AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

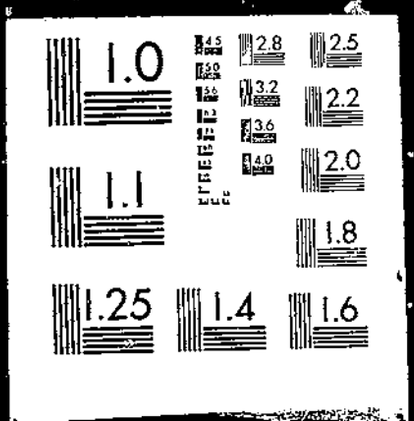
AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

USDA/FAER-71

WORLD SUPPLY AND DEMAND PROSPECTS FOR OILSEEDS AND OILSEED PRODUCTS IN 1980 WITH EMPHASIS ON TRADE BY THE LESS DEVELOPED COUNTRIES. (Foreign Agricultural Economic Report). / Lyle E. Moe (and others). Washington, DC: Economic Research Service. Mar. 1971. (NAL Call No. A281.9/Ag8F)

1 OF 3
USDA
FAER-71



WORLD SUPPLY AND DEMAND PROSPECTS FOR OILSEEDS AND OILSEED PRODUCTS IN 1980

WITH EMPHASIS ON TRADE BY THE LESS DEVELOPED COUNTRIES

FOREIGN AGRICULTURAL ECONOMIC REPORT NO. 71
U.S. DEPARTMENT OF AGRICULTURE • ECONOMIC RESEARCH SERVICE

ABSTRACT

World supply, demand, and trade of oilseeds and oilseed products are projected to 1980 under three alternative projection sets regarding economic development and production growth rates in the less developed countries (LDC's). Focus is centered on world demand prospects for exports of the LDC's. The projections suggest that world trade in oilseed products will continue to be highly competitive. With a continuation of recent supply and demand trends and policies, world prices for vegetable oils would decline and prices for oilcakes would remain stable. If LDC's increased their exportable supplies, world prices of both vegetable oil and oilcakes would decline, net earnings of LDC's from oilcakes would greatly increase, but combined net trade earnings from oilseed products would decrease.

World import markets for oilcakes will continue to be found almost exclusively in developed countries. Increased production in many LDC's would be absorbed by internal demand. Import demand for vegetable oils will become much greater in the LDC's. Per capita nutritional levels will improve in LDC's. There is an implied need for continued concessional sales of vegetable oil to importing LDC's. LDC's include both importing and exporting countries, making it difficult for them to achieve among themselves a consensus on policy objectives. Lower world prices for oilseed products would benefit importing countries but would adversely affect earnings of exporting countries.

Key words: Oilseeds, vegetable oil, oilcake, world supply and demand, projections, foreign trade.

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402

FOREWORD

Oilseeds and their products are some of the primary agricultural commodities traded on the world market. Not only is the volume of trade large, but also it grew substantially in the decade of the sixties. Further growth is expected due to rising levels of income and population growth.

This analysis focuses upon the expected long-term demand for oilseeds and their derivatives, especially from the perspective of potential exports of less developed countries (LDC's). Due to the independence of vegetable oil and oilseed meal markets, separate demand estimates are made under three sets of assumptions. Under these, the net trade earnings of LDC's are projected to be at lower levels in 1980 than they were in the 1963-65 base period.

Attention is called to several of the conclusions of the analysis. World trade is expected to continue to be highly competitive. Prices of vegetable oils will most likely decline and those of oilmeal remain relatively stable. The import demand for vegetable oils in LDC's and for oilmeal in developed countries will experience the greatest expansion. Increases in production will meet increased internal demand in many LDC's, several of which are importers of these commodities.

This study was part of a research project on "Demand Prospects for Agricultural Products of Less Developed Countries" conducted by the Economic Research Service under a participating agency service agreement for the Agency for International Development.

The research on demand prospects for agricultural products of less developed countries was conducted under the direction of an ERS Technical Advisory Committee, with Louis F. Herrmann as Chairman. Arthur B. Mackie and Anthony S. Rojko served as advisors and research leaders.

Senior Agricultural Advisor
Bureau of Technical Assistance
Agency for International
Development

Washington, D. C. 20250

March 1971

ACKNOWLEDGMENTS

The oilcake demand projections for the developed countries, contained in chapter 10, were developed by Donn A. Reimund, Marketing Economics Division (MED), Economic Research Service (ERS). Arthur Coffing, Foreign Regional Analysis Division (FRAD), ERS, contributed to the preparation of chapters 7, 8, and 9. Pauline Price and Lillian Loeb (both of FRAD) and Barbara Johnson and Nina Swann (both of MED) assisted in compiling statistical data for this report.

CONTENTS

		Page
	SUMMARY	ix
	PART I.--INTRODUCTION AND REVIEW OF PRICES	
1.	INTRODUCTION	1
	Basic Definitions	3
	Regional Grouping	4
2.	EXPORT EARNINGS, IMPORT COSTS, AND PRICES OF OILSEEDS AND OILSEED PRODUCTS.	6
	Export Earnings or Import Costs	6
	Prices	7
	PART II.--WORLD DEMAND FOR VEGETABLE OILS	
3.	INTERNATIONAL TRADE IN VEGETABLE OIL	18
	Level of Trade	18
	Relative Importance of Trading Regions	18
	Changes in Trade Levels	19
	Trade Patterns	20
	Trade in Animal Fats and Marine Oils	21
4.	PRODUCTION OF VEGETABLE OILS	31
	Production of Parent Materials	31
	Procedure for Computing Vegetable Oil Production	31
	Regional Production of Vegetable Oils, Oil-Equivalent Basis	32
	World Production of Edible Fats and Oils	39
	World Production of Animal Fats and Marine Oils	40
5.	CONSUMPTION OF FATS AND OILS	45
	Consumption of Vegetable Oils	45
	Consumption of Animal Fats and Marine Oils	46
6.	DEMAND ANALYSIS AND PROJECTIONS FOR VEGETABLE OILS	50
	Analysis	50
	Projections	52
	PART III.--WORLD DEMAND FOR OILCAKES	
7.	INTERNATIONAL TRADE IN OILCAKES	67
	Level of Trade	67
	Importance of Trading Regions	67
	Changes in Trade Levels	68
	Trade in Substitutes	69
8.	PRODUCTION OF OILCAKES	73
	Production of Parent Materials	73
	Procedure for Computing Oilcake Production	73
	World Production	73
	Regional Production	73
	Production of Fishmeal	74

		Page
9.	CONSUMPTION OF OILCAKES	77
	Regional Use of Individual Oilcakes	77
	Consumption of Fishmeal	79
10.	DEMAND ANALYSIS AND PROJECTIONS FOR OILCAKES	82
	Analysis	82
	Projections	88
	PART IV.--PROJECTED SUPPLY AND TRADE FOR OILSEEDS AND OILSEED PRODUCTS	
11.	PRODUCTION PROJECTIONS	96
	Vegetable Oils	97
	Oilcakes	97
	Competing Products	96
12.	TRADE PROJECTIONS	112
	Projection Set I	112
	Projection Set II	114
	Projection Set III	116
	Production Changes by Commodity	116
	Structure of the Oilseed Crushing Industry	117
13.	IMPLICATIONS FOR THE LESS DEVELOPED COUNTRIES	127
	Vegetable Oil Export Earnings and Import Costs	127
	Oilcake Export Earnings and Import Costs	127
	Total Export Earnings and Import Costs	127
	Methodology Used to Determine Values	128
	LITERATURE CITED	134
	APPENDIX A.--Regional Trade in Oilseeds and Oilseed Products, by Value, 1963-66	139
	APPENDIX B.--World Production of Oilseeds and Oilseed Products	158
	APPENDIX C.--Description and Uses of Oilseeds and Oilseed Products	191
	APPENDIX D.--World Population and Income by Region, 1965 and Projected to 1980	201
	APPENDIX E.--A Simultaneous Model for Developing Demand Estimates For Oilseeds and Oilseed Products	204

TEXT TABLES

Table		Page
1.	World trade in oilseeds and oilseed products, by value and region, 1963-66 average	13
2.	World trade in oilseeds and oilseed products, by value and commodity, 1963-66	14
3.	Price series of major oilseeds, fats and oils, and oilseed meals, 1955-68	15
4.	Correlation matrix of vegetable oil prices	16
5.	Correlation matrix of international oilcake prices	16
6.	World trade of vegetable oils and oilseeds, by region, averages 1955-57 and 1963-65, and annual rate of change	22
7.	Rank of countries in world trade of selected vegetable oils (oil equivalent), averages 1955-57 and 1963-65	26
8.	World trade in vegetable oils and oilseeds (oil equivalent), by region, average 1963-65	27
9.	World trade in oilseeds, oil-equivalent basis, by region, average 1963-65	28
10.	World trade in vegetable oils, by regions, average 1963-65	29
11.	World net trade of lard, butter, and marine oils, by region, averages 1955-57 and 1963-65, and annual rate of change	30
12.	World production of selected vegetable oilseeds, by region, average 1954-56 and 1965-67, and annual rate of change	41
13.	World production of selected vegetable oils (oil equivalent), by region, averages for 1955-57 and 1966-68, and percentage share of total	42
14.	Estimated world production of selected fats, oils, and oilseeds (fat or oil equivalent), averages for 1955-57 and 1966-68, and annual rate of change	43
15.	Estimated world production of lard, butter, and marine oils, by region, averages for 1955-57 and 1963-65, and annual rate of change	44
16.	Total and per capita availability of vegetable oils (oil equivalent), by region, averages 1955-57 and 1963-65	48
17.	Total and per capita availability of lard, butter, and marine oils, by region, averages 1955-57 and 1963-65	49
18.	Summary of regression analysis of regional per capita consumption of vegetable oils	58
19.	Elasticities computed from regression equations on per capita consumption of vegetable oils	64
20.	Total and per capita availability of vegetable oils, by region, average 1963-65, and projections to 1980	65
21.	World trade in oilcakes, including meal equivalent of oilseeds traded, by region, averages for 1955-57 and 1963-65, and annual rates of change	70
22.	Percentage distribution of world imports of oilcakes, by commodity, average 1960-64, annual 1964-67	71
23.	Fishmeal imports, by region, averages 1956-57 and 1963-65, and annual rates of change	72
24.	Fishmeal exports by major producer-exporters, average 1960-64, annual 1962-69	72
25.	Oilcake production, by region, averages for 1955-57, 1960-62, and 1965-67, and annual rates of change	75
26.	Fishmeal production averages for major producers, 1955-57 and 1963-65, and annual rate of change	76
27.	Oilcake and fishmeal availability, by region, averages for 1955-57 and 1963-65, and annual rates of change	80
28.	Availability of oilcakes in major developed regions, by type of cake, averages for 1955-57 and 1963-65, and annual rates of change	81

TEXT TABLES--CON.

