesameseed, castorseed and peanuts.

Since soybean production in the EC is negligible all of the soybeans crushed are imported. Soybean imports and crush roughly doubled between 1970 and 1982 (table 5.15). A linear trend line fit to the crush (CRSO7) data shows an average annual increase of 0.55 mmt (equation 5.11).

$$\underset{\text{t-value}}{\text{CRSO7}} = \underset{(-7.4)}{-32207.4} + \underset{(9.5)}{548.7}\ \text{Trend} \qquad (5.11)$$

$R^2 = 0.89$ D.W. = 1.87 Sample = 1970 - 1982

The EC is a large importer of soybean meal, during 1980-82 net imports accounted for roughly 40 percent of the domestic demand for soybean meal (table 5.16). Over the period 1970 to 1982 the domestic demand for soybean meal has more than doubled and net imports have grown slightly faster. A linear trend fit to the data on domestic soybean meal demand (DSM7) shows use increased by 0.85 mmt per year between 1970 and 1982 (equation 5.12).

$$\underset{\text{t-value}}{\text{DSM7}} = \underset{(-12.30)}{-53138.5} + \underset{(15.0)}{851.3}\ \text{Trend} \qquad (5.12)$$

$R^2 = 0.95$ D.W. = 1.72 Sample = 1970 - 1982

The rapid growth in EC oilmeal demand has been encouraged by the development of the Community's intensive livestock industry and the switch to compound feeding; the high income elasticity of demand for meats; and, the Common Agricultural Policy for cereals which makes oilmeals more price competitive. In fact, soybean meal in the EC is occasionally cheaper on a pound for pound basis than corn.

The EC is a net exporter of soybean oil with net trade running about 0.4 mmt between 1978 and 1982 (table 5.17). Net exports (NEXSL7) of soybean oil have been trending upward by 0.024 mmt per year and domestic demand (DSL7) by 0.073 mmt per year between 1970 and 1982 (equations 5.13 and 5.14).

17/ For more complete information on the EC see Paris and Ritson (1977) and Griffith and Meilke (1980).

18/ The EC here refers to the EC-9.

TABLE 5.15: European Community, Soybean Supply and Disposition, 1970 to 1982, '000 mt.

Calendar Year	Supply	Disappearance	
	Imports 2/	Exports 2/	Crush 1/
1970	5689.8	18.4	5671.4
1971	5788.2	16.6	5771.6
1972	6531.1	268.6	6262.5
1973	7118.3	112.5	7005.8
1974	9108.7	15.8	9092.8
1975	8233.5	110.5	8123.0
1976	9203.0	188.8	9014.2
1977	9137.1	120.1	9017.0
1978	11098.7	237.1	10861.6
1979	12015.4	352.4	11663.0
1980	12025.3	326.3	11699.0
1981	10414.1	159.7	10254.4
1982	12093.9	205.0	11888.9

1/ Calaculated as a residual, includes seed, feed, waste and stock change.

2/ Includes intra-EC trade.

Source: Trade Yearbook, FAO.

TABLE 5.16: European Community, Soybean Meal Supply and Disposition, 1970 to 1982, '000 mt.

Calendar Year	Supply			Disappearance	
	Production	Imports 2/	Total Supply	Exports 2/	Domestic Demand 1/
1970	4537.1	3566.0	8103.1	912.1	7191.0
1971	4617.3	4205.1	8822.4	957.2	7865.2
1972	5010.0	4498.1	9508.1	1300.3	8207.8
1973	5604.3	4336.9	9941.3	1792.8	8148.5
1974	7274.0	4761.9	12035.9	2034.4	10001.5
1975	6498.4	4756.7	11255.0	1521.7	9733.4
1976	7211.4	5630.2	12841.5	1686.8	11154.7
1977	7213.6	5646.1	12859.7	1672.4	11187.3
1978	8689.3	7825.3	16514.6	2455.4	14059.2
1979	9330.4	8424.3	17754.7	2836.9	14917.8
1980	9359.2	9417.0	18776.2	3170.9	15605.3
1981	8203.5	10553.1	18756.6	3581.9	15174.7
1982	9511.1	11442.1	20953.2	3942.7	17010.5

1/ Calculated as a residual includes waste and stock change.