Table		Page
29.	Summary of regression analysis of regional availability of oilcakes....	93
30.	World oilseed meal consumption, 1963-65 average, and demand projections to 1980.....	95
31.	Levels at which producer prices for selected oilseeds, oils, and fats were stabilized or supported, 1962-67.....	100
32.	Linear trends fitted to regional oilseed production and 1980 production estimates.....	103
33.	Production of oilseeds, by region, average 1963-65, and projections for 1980.....	107
34.	World production of vegetable oil, by region and commodity, oil-equivalent basis, average 1963-65, and projections to 1980, and annual rate of change.....	108
35.	World production of oilcakes by region and commodity, meal-equivalent basis, average 1963-65, and projections to 1980, and annual rate of change.....	110
36.	Vegetable oil: World supply, demand, and trade, by region, average 1963-65, and projected to 1980 under projection set I.....	119
37.	Oilcakes: World supply, demand, and trade, by region, average 1963-65, and projected to 1980 under projection set I.....	120
38.	Vegetable oil: World supply, demand, and trade, by region, average 1963-65, and projected to 1980 under projection set II.....	121
39.	Oilcakes: World supply, demand, and trade, by region, average 1963-65, and projected to 1980 under projection set II.....	122
40.	Vegetable oil: World supply, demand, and trade, by region, average 1963-65, and projected to 1980 under projection set III.....	123
41.	Oilcakes: World supply, demand, and trade, by region, average 1963-65, and projected to 1980 under projection set III.....	124
42.	Alternative 1980 projections of oilcake production, by commodity.....	125
43.	Alternative 1980 projections of vegetable oil production, by commodity.	125
44.	Value of the oil and cake components of selected oilseeds and fish products, 1967.....	126
45.	Vegetable oils: Net export earnings and net import costs for the less developed regions, average 1963-65, and alternative projections to 1980.....	130
46.	Oilcakes: Net export earnings and net import costs for the less developed regions, average 1963-65, and alternative projections to 1980	131
47.	Vegetable oils and oilcakes: Export earnings and import costs for the less developed regions, average 1963-65, and alternative projections to 1980.....	132
48.	Vegetable oils: Total and per capita availability, by region, average 1963-65, and alternative projections to 1980.....	133

FIGURES

Figures		Page
1	Flow chart of the fats and oils economy of France, average 1958-60	2
2	Per capita consumption of fats and oils and gross domestic product in selected countries, 1955 and 1963	47
3	Consumption of oilseed meals in major developed regions, actual and estimated	87
4	Simplified market structure for oilseeds, meal, and oil	210

SUMMARY

With rising levels of population and income, world production and trade of oilseeds and oilseed products are expected to continue to grow. World supply and demand projections show that by 1980, the level of vegetable oil demand will increase substantially over the 1963-65 level, with over half the expansion among the less developed countries (LDC's). Oilcake demand will also increase over 1963-65 levels, with developed countries making the greatest use of the commodity. World trade in oilseed products will continue to be highly competitive.

Projections of production, consumption, trade, and prices in this report vary according to alternative assumptions about trade policies, agricultural productivity, and economic growth.

With constant 1963-65 prices, a continuation of present trends and policies, and moderate gains in productivity in the LDC's (projection set I), 1980 world supply and demand for oilcakes would be in balance. However, under set I, the vegetable oil price would need to drop by about 20 percent to bring world demand in line with supply. Because oilcakes are principally used as a protein supplement to livestock feed, an increase in import demand would occur primarily in developed countries, where there is a high effective demand for animal products.

Projected earnings from vegetable oil by exporting LDC's would increase moderately over the 1963-65 level, while costs to importing LDC's would increase substantially because of rapid projected increases of vegetable oil imports by these countries. Net earnings of the LDC's from vegetable oil exports would be substantially below the level of net earnings during the mid-1960's. On the other hand, total LDC earnings from oilcakes would increase by 1980. Combined net trade earnings of the LDC's from vegetable oil and oilcakes, however, would be lower in 1980 than they were in 1963-65.

Projection set II assumes a higher level of economic growth and agricultural productivity in the LDC's. Their annual growth rate in oilseed production is assumed to be 40 percent higher than under set I. To bring world demand in line with the increased production, a 31-percent decline in vegetable oil prices and a 13-percent decline in oilcake prices are projected from the 1963-65 price levels. With higher income levels in the LDC's, their demand for vegetable oil would increase considerably. As a result, vegetable oil import costs would rise above and export earnings would drop below those of set I. LDC export earnings from oilcakes, however, would greatly increase. Consequently, LDC net export earnings from oilseed products would be greater under set II than under set I, but still lower than the 1963-65 level.

Projection set III assumes a lower level of economic growth and agricultural productivity in the LDC's. Their oilseed production is assumed to drop 30 percent below that projected under set I. With a decline in production and income, vegetable oil prices would drop 13 percent below the 1963-65 level, and oilcake prices would increase 8 percent. Net LDC export earnings would be less under set III than under the two other alternatives--mainly because of the lower level of trade--and such earnings would also be below the 1963-65 level.

Given the projected world supply and demand conditions for vegetable oils and oilcakes, the following conclusions are evident:

.... Per capita nutritional levels will improve.

.... There is an implied need for continued concessional sales of vegetable oil to less developed importing countries.

.... LDC's include both importing and exporting countries, making it difficult for them to achieve among themselves a consensus on policy objectives. Lower world prices for oilseed products would benefit importers but would adversely affect earnings of exporting countries.

.... With a continuation of present supply and demand trends and policies, world prices for vegetable oils would decline and prices for oilcakes would remain stable.

.... With higher production levels in the LDC's, their efforts to increase exportable supplies would result in reducing world prices of both vegetable oil and oilcakes, but net export earnings by the LDC's would increase as a result of increased earnings from oilcakes.

.... Increased domestic production in many LDC's would be absorbed by internal demand.

.... World import demand for vegetable oils will become much greater in the LDC's.

.... World import markets for oilcakes will continue to be found almost exclusively in the developed countries.

WORLD SUPPLY AND DEMAND PROSPECTS FOR OILSEEDS AND OILSEED PRODUCTS IN 1980
With Emphasis on Trade by the Less Developed Countries

by

Lyle E. Moe and Malek M. Mohtadi, Agricultural Economists
Foreign Regional Analysis Division, Economic Research Service

PART I.--INTRODUCTION AND REVIEW OF PRICES

1.--INTRODUCTION

The specific objective of this study is to estimate long-term prospects for world trade in oilseeds and oilseed products.

Analysis is primarily directed to demand and, to a lesser degree, supply. For the less developed countries (LDC's), this report indicates the probable magnitude of foreign exchange expenditures for and earnings from oilseeds and oilseed products.

Most oilseeds yield both vegetable oil and oilseed meal in relatively fixed proportions. Markets for the two products are largely independent and the growth rates of demand for oil and for meal can vary sharply. The complexity of the demand for oilseeds is indicated in figure 1, a flow chart of the French fats and oils economy during 1958-60.

Part II of this report concentrates on demand for vegetable oil and part III primarily concerns demand for oilseed meals. Part IV "marries" the two analyses, develops production projections, and presents the resulting trade implications.

The projections in this study are neither targets to be aimed at nor forecasts of what will actually take place. Rather, they are estimates, based on specific assumptions, of probable future demand for and supply of oilseeds and oilseed products. The assumptions used are meant, of course, to be as realistic as possible, and recent past experience is their point of departure. Therefore, the projections supply the basis for their own amendment in the future, should the underlying assumptions be changed as a result of new information or new policies. In some instances, enough statistical data have not been available to permit analysis of various economic relationships. Also, the reliability of the available data is not always as high as may be preferred. Finding enough reliable data is especially difficult for oilseeds because of the large number of crops involved.

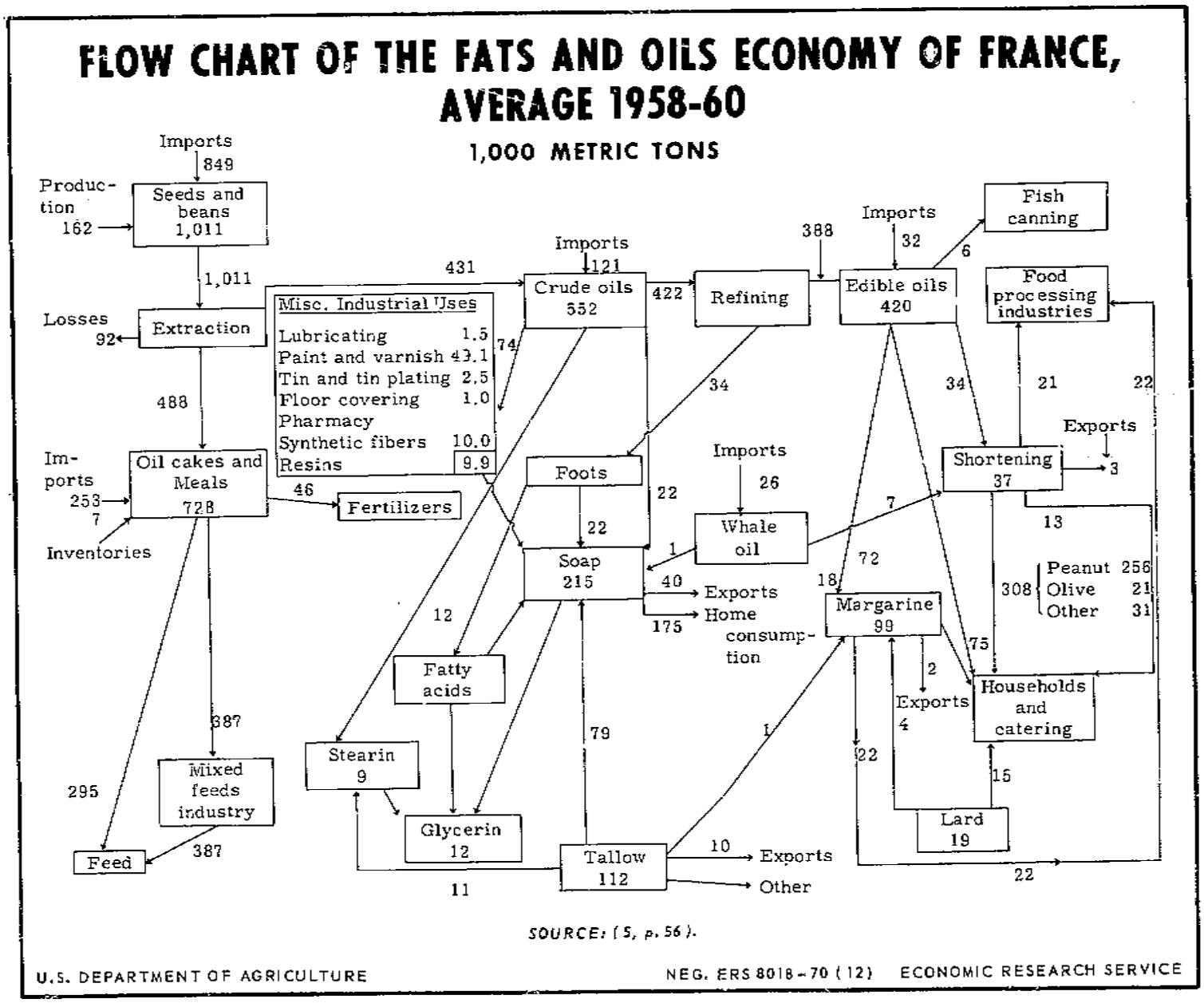

FLOW CHART OF THE FATS AND OILS ECONOMY OF FRANCE, AVERAGE 1958-60
1,000 METRIC TONS
Imports 849
Production 162
Seeds and beans 1,011
1,011
Losses 92
Extraction
488
Imports 253
7
Inventories
Oil cakes and Meals 728
46
Fertilizers
295
387
Mixed feeds industry
387
Feed
431
Misc. Industrial Uses
Lubricating 1.5
Paint and varnish 43.1
Tin and tin plating 2.5
Floor covering 1.0
Pharmacy
Synthetic fibers 10.0
Resins 9.9
74
Imports 121
Crude oils 552
422
Refining
388
Imports 32
Edible oils 420
6
Fish canning
Food processing industries
34
34
21
22
Exports
3
Shortening 37
13
Imports 26
Whale oil
1
7
Foots
22
22
Soap 215
40
Exports
175
Home consumption
12
Fatty acids
Stearin 9
Glycerin 12
11
79
Tallow 112
10
Exports
Other
1
18
72
Margarine 99
75
2
Exports 4
22
15
Lard 19
22
Households and catering
308
Peanut 256
Olive 21
Other 31
SOURCE: (5, p. 56).
U.S. DEPARTMENT OF AGRICULTURE
NEG. ERS 8018-70 (12) ECONOMIC RESEARCH SERVICE

Figure 1

Basic Definitions 1/

Key terms used in this report are defined as follows:

Oilseeds

Unless otherwise indicated, "oilseeds" include soybeans, peanuts, cottonseed, sunflowerseed, rapeseed, copra, and palm kernels. Since linseed oil is classified as an industrial oil, flaxseed is not included in this study's analysis of vegetable oil demand. However, in the analysis of oilcake demand, flaxseed is included.

Vegetable Oils

Unless otherwise indicated, "vegetable oils" include soybean oil, peanut oil, cottonseed oil, sunflowerseed oil, rapeseed oil, coconut oil, palm kernel oil, palm oil, and olive oil.

Oilcakes

The term "oilcakes" is applicable to both expeller cake (obtained from pressing seeds and generally containing 3-7 percent oil by weight) and extracted meals (obtained from solvent extraction of seeds and generally containing less than 1 percent oil by weight). The terms "oilcakes" and "meal" are therefore synonymous in this report.

Unless otherwise indicated, "oilcakes" include the meal and cake from soybeans, peanuts, cottonseed, sunflowerseed, rapeseed, copra, palm kernels, and linseed.

Oil-Equivalent Basis

The quantity of oil contained in oilseeds produced and in oilseeds traded is converted to an oil-equivalent basis. For example, to obtain a total oil trade figure for a region, the quantity of vegetable oil shipped in the form of oilseeds, or oil-equivalent, is added to the quantity of vegetable oil traded as such.

Meal-Equivalent Basis

The quantity of meal contained in oilseeds produced and in oilseeds traded is converted to a meal-equivalent basis. For example, to obtain a total meal trade figure for a region, the quantity of meal shipped in the form of oilseeds, or meal-equivalent, is added to the quantity of meal traded as meal.

Units of Measurement

Metric tons are used unless otherwise noted.

Time Reference

Trade, production, and consumption are on a calendar year basis.

1/ A more detailed discussion of oilseeds and oilseed products and their uses appears in app. C, pp. 191-200.

Regional Grouping

For vegetable oils, the world is divided into 18 regions, based on economic, political, and geographic criteria.

Developed

1.	United States	
2.	Canada	
3.	European Community	Belgium-Luxembourg, France, Federal Republic of Germany, Italy, and the Netherlands.
4.	United Kingdom	
5.	Other Western Europe	Austria, Denmark, Finland, Greece, Iceland, Ireland, Malta, Norway, Portugal, Spain, Sweden, and Switzerland.
6.	Japan	
7.	Australia and New Zealand	
8.	Republic of South Africa	

Central Plan

9.	Eastern Europe	Albania, Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, Romania, and Yugoslavia.
10.	USSR	
11.	Communist Asia	Mainland China, Mongolia, North Korea, and North Vietnam.

Less Developed

12.	Central America and Mexico	British Honduras; Carribbean including Cuba, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, and Panama.
13.	South America	Argentina, Bolivia, Brazil, French Guiana, Paraguay, Surinam, Uruguay, Venezuela, Chile, Colombia, Ecuador, Peru, and Guyana.
14.	East and West Africa	Botswana, Burundi, Ethiopia, Kenya, Lesotho, Malagasy Republic, Malawi, Mauritius, Mozambique, Rhodesia, Rwanda, Somalia, Swaziland, Tanzania, Uganda, and Zambia. Angola, Cameroon, Central African Republic, Chad, Congo (Kinshasa), Congo (Braz.), Dahomey, Gabon, Gambia, Ghana, Guinea, Ivory Coast, Liberia, Mali, Mauritania, Niger, Nigeria, Portuguese Guinea, Senegal, Sierra Leone, Togo, Upper Volta and Other Portuguese West Africa.
15.	North Africa and West Asia	Algeria, U.A.R. (Egypt), Libya, Morocco, Sudan, Tunisia, Bahrein, Cyprus, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Muscat and

		Oman, Qatar, Saudi Arabia, South Yemen, Syria, Trucial States, Turkey, and Yemen.
16.	South Asia	Afghanistan, Bhutan, Ceylon, India, Nepal, and Pakistan.
17.	Southeast Asia	Burma, Cambodia, Laos, South Vietnam, and Thailand.
18.	East Asia and Pacific Islands	Brunei, China (Taiwan), Hong Kong, Indonesia, South Korea, Macao, Malaysia, New Guinea, Pacific Islands, Papua, Philippines, and Singapore.

For oilcakes, the world is divided into 13 rather than 18 regions--nine regions used in the vegetable oil analysis were combined into four regions for the oilcake analysis:

Republic of South Africa
Australia and New Zealand

South America
Central America and Mexico

East and West Africa
North Africa and West Asia

South Asia
Southeast Asia
East Asia and Pacific Islands

2.--EXPORT EARNINGS, IMPORT COSTS, AND PRICES OF OILSEEDS AND OILSEED PRODUCTS

Export Earnings or Import Costs

World export earnings from the oilseeds and oilseed products of primary concern to this report averaged some $2,901 million during 1963-66. Trade in oilseeds was valued at $1,458 million; trade in vegetable oil amounted to $898 million and trade in oilseed meals, to $545 million (table 1).

The less developed countries earned an average of $1,344 million in foreign exchange from oilseeds and their products during 1963-66. Imports for the LDC's averaged $421 million. Thus, net exports were $923 million. LDC's exported $268 million worth of oilseed meals, while imports averaged only $7 million. Their vegetable oil exports were $440 million, while imports were $269 million to bring about net exports of $171 million. LDC's exports of oilseeds, as such, averaged $636 million; imports amounted to $145 million.

Developed countries provide the bulk of the market for oilseed exports of the LDC's. During 1963-66, the developed countries' imports of oilseeds and oilseed products averaged $2,405 million a year. This is approximately 80 percent of total world imports.

By region, average annual net export earnings from oilseeds and oilseed products during 1963-66 were greatest for the United States--$864 million. Such net exports provided the East and West Africa region with $473 million a year, while the East Asia and Pacific Islands region earned $341 million. Trading pattern differences within regions are, naturally, reflected in export earnings. For instance, South America was a net importer of oilseeds and vegetable oils but a net exporter of meals, so on balance the region was a net exporter.

For the European Community (EC), net imports of oilseeds and oilseed products during 1963-66 averaged some $993 million. The United Kingdom's net imports averaged $292 million, while Japan's averaged $283 million. Net imports of the Other Western Europe (O.W.E.) region amounted to $327 million. Individual regional trade in oilseeds and oilseed products for 1963-66 is presented in appendix A.