2/ Includes intra-EC trade.

Source: Trade Yearbook, FAO

TABLE 5.17: European Community, Soybean Oil Supply and Disposition, 1970 to 1982, '000 mt.

Calendar Year	Supply			Disappearance		
	Production	Imports 2/	Total Supply	Exports 2/	Domestic 1/ Demand	
1970	1003.8	240.5	1244.4	288.5	955.9	
1971	1021.6	256.7	1278.2	282.4	995.9	
1972	1108.5	176.0	1284.5	333.4	951.1	
1973	1240.0	188.7	1428.8	404.1	1024.6	
1974	1609.4	392.4	2001.8	638.6	1363.2	
1975	1437.8	344.6	1782.3	670.3	1112.1	
1976	1595.5	323.7	1919.2	611.7	1307.6	
1977	1596.0	364.7	1960.7	619.0	1341.7	
1978	1922.5	436.7	2359.2	804.3	1554.9	
1979	2064.5	448.8	2513.3	858.5	1654.8	
1980	2070.7	476.6	2547.3	784.8	1762.5	
1981	1815.0	454.8	2269.8	775.9	1493.9	
1982	2104.3	508.2	2612.5	813.2	1799.3	

1/ Calculated as a residual includes waste and stock change.

2/ Includes intra-EC trade.

Source: Trade Yearbook, FAO.

$$\text{NEXSL7} = -1551.7 + 24.0\ \text{Trend} \qquad (5.13)$$
$$\text{t-value} \quad (-3.99) \quad (4.64)$$
$$R^2 = 0.66 \quad \text{D.W.} = 0.95 \quad \text{Sample} = 1970 - 1982$$

$$\text{DSL7} = -4149.0 + 73.1\ \text{Trend} \qquad (5.14)$$
$$\text{t-value} \quad (-6.26) \quad (8.28)$$
$$R^2 = 0.86 \quad \text{D.W.} = 2.6 \quad \text{Sample} = 1970 - 1982$$

As long as soybean crushing expands more rapidly than the domestic demand for soybean oil the EC will continue to expand exports of soybean oil. In 1978 soybean oil's share of the edible vegetable oil market in the EC was 40 percent and rapeseed oil's seven percent.

The demand for all edible vegetable oil in the EC is inelastic with an estimated income elasticity of 0.62 and a direct price elasticity of -0.15 (Meilke and Griffith, 1981). This masks the fact, however, that the demand for the individual edible oils are quite elastic. The direct price elasticity of soybean oil is calculated to be -1.06 and the cross price elasticity with respect to the rapeseed oil price is estimated to be 0.91 (Meilke and Griffith, 1981).

The EC charges a 10 percent ad valorem tariff on imports of crude soybean and rapeseed oil. Soybeans and soybean meal enter the EC duty free.

5.4 Policy and Economic Environment Affecting Soybean Supply and Demand

Canada is a small actor in the international market for soybeans and its products; nonetheless it has a stake in any changes in economic policies, or the economic environment, which will impact on the price of soybeans. Although changes in the economic and policy environment are difficult to forecast six factors which may influence the soybean market seem worthy of discussion.

First, the U.S. has traditionally taken a "hands off" policy stance towards the soybean market. Soybean growers are guaranteed a minimum price for their soybeans, but market prices have almost always been above this price, i.e., loan rate. In addition, soybean growers have never been required to reduce the area planted to soybeans, to be eligible for government price support programs, as they have for feed grains and wheat. However, in 1982/83 it appeared this "hands-off" policy stance was running into problems. The stocks/use ratio in the U.S. soybean market was forecast in late 1982 to be 21.1 percent, up from 9.3 percent in 1978/79, and soybean prices in Central Illinois fell below the loan rate, in the fall of 1982, for the first time in many years.[19] The U.S. also faced huge surpluses of feed grains and wheat. For 1983/84 wheat and feed grain producers were offered attractive options (payment-in-kind program) to reduce their wheat and feed grain acreage by anything from 10 to 50 percent.

19/ The actual ratio turned out to be 16.5 percent.