On a commodity basis, the largest export earner among the oilseeds in 1966 was soybeans, $859 million, followed by peanuts, $295 million, and copra, $245 million (table 2). The major vegetable oils traded in 1966 were sunflowerseed oil, $175 million, and soybean oil, $160 million, followed by peanut oil, coconut oil, and palm oil, which were all around $143 million. Palm kernel oil was the least important--$28 million.

By value, soybean meal was the most important meal exported in 1966. Soybean meal exports, which totaled $297 million, were followed by peanut meal, $129 million, and cottonseed meal, $71 million.

Prices

The profitability of trade is primarily determined by the level of prices received. The price of copra, palm kernels, and peanuts has consistently been well above the price of soybeans, while rapeseed, sunflowerseed, and cottonseed prices have been relatively close to the soybean price, especially in recent years (table 3).

The price levels of oilseeds are determined by the price of their oil and meal components. The combined value of the meal and the oil is greater than the price per ton of the parent product since oil and meal values include, among other things, crushing costs and margins. Among the oilseed products, the value of soybean meal is greater than the value of soybean oil per ton of the product. The price for copra, palm kernels, rapeseed, and flaxseed is determined mainly by the value of the oil contained in each. The value of peanut oil has been two to three times as great as the value of peanut meal. The oil value in sunflowerseeds has been about twice as large as the meal value, while for cottonseed, the meal and oil values have been relatively equal.

During 1955-68, the value of soybeans, copra, and palm kernels generally increased, while the value of peanuts, sunflowerseed, cottonseed, rapeseed, and flaxseed declined. During the same period, the oil component value declined for all of the oilseeds except copra and palm kernels. Conversely, the value of the meal has been increasing for all commodities except sunflowerseed.

The main component determining the price of the parent product strongly influences the future price prospects of an oilseed product. For example, soybean meal constitutes the bulk of soybean value and while soybean oil prices have been declining, meal prices have been increasing. As a consequence, the price for soybeans has been relatively firm. For peanuts, the price of meal has also been increasing, while the price of peanut oil has been trending down. Since the major portion of the value of peanuts is in the oil, peanut prices have been declining.

Vegetable Oil Prices

The price levels that bring supply and demand into equilibrium on the world market represent the total effect of decisions taken by a large number of individuals, companies, and organizations that make up the fats and oils market. International market prices of fats and oils move freely in response to changes in supply and demand within this highly complex market. To date, they have operated satisfactorily in providing a flexible process for bringing supply and demand into equilibrium, although at declining prices.

Price developments of individual oilseeds and vegetable oils cannot be explained primarily by changes in supply and demand on the markets of the individual commodities. Short-term fluctuations in prices result largely from changes in the supply of each individual oilseed commodity and in the prices of substitutable oils and fats. Prices are also determined by changes in supplies from domestic production in the main importing countries as well as price changes on the world market. Also, price changes for oilseeds may differ significantly from price changes for vegetable oils--for reasons that have to do with the policies of crushers, the policies of the governments of importing and exporting countries, and the demand for byproducts (cakes and meals) (26, p. 55). 2/

Technical and economic factors influence the substitutability of fats and oils. From the technical point of view, most individual fats and oils are interchangeable

2/ Underscored numbers in parentheses refer to references listed at the end of this report.

since the various characteristics of the oils can be altered by processing. As indicated in appendix C, soft oils can be hardened and flavors can be added, moderated, or entirely removed, for example. All of the soft oils used for cooking or for salad oils are substantially interchangeable and additionally, butter, lard, and the palm oils are used as cooking fats. For the manufacture of margarine and shortening, all the soft oils, palm oils, and lard are substitutable to a large degree.

The chief economic factors influencing interchangeability, apart from consumer preferences, are the availability of different kinds of fats and oils and, where substitution is not too difficult, their relative prices. The possibility of storing oilseeds, oils and fats, and their products enhances the scope for interchangeability (15, p. 7).

The utilization of any individual oil cannot be considered without reference to the end use in which it is incorporated because the margin on different products can vary widely. For some products, a small increase in price in any individual oil might mean its elimination from usage because of the close degree of substitutability of a cheaper oil. On the other hand, to obtain a premium product, the continued use of the specific oil might be considered worthwhile despite the price increase. Thus, it is difficult to indicate with any degree of accuracy how wide the margin must be between the various oils and fats to encourage a greater use of one over another.

Advances in technology have made it possible to use a wider variety of oils and fats as substitutes. Changes in the composition of margarine in recent years are an example. A study of the changing composition of margarine in a group of Western European countries during 1958-63 indicated substantial increases in use of marine oils, animal fats, and soybean oil (20). By contrast, there were decreases in use of lauric oils (coconut and palm kernel), palm oil, and peanut oil. Once technology comes into play, prices are more significant in determining the use of various vegetable oils.

Increasing interchangeability among fats and oils has had two discernible effects on their prices over time: (a) The scatter or spread of prices of the various kinds has become narrower over a long period because the increasing scope for substituting cheaper for more expensive kinds tends to raise the long-term price level of the former and lower the price level of the latter, in relative terms; and (b) over a long period, short-term divergences in prices of one kind of fat or oil from their own trend or from the general average of many kinds become smaller and briefer since users of an oil that temporarily becomes unusually expensive can more easily and quickly substitute an oil whose price has not risen or has not risen as much.

The degree to which the prices of different vegetable oils have moved together is a good indication of their substitutability. Such movements can conveniently be expressed in terms of correlation coefficients. In a recent report (13), a matrix of price correlation coefficients was calculated for four soft oils and the two lauric oils (coconut and palm kernel), covering data for 1950-66. To complete the matrix for the vegetable oils under consideration in the present report, correlation coefficients were computed for the remaining oils for the same time period. A summary of the results is given in table 4.

These calculations clearly show that while the prices of the two lauric oils are very closely related, they bear no significant relationship to the prices of any of the other seven oils. This is not surprising in view of the distinct qualitites of the lauric oils (see app. C).

Olive oil prices also displayed a low correlation with other vegetable oil prices. This was probably due in part to the sharp variations in annual production of olive oil and in part to the distinct demand for the oil, especially in the Mediterranean countries, despite its high price level.

Among the soft oils and palm oil, there is a network of close price relationships. This close linkage is as expected in view of the high degree of substitutability of these oils.

Price Flexibilities

This section measures the factors affecting the level of international prices for selected vegetable oils. To permit comparisons of the price responsiveness of these oils, price flexibilities were computed. Price flexibility is defined as the percentage change in the price of a commodity associated with a 1-percent change in the quantity produced of that commodity or a related variable, all else remaining constant. 3/

In the development of price flexibilities, the two lauric oils are considered by themselves because of their low price correlation with the prices of the other oils. For similar reasons, olive oil is considered by itself. The remaining six oils are grouped together and are called "other oils" for the purposes of this section.

Multiple regression analysis is used with the international market price as the dependent variable. Quantities produced in the current year, quantities produced in the previous year, and income are the independent variables. A lagged production variable was introduced because of the absence of stock data. When the data are expressed in logarithms, the regression coefficients can be viewed as price flexibility estimates.

Several regressions were developed with 1955-68 data, for the lauric oils, olive oil, and the other oils. The following regressions were selected on the basis of confirmation of the estimated coefficients to a priori knowledge derived from economic theory and on the basis of their "t," "F," and "R^2" values:

(a) Lauric oils:

$$\underset{}{\text{Log } P^{l}_{t}} = \underset{}{5.46} - \underset{(1.99)}{2.357}\ \text{Log } Q^{l}_{t} + \underset{(0.91)}{1,145}\ \text{Log } Q^{l}_{t-i} + \underset{(1.20)}{0.616}\ \text{Log } I_{t}$$

$F = 4.0 \qquad R^2 = .43$

(b) Olive oil:

$$\underset{}{\text{Log } P^{o}_{t}} = \underset{}{5.477} - \underset{(4.60)}{0.821}\ \text{Log } Q^{o}_{t} - \underset{(1.74)}{0.314}\ \text{Log } Q^{o}_{t-1} + \underset{(1.75)}{0.395}\ \text{Log } I_{t}$$

$F = 7.4 \qquad R^2 = .71$

(c) Other oils:

$$\underset{}{\text{Log } P^{oo}_{t}} = \underset{}{4.607} - \underset{(2.51)}{0.511}\ \text{Log } Q^{oo}_{t}$$

$F = 6.3 \qquad R^2 = .36$

3/ Price flexibilities are discussed in (30, pp. 53-55).

where:

P_t^l = weighted[4] international price of coconut oil and palm kernel oil

Q_t^l = current quantity of world lauric oils production

Q_{t-1}^l = lagged quantity of world lauric oils production

I_t = national product index of developed countries

P_t^o = international price of olive oil

Q_t^o = current quantity of world olive oil production

Q_{t-1}^o = lagged quantity of world olive oil production

P_t^{oo} = weighted[4] international price of the six other vegetable oils

Q_t^{oo} = current quantity of other vegetable oils produced, world basis

The estimated "t" values appear in parentheses below the estimated coefficients.

The estimated price flexibility of lauric oils indicates that a 1.0-percent change in the quantity produced would be associated with about a 2.4-percent change in the price in the opposite direction, other things remaining equal. This means that opposite price movements more than offset the effect of quantity changes. In sharp contrast, the estimated price flexibility for olive oil indicates about a 0.8-percent price decline with a 1.0-percent production increase. 5/ For the other oils, the estimated price flexibility indicates that during 1955-68, the price declined about 0.5 percent with each 1.0-percent quantity increase.

The reciprocal of the price flexibility estimate may be considered as an approximation of the price elasticity of demand (30). Based on the price flexibilities, the implied price elasticities of demand were computed to be -0.4 for lauric oils, -1.2 for olive oil, and -2.0 for the other oils. In view of the inelastic price elasticity for lauric oils, one would, of course, expect a change in price greater than the rate of change in production. The converse would be true for olive oil and the other oils.

Effects of U.S. Public Law 480 on World Prices

The effect on world prices of large-scale P.L. 480 concessional shipments of vegetable oil is important in view of the high degree of substitutability among vegetable oils.

Soybean and cottonseed oils are the major oils under the provisions of P.L. 480. Soybean oil shipments are the most important; in 1965, they totaled some 350,000 tons.

A recent study of the world soybean market included an analysis of the impact on the market of P.L. 480 exports of soybean oil (31). The study concluded that "concessional exports of soybean oil under P.L. 480 have done much to sustain prices and incomes of growers in the soybean sector since the mid-fifties and the abandonment of these shipments in 1965 would have depressed oil prices an estimated 2 or 3 cents per pound, and bean prices by as much as 28 cents per bushel." Reworded, P.L. 480 shipments of soybean oil in 1965 increased the price of soybean oil on the normal U.S. commercial market by about 20 percent above what it would have been in the absence of such shipments. The United Nations Food and Agriculture Organization (FAO) has stated that since

4/ Weighted by the volume of world trade of each oil (table 2) and the international price of each oil (table 3).

5/ Dr. Al-Zand, using 1950-66 data, obtained a price flexibility of -0.835 for olive oil (2, p. 126).

soybean oil is the major vegetable oil traded in the world, it seems reasonable to assume that the market prices of other oils, particularly those most interchangeable with soybean oil, were higher than they would have been had the P.L. 480 vegetable oil shipments been placed on the commercial market (19, p. 5).

Oilcake Prices

International prices for oilcakes have trended upward in the past decade as a result of a sustained increase in demand. The increase in demand has been primarily due to an increase in livestock production and the feeding of more concentrate rations per unit of livestock output. The increased production of animal products has occurred mainly because of increases in per capita income and population and changes in dietary habits in many economically advanced countries of the world.

With respect to demand for different types of oilcakes, substitutability does exist in varying degrees even though chemical and biological characteristics of the oilcakes differ (see app. C). A study of the structure of the soybean export market states:

> Individual high-protein feeds, for example soybean meal and linseed meal, are substitutable in varying degrees in mixed feeds with other high-protein feeds such as the meals of peanut, cottonseed, copra, fishmeal, alfalfa, meat scraps, and tankage.
>
> The practicality of such substitution depends on a number of factors, including relative prices, growth rate for the consuming animal, and ability of the meals to meet their amino-acid requirements. As a consequence of such substitution, the elasticity of demand for any given high-protein feed may be expected to be greater than the elasticity of demand for high-protein feeds in the aggregate (4, pp. 19-20).

The degree to which prices of the different oilcakes have moved together, as expressed in terms of correlation coefficients, was used to measure the substitutability of different oilcakes (table 5). Data for prices of six oilseed meals and fishmeal for 1955-66 are given in table 3.

As expected, the calculations indicate that prices of the various oilcakes are closely related. The varying degrees of price correlation among the various oilcakes, apart from supply constraints, are partly due to differences in the crude protein content and to differences in the essential amino-acid composition of such protein. For example, sunflowerseed meal contains about 28 percent protein, while soybean meal is nearly 46 percent crude protein. Soybean meal and peanut meal are nearly identical with respect to crude protein content, but soybean meal is preferable--mainly because its lysine content, one of the more restricting essential amino-acids, is about 65 percent greater than that of peanut meal. The essential amino-acid pattern of protein in various meals is contained in appendix table C-1.

Price Flexibilities

As with vegetable oils, price flexibilities for oilcakes were computed to estimate price responsiveness to changes in supply. Because there were no sharp disparities in the price correlation coefficients of the different oilcakes, price flexibility estimates were developed with 1955-66 data for all meals combined. The following three regressions were developed:

$$\text{(a) } \log P = 1.354 - \underset{(0.64)}{0.391} \log Q_{mt} - \underset{(1.21)}{0.578} \log Q_{mt-1}$$

$$+ 1.465 \underset{(2.58)}{\text{ Log I}}$$

$F = 13.4$ $\quad R^2 = .83$

(b) $\text{Log P} = .702 - \underset{(0.96)}{0.579 \text{ Log } Q_{mt}} + \underset{(2.23)}{1.120 \text{ Log I}}$

$F = 18.4$ $\quad R^2 = .80$

(c) $\text{Log P} = 1.062 - \underset{(0.23)}{0.142 \text{ Log } Q_{mt}} - \underset{(1.60)}{0.522 \text{ Log } Q_{gr}}$

$$+ \underset{(2.25)}{1.051 \text{ Log I}}$$

$F = 15.2$ $\quad R^2 = .85$

where:

P = international prices of peanut, coconut, palm kernel, soybean, cottonseed, linseed, sunflower, and rapeseed meals. The prices are weighted by the volume of world trade of each meal

Q_{mt} = current quantity of world oilcake production

Q_{mt-1} = lagged quantity of world oilcake production

I = national product index of developed countries 6/

Q_{gr} = current quantity of world corn, barley, and oats production

The estimated "t" values appear in parentheses below the estimated coefficients.

In equation (a), world production and lagged world production of oilcakes were not good explanatory variables, but the income variable was significant. This is not surprising because sharp increases in demand absorbed production increases during 1955-66. The estimated price flexibility indicates that a 1.0-percent change in production would be associated with an approximate .4-percent change in the price of oilcakes in the opposite direction, other things remaining equal.

Equation (b) is the same as equation (a) with the exception of lagged production. The lag variable was deleted to see if the production variable would show any statistical significance. The "t" value for the production coefficient increased but it still was not a good explanatory variable.

In equation (c), world grain production was added as an independent variable to measure its significance on meal prices. World production of grain was significant at the 10-percent level. The equation indicates that a 1-percent increase in world grain production would reduce world meal prices by 0.5 percent, other things remaining equal. The equation also indicates that on the world level, oilcakes and grain are substitutes. However, within certain price limits, the two tend to be complementary rather than substitutes in the compound feed industry. As technological advances are continued in the mixed-feed industry, the tendency to substitute is likely to increase.

6/ Index constructed from Moe's population study (44).

Table 1.--World trade in oilseeds and oilseed products, by value and region, 1963-66 average 1/

Region	Oilseeds		Vegetable oil		Oilseed meal		Total		Net trade			
	Exports	Imports	Exports	Imports	Exports	Imports	Imports	Imports	Oilseeds	Oil	Meal	Total
	1,000 dollars											
United States	626,046	47,750	197,337	79,862	170,610	2,402	924,193	129,814	578,296	117,475	168,609	864,379
Canada	34,392	55,222	3,627	19,372	21,601	15,563	59,820	93,161	-20,830	-15,545	5,029	-33,341
EC	24,393	643,105	66,888	192,827	67,709	316,103	158,990	1,152,040	-618,712	-125,939	-248,399	-993,050
United Kingdom	626	115,818	5,041	77,046	48	105,092	5,715	297,916	-115,192	-72,005	-105,004	-292,201
O.W.E.	12,148	178,166	67,157	96,388	13,914	145,503	93,219	420,057	-166,018	-29,230	-131,589	-326,837
Japan	180	272,849	3,642	7,076	363	7,708	4,186	287,634	-272,669	-3,434	-7,345	-283,448
Australia-New Zealand	2	8,767	3	10,948	--	1,231	5	20,946	-8,765	-10,946	-1,231	-20,942
South Africa, Rep. of	9,249	49	2,903	3,754	--	11	12,152	3,813	9,200	-851	-11	8,339
Total	707,036	1,321,726	346,798	487,273	274,445	596,383	1,328,280	2,405,361	-615,191	-145,474	-321,938	-1,077,301
Eastern Europe	25,262	62,014	25,880	67,789	2,110	37,622	53,252	167,489	-36,752	-41,909	35,512	-124,173
USSR	13,915	10,460	73,880	8,553	--	--	87,794	19,013	3,455	65,326	--	68,781
Communist Asia	75,448	912	11,942	4,682	--	--	87,391	5,594	74,536	7,260	--	81,797
Total	114,625	73,386	111,702	81,024	2,110	37,622	228,437	192,032	41,239	30,677	-35,512	36,404
Central America & Mexico	15,056	8,548	3,812	25,965	10,624	3,168	29,491	36,681	6,507	-22,153	8,496	-7,190
South America	8,862	15,126	26,680	38,286	20,840	578	126,388	53,990	-6,265	-11,606	91,268	72,398
East & West Africa	298,069	1,723	156,934	37,948	38,863	1,538	493,867	81,198	296,347	138,986	37,335	472,669
North Africa & West Asia	46,407	51,812	54,256	93,536	28,030	150	129,699	145,498	-5,405	-39,280	81,856	-22,829
South Asia	15,068	18,638	36,645	42,761	77,106	8	128,819	61,408	-3,570	-6,116	77,098	67,411
South East Asia	5,356	2,750	608	13,126	9,864	--	15,828	15,876	2,606	-12,376	9,864	-48
East Asia & Pacific Is.	247,248	45,917	160,798	37,078	18,878	2,890	426,924	85,885	201,331	123,720	15,986	341,039
Total	636,066	144,514	439,733	268,700	208,217	7,352	1,344,916	480,566	491,551	171,083	320,903	923,450
World total	1,457,727	1,539,626	898,233	836,997	544,772	641,357	2,900,733	3,017,980	-82,401	61,236	-96,585	-117,247

1/ Values are for the seeds, oils, and meals listed in chap. 1 under Basic Definitions.
Source: (17).