The payment-in-kind program, and the worst drought in many years resulted in very small soybean, wheat and feedgrain crops in 1983/84. Soybean production in 1983/84 was down 28.5 percent from 1982/83, feed grain production was down 45.6 percent and wheat production was down 14.3 percent. The combination of poor weather and policy induced supply reductions resulted in much stronger prices for soybeans and corn in 1983/84 compared with 1982/83. These gains came, however, at a tremendous federal government budget cost. During 1985 the United States government will enact the 1985 Farm Bill which will set the basic parameters of U.S. grains policy over the next four years. Although the direction of this policy is unknown, the cost of U.S. farm programs has become so large it seems unlikely that there will be major changes in the U.S. government approach to the soybean sector. Nonetheless changes in programs for other grains may have spill-over effects on the soybean market, but without knowledge of these changes it is impossible to forecast their effect.

Second, the EC is lookiong for ways to reduce its imports of soybean meal. The obvious way to do this is through a tariff on soybean meal, but the zero tariff on soybean meal is bound under the GATT. In addition, the U.S. has made it clear that any move to restrict soybean meal imports by the EC will invite retaliation. Consequently, the present situation appears to be a standoff, but any policy which restricts the entry of soybean meal into the EC would put downward pressure on soybean meal prices.

Third, both the EC and Japan have tariffs on imported soybean oil. Elimination of these tariffs, if done in concert with the elimination of tariffs on other vegetable oils, would have a small but positive impact on the price of soybean oil. For a complete analysis of this issue see Griffith and Meilke (1982b).

Fourth, both Brazil and Argentina are following policies designed to encourage exports of soybean meal and oil in place of raw soybeans. These policies, which are implemented using subsidies and taxes, raise the price of soybeans and lower the price of oil and meal. This makes it more difficult for an unsubsidized processing industry, such as Canada's, to compete on the world market.

Fifth, soybean oil will continue to face considerable competition on the world market from tropical oils, namely, palm oil and coconut oil. Between 1978/79 and 1982/83 the production of palm oil has increased by 34 percent and coconut oil by 14 percent (U.S.D.A., 1982). Further increases in tropical oil production will continue to put pressure on soybean oil prices.

Finally, any changes in Canada's freight rates on canola and/or canola products will change the competitiveness of rapeseed and rapeseed products in the Ontario market.

CHAPTER 6

OPPORTUNITIES FOR EXPANSION OF PRODUCTION, PROCESSING AND MARKETING OF SOYBEANS

Production of soybeans in Ontario is expected to increase in the future as a result of both area and yield increases. Average soybean yields are expected to increase by 4 to 5 bushels/acre over the next 10 years, as a result of improved inputs; primarily better soybean varieties, herbicides and planting equipment. Average yields should reach 38-40 bushels/acre by the end of the decade.

Trend increases in area will be concentrated outside the traditional soybean producing area, and production both within and outside the traditional production area will be strongly influenced by soybean/corn and to a lesser extent soybean/wheat price relationships. By 1990, soybean plantings may reach 1.2 million acres. Soybean production near 45 million bushels sometime this decade seems possible.

In 1982/83, 38.3 million bushels of soybeans were crushed in Ontario, compared with domestic production of 31.5 million bushels, and a crushing capacity of 47.0 million bushels. Soybean imports in 1982/83 were 15.4 mil. bu. leaving ample room for import replacement. In addition, some Ontario soybeans will continue to be exported to Asia for human food use. Efforts are currently underway to change the soybean grading system so that soybeans low in oil content, which are best suited for food use, can be separated from crushing quality soybeans.

The use of soybeans domestically for food will expand but this expansion will be slow, and food use of soybeans will not be a major factor in soybean use this decade.

Major increases in soybean processing capacity do not appear likely, in the near future, although a small crushing facility may be built in Eastern Ontario. Canada is importing the equivalent of 16.5 mil. bu. of soybeans, in the form of soybean meal, and this may result in some increase in soybean crushing and the replacement of imported soybean meal by domestically produced meal. However, more than one-half of the soybean meal imports go into Western Canada which can purchase soybean meal more cheaply from the U.S. than from Toronto.