Table 2.--World trade in oilseeds and oilseed products, by value and commodity, 1963-66

Item	1963		1964		1965		1966	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
	Million dollars							
Soybeans	530	557	638	673	749	773	859	916
Peanuts	256	283	260	288	275	287	295	313
Cotton	31	42	23	32	34	40	37	39
Sunflowerseed	24	38	35	36	31	33	53	18
Rapeseed	43	51	48	50	77	80	88	98
Copra	275	249	266	265	262	288	245	276
Palm kernels	94	98	93	103	110	114	93	97
Total	1,254	1,319	1,369	1,447	1,537	1,612	1,671	1,788
Soybean oil	154	160	175	174	202	203	160	135
Peanut oil	118	142	132	156	140	148	144	150
Cotton oil	53	70	75	79	94	99	49	60
Sunflowerseed oil	88	89	66	71	93	103	175	151
Rapeseed oil	11	10	11	10	25	19	43	36
Coconut oil	116	108	135	133	143	147	142	145
Palm kernel oil	19	21	20	22	28	31	28	34
Palm oil	133	126	126	140	141	153	143	160
Olive oil	130	161	116	105	83	95	119	128
Total	803	883	888	892	954	997	1,003	1,007
Soybean meal	180	166	204	194	248	239	297	306
Peanut meal	119	133	125	135	128	137	129	142
Cottonseed meal	55	92	74	92	71	113	71	118
Sunflowerseed meal	17	31	16	24	19	30	25	52
Rapeseed meal	9	9	7	10	11	12	13	17
Copra meal	27	35	26	38	28	42	33	49
Palm kernel meal	8	15	12	17	10	19	11	25
Linseed meal	55	65	52	67	61	74	49	68
Fish meal 1/	190	231	265	294	302	344	354	402
Total	471	546	501	576	579	666	628	777

1/ Included for comparison purposes, values not added in totals.

Source: (17).

Table 3.--Price series of major oilseeds, fats and oils, and oilseed meals, 1955-68

Item 1/	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
	Dollars per metric ton													
Oilseeds:														
Peanuts	190	208	204	165	181	198	196	171	173	187	206	187	2/182	2/168
Cottonseed	106	108	98	89	90	97	99	89	92	98	104	104	99	102
Soybean	111	112	106	94	96	92	111	101	110	111	117	128	114	111
Sunflowerseed	110	118	111	96	109	104	106	108	108	103	124	138	117	109
Rapeseed	141	152	136	114	128	128	135	107	110	116	124	131	122	104
Copra	186	183	179	205	249	207	170	166	186	198	225	187	207	232
Palm kernels	143	144	141	153	190	164	136	136	152	151	179	156	164	174
Flaxseed	155	175	142	145	153	145	150	149	136	136	133	128	136	143
Vegetable oils:														
Peanut oil	287	369	358	275	300	326	329	274	269	313	323	296	287	269
Cottonseed oil	265	335	323	291	252	235	305	266	243	250	278	333	278	3/269
Soybean oil	295	344	320	261	233	225	283	218	215	228	265	259	216	178
Sunflowerseed oil	293	355	345	268	269	244	316	241	236	254	292	262	212	194
Rapeseed oil	308	377	358	261	221	219	280	221	215	252	263	244	206	161
Coconut oil	260	264	271	316	378	317	254	252	283	296	360	311	332	393
Palm kernel oil	259	262	267	296	358	305	253	249	279	294	350	292	256	3/330
Olive oil	608	952	769	644	589	624	567	651	923	585	663	660	689	681
Palm oil	240	258	252	229	238	224	228	210	218	234	269	233	4/226	4/140
Linseed oil	247	329	271	266	226	254	280	254	213	237	213	191	202	234
Other oils and fats:														
Butter	970	882	772	948	948	853	706	820	900	930	911	838	761	768
Lard	--	--	364	345	269	253	244	217	213	251	292	282	205	170
Fish oil	199	218	214	185	171	155	138	99	164	204	217	192	127	99
Whale oil	242	249	249	214	215	206	192	132	195	225	239	233	167	127
Oilseed meals:														
Peanut	112	110	98	87	101	98	93	102	106	108	119	111	111	105
Cottonseed	--	89	78	65	84	79	78	83	93	102	96	94	n.a.	n.a.
Soybean	102	98	90	92	95	91	100	106	113	112	115	124	119	120
Sunflowerseed meal	101	91	77	67	77	69	67	81	89	88	84	83	82	79
Copra	84	86	70	72	89	88	71	77	n.a.	76	96	103	98	n.a.
Linseed	104	105	84	75	97	88	85	95	101	100	103	121	108	108
Fish						103	123	137	133	148	182	175	154	134

1/ The price series used for each item is:

Oilseeds

Peanuts: Nigerian, shelled.
Cottonseed: Sudanese, bulk.
Soybeans: U.S. No. 2 yellow.
Sunflowerseed: East African, pure.
Rapeseed: Canadian, 40 percent bulk.
Copra: Straits.
Palm kernels: Nigerian.
Flaxseed: Canadian, No. 1, 2 1/2 percent bulk, c.i.f. U.K.

Oils and Fats

Peanut oil: Nigerian 3-6 percent bulk.
Cottonseed oil: American, crude, bulk.
Soybeans: Any origin, crude.
Sunflower oil: Argentine, semi-refined, bulk.
Rapeseed oil: Any origin, ex-tank Rotterdam.
Coconut oil: White Ceylon, 1 percent bulk.
Palm kernel oil: Net, naked, ex-mill London.
Olive oil: Spanish, edible, 1 percent drums, f.o.b.
Palm oil: Nigerian, 5 percent c.i.f., U.K.
Butter: New Zealand finest, ex-store, London.
Lard: U.K., American, bulk.

Oils and Fats con't.

Fish oil: Peruvian, semi-refined.
Whale oil: Crude
Linseed oil: Argentine-Uruguayan, c.i.f. U.K.

Oilseed Meals:

Peanut meal: Nigerian, 56 percent.
Cottonseed meal: Argentine, 44/45 percent.
Soybean meal: Canadian, 45 percent.
Sunflowerseed meal: Argentine. 37/38 percent.
Copra meal: Indian, 30 percent.
Linseed meal: Argentine, 37/38 percent.
Fish meal: Peruvian, 65 percent

2/ Nigerian.
3/ Estimated.
4/ Malayan, 5-percent bulk.

Sources: Unilever Ltd. and the Public Ledger (weekly U.K. paper of market quotations). All prices c.i.f. Europe unless otherwise stated.

Table 4.--Correlation matrix of vegetable oil prices 1/

Oils	Soft oils						Hard oils		
	Peanuts	Cotton-seed	Sun-flower	Soybean	Rapeseed	Olive	Palm oil	Palm Kernel	Coconut
Soft oils:									
Peanut	1.00	0.68	0.71	0.78	0.86	0.48	0.57	0.34	0.16
Cottonseed		1.00	0.67	0.75	0.72	0.43	0.59	0.04	0.04
Sunflower			1.00	0.90	0.78	0.20	0.49	0.06	0.12
Soybean				1.00	0.84	0.24	0.50	0.18	0.03
Rapeseed					1.00	0.45	0.73	0.20	0.03
Olive						1.00	0.34	0.03	0.03
Hard oils:									
Palm oil							1.00	0.35	0.09
Palm kernel								1.00	0.90
Coconut									1.00

1/ The figures shown are correlation coefficients calculated from annual price data for 1955-66 for each pair of oilcakes.
Source: Computed from data in (13).

Table 5.--Correlation matrix of international oilcake prices 1/

Oils	Peanut	Cottonseed	Soybean	Sunflower	Copra	Linseed	Fish 2/
Peanut	1.00	0.91	0.73	0.82	0.65	0.83	0.88
Cottonseed		1.00	0.76	0.84	0.46	0.81	0.71
Soybean			1.00	0.59	0.49	0.79	0.89
Sunflower				1.00	0.28	0.74	0.61
Copra					1.00	0.75	0.62
Linseed						1.00	0.80
Fish							1.00

1/ The figures shown are correlation coefficients calculated from annual price data for 1955-66 for each pair of oilcakes.
2/ Price data for 1960-66.

PART II.--WORLD DEMAND FOR VEGETABLE OILS

Since this report concentrates on oils of primary importance to the less developed countries from an export-earning point of view, demand projections are not developed for the animal fats and the marine oils. The animal fats--such as butter, lard, and tallow--are the byproducts of milk and meat production. The marine oils--fish and whale oils--are the byproducts of the fishing industry. Thus, besides being of limited importance from a trade point of view to the LDC's, production of animal fats and marine oils is not closely related to demand for fats and oils, but to supply and demand for the main products from which they are derived.

Vegetable oils are often subdivided into three broad groups according to their consistency in temperate climates: (1) "Soft" oils consist principally of soybean, peanut, cottonseed, rapeseed, sunflowerseed, and olive oils, which are used mainly for human consumption, largely in direct liquid form, but also in the manufacture of margarine and shortening; (2) "hard" oils consist of products of palm trees--coconut, palm kernel, and palm oil--which are used both for food, mainly in margarine manufacturing and baking, and for industrial purposes, mainly in soap; and (3) "industrial" or "technical" oils consist mainly of linseed, tung, and castor oils, which are principally used as lubricants and as drying agents in products such as paints and varnishes.

The vegetable oils to which this report gives primary consideration are: soybean, peanut, cottonseed, sunflowerseed, rapeseed, olive, coconut, palm kernel, and palm oil. Excluded are edible vegetable oils of minor importance from a trade point of view, such as corn, safflower, sesame, and babassu kernel oil. Also excluded are the industrial oils, which are of minor importance from a trade point of view to the LDC's and which have a demand schedule that is sharply different from the demand schedule for the edible vegetable oils.

3.--INTERNATIONAL TRADE IN VEGETABLE OIL

Level of Trade

World exports of vegetable oils increased 4.5 percent annually from 1955-57 through 1963-65 (table 6). 1/ A striking feature in the development of vegetable oil exports during the period was the difference in the rate of increase of the developed countries' exports compared with that of the other countries. The developed countries increased their exports 7.3 percent a year, while the central plan countries increased exports at 3.7 percent and the LDC's at 3.1 percent.

During 1955-57 through 1963-65, there were also marked differences in the composition of the exports among the regions. The annual rate of increase in exports of oil in the form of oilseeds was 13.3 percent for the developed countries, but only 2.9 percent for the LDC's. In the central plan countries, such oil-equivalent exports declined at an annual rate of 6.5 percent. Conversely, exports of vegetable oil as such increased more than 24 percent a year in the central plan countries, but only 3.9 percent in the LDC's and 2.9 percent in the developed countries.

On a world basis, the developed countries' share of world exports increased from 20 to 36 percent from 1955-57 through 1963-65. The central plan countries' share declined from 13 to 5 percent of the total, while the less developed countries' share dropped from 67 to 59 percent.

The developed countries took some 74 percent of the world's total vegetable oil imports in 1963-65--a decline from 80 percent during 1955-57. This was due to a relative decline in the imports of vegetable oil as such--from 81 to 65 percent of the world's total. The central plan countries' share of total vegetable oil imports increased from 5.6 to 6.5 percent. The LDC's, however, increased their share from 14 to 19 percent.

The total import and export trade of each of the 18 regions was developed from 1955 to as far forward as data permitted. For all of the developed regions, trade data were available through 1967. For most of the LDC's and central plan countries, trade data were available only through 1965. Thus, the time span for considering the trade of all regions is 1955-65.

Relative Importance of Trading Regions

Exporting Regions

The position of the exporting regions changed considerably from the 1950's to the 1960's. During 1955-57, the East Asia and Pacific Islands region was the leading exporter; the East and West Africa region, second; the United States, third; and Communist Asia and South Asia, fourth and fifth, respectively. In 1963-65, the United States was the largest exporting region, followed by East Asia and the Pacific Islands, East and West Africa, the EC, and the USSR, respectively. On a net export basis, the East and West Africa region was the largest, while East Asia and the Pacific Islands ranked second and the United States, third. These three regions dominated the world market in the same order of importance in both periods. Communist Asia shifted from the fourth-ranked net exporter in 1955-57 to the fifth-ranked in the 1960's. The

1/ World exports are the total of oil traded in the form of oil plus the oil equivalent of oil traded in the form of oilseeds.

USSR, which was a net importer during 1955-57, was the fourth leading net exporter by 1963-65. Conversely, South Asia, the fifth leading net exporter in 1955-57, was a net importer during 1963-65.

Importing Regions

The most significant importing region in 1955-57 was the EC, followed by the United Kingdom, Other Western Europe, the United States, and Japan. In 1963-65, the EC was still the leading importer, but O.W.E. was the next most important market, followed by the United Kingdom, North Africa and West Asia, and Japan. On a net importer basis, the regions rank somewhat differently. In 1955-57, the EC was the world's leading market, followed by the United Kingdom, O.W.E., and Japan. The same order of importance was maintained in 1963-65. The North Africa and West Asia region, which was a net exporter in 1955-57, replaced the USSR in the 1960's as the fifth largest net import market.

Changes in Trade Levels

Net Exporting Regions

The United States accounts for approximately three-fourths of the vegetable oil exports originating from the developed countries. During 1955-57 through 1963-65, total U. S. vegetable oil exports increased 8.1 percent a year. U. S. oilseed exports on an oil-equivalent basis increased at 13.2 percent a year, while exports of oil as such increased only 2.8 percent a year. This disparity, of course, is a reflection of the rapid expansion of soybean exports from the United States.

Among the central plan countries, the USSR phenomenally changed its position from a net importer during the mid-1950's to a net exporter in the mid-1960's. The shift in the USSR's trade position has had very widespread effects on the world vegetable oil market in recent years. Although the average volume of exports in 1963-65--243,600 tons--was not relatively significant in the world total, exports by 1967 had risen to 707,000 tons. The bulk of these exports has been sunflowerseed oil. Traditionally, the East European countries have absorbed most USSR sunflowerseed oil exports. In recent years, however, Russia has had to look increasingly elsewhere to market its large volume of oil.

Communist Asia was a relatively large exporter of vegetable oil during 1955-57. However, through 1963-65, exports declined at an average annual rate of 12.2 percent. The decline was primarily due to reduced production, mainly of soybeans, in Mainland China.

With respect to exporters in the less developed regions, the East and West Africa region continued to maintain its position as a major exporter. During 1955-57 through 1963-65, exports expanded at an average annual rate of 3.4 percent. This increase was primarily due to increases in peanut production. Exports of the other major oil from the region, palm oil, declined slightly.

In the East Asia and Pacific Islands region, exports increased at an annual rate of 2.3 percent between 1955-57 and 1963-65. Oil palm production in this region has increased markedly since 1965 and, consequently, the region currently has a much larger role in the world vegetable oil market than it did in 1963-65.

Net Importing Regions

The EC is easily the world's leading market for vegetable oils. While its net imports of vegetable oil as such increased only 1.3 percent annually from the mid-1950's to the mid-1960's, imports on an oil-equivalent basis increased nearly 3.0 percent. The EC's demand for high-protein oilseed meals has risen sharply since the mid-1950's, and one of the side consequences has been the rise in vegetable oil imports on an oil-equivalent basis.

The United Kingdom relies almost wholly on imports to meet its vegetable oil needs. Its net imports of vegetable oils declined in excess of 2.0 percent a year from the 1950's through the mid-1960's. Offsetting this decline were large increases in imports of butter, which, in general, enjoyed a relative price advantage over vegetable oils in the United Kingdom.

Imports by the Other Western Europe region have been increasing slowly--only 1.4 percent a year. Moderate increases in rapeseed oil and olive oil production have partially offset the need for imports.

Japan's vegetable oil imports have been rising very rapidly, averaging some 10.2 percent a year from 1955-57 through 1963-65. This rise can be attributed to many factors, the main ones being a decline in domestic production, a rapidly expanding economy, and a low level of per capita oil consumption.

Among the LDC's, the most dramatic changes during 1955-57 through 1963-65 were the changes of the South Asia region and the North Africa and West Asia region from net exporters to net importers. Substantial population increases, moderate increases in oilseed production, and large levels of imports on a concessional basis characterized both these regions during the review period.

Trade Patterns

Table 8 presents the average 1963-65 data on trade flows of vegetable oils for 16 regions and shows region of origin and destination of exports. Tables 9 and 10 break down total trade flows into component parts of trade in oil as such and trade in oil, oil-equivalent basis. These tables are presented in tabular matrix form so that imports and exports among the 16 regions, and for the three divisions of the world, can be readily discerned. For example, the matrix shows that during 1963-65, the LDC's exported a total of some 3.3 million tons of vegetable oil (including oil-equivalent) with 2.8 million tons going to developed countries (84 percent), .2 million tons going to central plan countries, and the remaining .3 million tons being traded within the LDC region.

The matrix also shows that the EC imported an average of 2.3 million tons of vegetable oils during 1963-65, with 1.4 million tons coming from the LDC's, 0.1 million from central plan countries, and .8 million from developed countries. Of the 2.3 million tons of vegetable oil imports, 1.4 million were imported in the form of oilseeds. Of this, .53 million tons originated from developed regions, .05 million from central plan regions, and .83 million from LDC regions.

The above are but a few of the comparisons tables 8-10 permit. By assuming a trade flow among the exporters and importers based on these tables, a future flow of trade can be projected.

Trade in Animal Fats and Marine Oils

In analyzing trade patterns of vegetable oils, and subsequent demand, it is necessary and logical to examine exports and imports of the relevant vegetable oil substitutes--lard, butter, and marine oils (table 11). Because of problems in disaggregating data, the LDC's and Communist Asia were grouped together in the review of trade of these substitutes. Developed countries dominate trade in lard, butter, and marine oils. In 1963-65, they accounted for 87 percent of the total net exports and 93 percent of the total net imports.

The four leading export regions and their share of the net world exports for the mid-1950's and mid-1960's, respectively, were: (1) the United States, 40 and 35 percent; (2) Australia and New Zealand, 29 and 25 percent; (3) Other Western Europe, 21 and 19 percent; and (4) Japan, 7 and 8 percent.

The three leading importers in the mid-1950's and mid-1960's, respectively, were: (1) the United Kingdom, 67 and 78 percent; (2) the EC, 20 and 15 percent; and (3) Eastern Europe, 11 and 7 percent.

From 1955-57 to 1963-65, Russia and Canada changed from net importers to net exporters. As a group, the LDC's plus Communist Asia changed from a net exporter to a net importer.

Table 6.--World trade of vegetable oils and oilseeds, by region, averages 1955-57 and 1963-65, and annual rate of change

Region	Average, 1955-57		Average, 1963-65		Annual rate of change		Net trade 1/		Annual rate of change
	Exports	Imports	Exports	Imports	Exports	Imports	Average 1955-57	Average 1963-65	
	1,000 metric tons				Percent		1,000 metric tons		Percent
United States:									
Oil equivalent of oilseeds	355	202	959	170	13.2	-2.1	-153	-789	22.7
Vegetable oils as such	477	144	597	245	2.8	6.8	-334	-352	.7
Total	832	346	1556	415	8.1	2.3	-487	-1141	11.2
Canada:									
Oil equivalent of oilseeds	24	61	66	88	13.6	4.6	37	22	-6.3
Vegetable oils as such	20	62	16	70	-3.0	1.5	42	54	3.2
Total	44	123	82	158	8.1	3.2	79	76	- .5
EC:									
Oil equivalent of oilseeds	10	907	53	1168	22.3	3.2	897	1115	2.8
Vegetable oils as such	145	774	213	912	4.9	2.0	629	699	1.3
Total	155	1681	266	2080	6.9	2.7	1526	1815	2.2
United Kingdom:									
Oil equivalent of oilseeds	--	342	--	253	--	3.7	342	253	-3.7
Vegetable oils as such	42	295	18	263	-9.8	-1.4	254	245	-0.4
Total	42	638	18	516	-9.8	-2.6	595	498	-2.2
O.W.E.:									
Oil equivalent of oilseeds	14	241	37	283	12.9	2.0	227	246	1.0
Vegetable oils as such	85	238	147	325	7.0	4.0	153	178	1.9
Total	99	479	184	608	7.9	3.0	370	424	1.4
Japan:									
Oil equivalent of oilseeds	--	174	--	393	--	10.7	174	393	10.7
Vegetable oils as such	12	27	11	26	-1.8	-0.4	14	15	0.9
Total	12	201	11	419	-1.8	9.7	188	408	10.2

Footnotes at end of table.

-- Continued

Table 6.--World trade of vegetable oils and oilseeds, by region, averages 1955-57 and 1963-65, and annual rate of change--Con.