CHAPTER 7

CONSTRAINTS TO EXPANSION OF ONTARIO SOYBEAN PRODUCTION, PROCESSING AND MARKETING

There are two major sets of constraints to increased soybean production. The first set of constraints are physical constraints and involve the development of higher yielding, earlier maturing, more disease resistant varieties of soybeans; and, related production requisites suited for Ontario conditions. This constraint can be overcome through continued and expanded research and development activity in both the public and private sectors.

The second set of constraints are economic constraints. Basically, producers will not grow soybeans unless they perceive this as the most profitable use of their resources. Clearly, as a small producing nation there is little Canada can do to affect the price of soybeans. Soybean producers are provided with some price protection under the Provincial and Federal Agricultural Stabilization Acts, and a review of the adequacy of these price guarantees would be prudent. However, for individual producers better and more sophisticated marketing strategies may be a way to improve the returns they can obtain from the marketplace. Again a research and educational program is necessary.

Increases in soybean processing are constrained primarily by the domestic demand for soybean oil. It appears that increases in soybean crush will result in soybean oil in excess of domestic market demands, thus requiring oil to be exported. The trend in the Ontario oilseed crushing industry seems to be to increase its capacity to crush canola. A possible outcome is that the industry will increase its crushing of canola; and, canola oil and meal will replace soybean meal and oil. This development is, however, highly dependent on an Ontario canola production sector and changes in the freight rate structure for canola, oil and meal. Since canola yields less meal, and more oil, than soybeans we may see the crush and importation of soybeans decline, and imports of soybean meal increase. Consequently, while Canada will almost certainly become more self-sufficient in soybean production in the future, it may import more soybean meal. Canada is presently a small net exporter of soybean oil, a position it is likely to maintain.

REFERENCES

Balfour Guthrie (Canada) Ltd. Vegetable Oils. Toronto.

Canada Grains Council (1982). Statistical Handbook 82. Winnipeg.

Dept. of Industry, Trade and Commerce (1981). Fats and Oils in Canada. Grain Marketing Office, Ottawa.

Fisher, G. A. (1981). The Economics of Soybean Production in Ontario, 1980. Economics Branch, O.M.A.F., Toronto.

Gallagher, P. W. (1978). "The Effectiveness of Price Support Policy - Some Evidence for U.S. Corn Acreage Response." Agr. Econ. Research 30(4):8-14.

Griffith, G. R., and Meilke, K. D. (1980). A Description of the Market Structure and Agricultural Policies in Five Regional Oilseed and Oilseed Product Markets. AEEE/80/13, School of Agricultural Economics and Ext. Ed., University of Guelph.

Houck, J. P., Ryan, M. E., and Subotnik, A. (1972). Soybeans and Their Products: Markets, Models and Policy. Minneapolis: University of Minnesota Press.

Hutchison, J. E., Urban, F. S., and Dunmore, J. C. (1972). Argentina: Growth Potential of the Grain and Livestock Sectors. For. Ag. Econ. Rpt. 78, Economic Research Service, U.S. Dept. of Agriculture.

Instituto Nacional De Tecnologia Agropecuaria. (1972). Argentina: Projections of Supply and Demand for Selected Agricultural Products Through 1980. Under contract with the U.S. Dept. of Agriculture, Buenos Aires.

Jaeger, M. (1973). Pricing and Marketing Soybeans. Agdex 141/840, O.M.A.F., December.

Jaeger, M. (1977). Pricing and Marketing Soybeans. Factsheet No. 77-003, O.M.A.F., Toronto.

Jaeger, M. (1979). The Likely Effects on Ontario Soybean Producers of the Shift in the Location of a Soybean Crushing Plant from Toronto to Windsor. Economics Branch, O.M.A.F., June.

Martin, L. J. and D. Hope (1983). An Analysis of Strategies for Pricing Corn in Ontario. Research Bulletin AEEE/83/4, School of Agricultural Economics and Extension Education, University of Guelph.

McGregor, O. (1982). "Soybeans - The Human Consumption Approach." Notes on Agriculture. 18(1): 13-14.

Meilke, K. D., and Griffith, G. R. (1981). "An Application of the

Market Share Approach to the Demand for Soybean and Rapeseed Oil". Eur. Rev. Agr. Econ. 8(1): 85-97.

Nerlove, M. (1958). "Distributed Lags and the Estimation on Long-Run Supply and Demand Elasticities: Theoretical Considerations". J. of Farm Econ. 40(2): 301-14.

Ontario Agricultural Economics Research Coordinating Committee (1983). Ontario Agricultural Economics Research Coordinating Committee Annual Report. Presented to Ontario Agricultural Services Coordinating Committee, January.

Ontario Ministry of Agriculture and Food (1981). Soybeans: Updated Cost of Production, Per Hectare, Southern Ontario, 1980. Agdex 141/821, February, Toronto.

Ontario Ministry of Agriculture and Food (1982). Agricultural Statistics for Ontario, 1981. Pub. 20, Statistics Section, Economics Branch, Toronto.

Parris, K., and Ritson, C. (1977). EEC Oilseed Products Sector and the Common Agricultural Policy. Occasional Paper 4, Centre for European Agricultural Studies, Wye College.

Reca, L. G. (1980). Argentina: Country Case Study of Agricultural Prices and Subsidies. Staff Working Paper 386, World Bank, Washington, D.C.

Reynolds, G. (1976). "We Saw Brazil's Biggest Soybean Crop." Farm Journal, April.

Roberts, I. M., R. A. Bain and E. A. Saxon (1980). Japanese Agricultural Policies, Their Origins, Nature and Effects on Production and Trade. Policy Monograph No. 1, Bureau of Agricultural Economics, Australia.

Saxon, E. A. (1975). Food Consumption in Japan: A Review of Selected Japanese Data and Research Results. Occasional Paper 32, Bureau of Agricultural Economics, Australia.

Saxon, E. A. (1976). Farm Production in Japan: Determinants, Performance and Prospects. Occasional Paper 35, Bureau of Agricultural Economics, Australia.

Statistics Canada. Census of Canada, Agriculture: Ontario. Catalogue 96-806 (Bul. 12-2), Ottawa.

Statistics Canada. Imports Merchandise Trade. Catalogue 65-203, annual, Ottawa.

Statistics Canada. Exports Merchandise Trade. Catalogue 65-202, annual, Ottawa.

Statistics Canada. Grain Trade of Canada. Catalogue 22-201, annual, Ottawa.

Statistics Canada. Grains and Oilseeds Review. Catalogue 22-007, monthly, Ottawa.

Statistics Canada. Oils and Fats. Catalogue 32-006, Ottawa.

Statistics Canada (1981). Manufacturing Industries of Canada: National and Provincial Areas 1980. Catalogue 31-203, annual, Ottawa.

Thompson, R. L. (1975). Brazilian Soybean Production - Competition for Indiana Farmers? Purdue Farm Management Report, Purdue University, October.

Thompson, R. L. (1979). "The Brazil Soybean Situation and its Impact on the World Oils Market." J. of the Amer. Oil Chemists' Society, 56(5): 391a-398a.

U.S. Dept. of Agriculture (1981). Foreign Agriculture Circular, Oilseeds and Products. Foreign Agriculture Service FOP 6-81, Washington, D.C.

U.S. Dept. of Agriculture (1981). Costs of Producing Selected Crops in the United States - 1978, 1979, 1980 and Projections for 1981. Prepared by E.S.C.S. for the Committee on Agriculture, Nutrition and Forestry, U.S. Senate.

U.S. Dept. of Agriculture (1982). Foreign Agriculture Circular, Oilseeds and Products. Foreign Agriculture Service FOP 13-82, Washington, D.C.

U.S. Dept. of Agriculture. Fats and Oils Situation, Economic Research Service.

U.S. Dept. of Agriculture. Agricultural Statistics, annual, Washington, D.C.

Velde, P. D. (1979). "Economic Feasibility of Processing Soybeans at West Coast Locations". Fats and Oils Situation. FOP-294, Economics, Statistics, and Cooperative Service, U.S. Dept. of Agriculture, 20-25.

Vinall, G. H. (1982). "The Processing and Marketing of Oilseeds in Ontario". Notes on Agriculture 18(1): 24-27.

Williams, G. W. (1981). The U.S. and World Oilseeds and Derivatives Markets: Economic Structure and Policy Interventions. Ph.D. Thesis, Purdue University.