Region	Average, 1955-57		Average, 1963-65		Annual rate of change		Net trade 1/		Annual rate of change
	Exports	Imports	Exports	Imports	Exports	Imports	Average: 1955-57	Average: 1963-65	
	1,000 metric tons				Percent		1,000 metric tons		Percent
Australia-New Zealand:									
Oil equivalent of oilseeds.	--	25	--	25	--	0.1	25	25	--
Vegetable oils as such.	--	8	--	28	--	16.9	8	28	17.0
Total.	--	33	--	53	--	6.0	33	53	6.1
South Africa:									
Oil equivalent of oilseeds.	15	--	17	1	1.6	2/	-15	-16	.8
Vegetable oils as such.	22	10	10	10	-9.0	1.9	-12	--	3/
Total.	37	10	28	11	-3.6	.9	-27	-16	-6.3
Total developed:									
Oil equivalent of oilseed	418	1952	1132	2381	13.2	2.5	1534	1249	-2.5
Vegetable oils as such	804	1559	1012	1879	2.9	2.4	755	867	1.7
All.	1222	3511	2144	4260	7.3	2.4	2289	2116	-1.0
Eastern Europe:									
Oil equivalent of oilseeds.	14	55	45	110	15.7	9.1	41	65	5.9
Vegetable oils as such	22	38	71	202	15.8	23.2	16	131	30.0
Total.	36	93	116	312	15.7	16.3	57	196	16.7
USSR:									
Oil equivalent of oilseeds.	14	124	35	24	12.2	-18.6	110	-11	4/
Vegetable oils as such.	--	12	209	21	--	7.3	12	-188	4/
Total.	14	136	244	45	4/	-12.9	122	-199	4/
Communist Asia:									
Oil equivalent of oilseeds.	274	13	87	2	13.3	-21.1	-261	-85	-13
Vegetable oils as such.	25	4	17	15	-4.7	17.0	-21	-3	-22.0
Total.	299	17	105	17	-12.1	--	-282	-88	-13.6

Footnotes at end of table.

--Continued

Table 6.--World trade of vegetable oils and oilseeds, by region, averages 1955-57 and 1963-65, and annual rate of change--Con.

Region	Average, 1955-57		Average, 1963-65		Annual rate of change		Net trade 1/		Annual rate of change
	Exports	Imports	Exports	Imports	Exports	Imports	Average 1955-57	Average 1963-65	
	1,000 metric tons				Percent		1,000 metric tons		Percent
Total central plan:									
Oil equivalent of oilseeds	302	192	167	136	-7.2	-4.2	-110	-31	-14.7
Vegetable oils as such	47	54	297	237	26.0	20.3	7	-60	2/
All	349	246	464	373	3.6	5.3	-103	-91	-1.5
Latin America:									
Oil equivalent of oilseeds	62	66	80	55	3.2	-2.3	4	-25	4/
Vegetable oils as such	26	97	72	151	13.6	5.7	71	79	1.1
Total	88	163	152	206	7.1	3.0	75	54	4.2
East and West Africa:									
Oil equivalant of oilseeds	548	1	725	3	3.5	14.8	-547	-722	3.5
Vegetables oils as such	453	16	586	27	3.3	6.8	-437	-599	3.1
Total	1001	17	1311	30	3.4	7.3	-984	1281	3.4
North Africa and West Asia:									
Oil equivalent of oilseeds	81	26	117	92	4.7	17.1	-55	-25	-9.1
Vegetable oils as such	76	90	111	341	4.8	18.1	14	230	2/
Total	157	116	228	433	4.8	17.9	-41	205	3/
South Asia:									
Oil equivalent of oilseeds	41	52	55	60	3.8	1.8	11	15	-10.1
Vegetable oils as such	145	39	142	158	-.2	19.1	-106	16	3/
Total	186	91	197	218	.7	11.5	-95	21	3/

Footnotes at end of table.

--Continued

Table 6.--World trade of vegetable oils and oilseeds, by region, averages 1955-57 and 1963-65, and annual rate of change--Con.

Region	Average, 1955-57		Average, 1963-65		Annual rate of change		Net trade 1/		Annual rate of change
	Exports	Imports	Exports	Imports	Exports	Imports	Average 1955-57	Average 1963-65	
	1,000 metric tons				Percent		1,000 metric tons		Percent
Southeast Asia:									
Oil equivalent of oilseeds	8	1	42	6	23.0	25.0	-7	-36	21.8
Vegetable oils as such	1	30	2	49	9.1	6.3	29	47	6.2
Total	9	31	44	55	21.9	7.4	22	11	-7.8
East Asia and Pacific Islands:									
Oil equivalent of oilseeds	741	145	832	94	1.5	-5.3	-596	-738	2.7
Vegetable oils as such	382	40	514	60	3.8	5.2	-342	-454	3.6
Total	1123	185	1346	154	2.3	-2.3	-938	-1192	3.1
Total less developed:									
Oil equivalent of oilseeds	1481	291	1851	310	2.8	.8	-1190	-1541	3.3
Vegetable oils as such	1083	312	1427	786	3.5	12.3	-771	-641	-2.3
All	2564	603	3278	1096	3.1	7.7	-1961	-2182	1.4
World total:									
Oil equivalent of oilseeds	2201	2435	3150	2827	4.6	--	--	--	--
Vegetable oils as such	1934	1924	2736	2902	4.4	--	--	--	--
All	4135	4359	5886	5729	4.5	--	--	--	--

1/ Minus = exports. 2/ Computed percentage not relevant because of very small net trade in 1955-57. 3/ Changed from a net exporter to a net importer. 4/ Changed from a net importer to a net exporter. 5/ Totals are for the oils and oilseeds listed in ch. 1 under basic definitions.

Sources: (17 and 55).

Table 7.--Rank of countries in world trade of selected vegetable oils (oil equivalent), averages 1955-57 and 1963-65 1/

Region	Exports		Imports		Net exports		Net imports	
	1955-57	1963-65	1955-57	1963-65	1955-57	1963-65	1955-57	1963-65
	Rank							
United States	3	1	4	6	3	3	-	-
Canada	10	12	9	10	-	-	6	8
EC	7	4	1	1	-	-	1	1
United Kingdom	11	15	2	3	-	-	2	2
O.N.E.	8	8	3	2	-	-	[illegible]	3
Japan	15	16	5	5	-	-	4	4
Australia-New Zealand	17	17	13	12	-	-	8	7
South Africa	12	14	17	17	7	6	-	-
Eastern Europe	13	10	11	7	-	-	9	6
USSR	14	5	8	14	-	4	5	-
Communist Asia	4	11	15	16	4	5	-	-
Latin America	9	9	7	9	-	-	7	9
East and West Africa	2	3	16	15	1	1	-	-
North Africa & West Asia	6	6	10	4	6	-	-	5
South Asia	5	7	12	8	5	-	-	10
Southeast Asia	16	13	14	13	-	-	10	11
East Asia & Pac. Is.	1	2	6	11	2	2		

1/ Ranking of countries in world trade of selected vegetable oil and oil-equivalent pertains to the vegetable oils listed in ch. 1 under Basic Definitions.

Table 8.--World trade in vegetable oils and oilseeds (oil equivalent), by region, average 1963-65

Exporting regions \ Importing regions	Developed: United States	Developed: Canada	Developed: EC	Developed: EFTA	Developed: O.W.E.	Developed: Japan	Developed: Aus-N. Zea. & S. Afr. Rep.	Developed: Total Developed	Central plan: Eastern Europe	Central plan: USSR	Central plan: Communist Asia	Less developed: Latin America	Less developed: East & West Africa	Less developed: N. Africa & West Asia	Less developed: South Asia	Less developed: Southeast Asia	Less developed: East Asia & Pacific Is.	World total exports
	1,000 metric tons																	
United States		116.9	[illegible]	121.7	129.9	251.5	7.4	1142.7	74.8	3.1		98.9	12.3	269.9	125.9	15.3	51.2	1794.1
Canada	[illegible]		[illegible]	[illegible]	6.9	66.5		185.8	9.8			0.1		2.6	2.7		1.0	202.0
EC	[illegible]	[illegible]	[illegible]	[illegible]	18.4	0.3	4.9	208.4	8.9	0.1		16.5	8.1	42.5		1.0	1.0	286.5
EFTA 1/	[illegible]	[illegible]	[illegible]	[illegible]	5.4	0.6	3.8	102.1	12.2			4.4	7.6	3.6		1.3	1.0	132.2
O.W.E.	[illegible]	[illegible]	[illegible]	[illegible]	0.1		4.0	73.3	2.6	1.0		4.7		3.7				85.3
Japan	[illegible]		[illegible]				1.0	3.3			0.1						6.9	10.3
Australia-New Zealand & South Africa, Rep.	[illegible]	1.4	[illegible]	7.8	1.1	1.2	1.0	25.2						0.2			8.4	33.8
Total	[illegible]	[illegible]	[illegible]	274.5	164.8	320.1	22.1	1740.8	108.3	4.2	0.1	124.6	28.0	322.5	128.6	17.6	69.5	2544.2
Eastern Europe	[illegible]		[illegible]	24.5	0.5	10.0		98.5	12.9	2.0		0.5		7.0				120.9
USSR			[illegible]	13.5	26.8	0.1		76.3	127.9		0.7	35.0					0.3	240.2
Communist Asia		[illegible]	[illegible]	10.4	4.1	48.8	0.6	87.7	0.3							2.0	9.0	99.0
Total	[illegible]	[illegible]	[illegible]	48.4	31.4	58.9	0.6	262.5	141.1	2.0	0.7	35.5		7.0		2.0	9.3	460.1
Latin America	[illegible]	[illegible]	[illegible]	9.2	12.8	26.2		122.6	5.6	0.7		32.7		0.3	0.7	0.3	0.6	163.5
East and West Africa	[illegible]	[illegible]	[illegible]	389.4	31.1	18.2	6.7	1204.2	30.4	2.4	0.9	10.6	21.2	17.8	16.4	10.2	3.0	1317.1
North Africa & West Asia	[illegible]		117.2	41.2	6.1	6.4		174.1	16.4	6.2	0.4	0.3	0.8	27.7	0.5	0.3	2.0	228.7
South Asia	[illegible]	10.6	31.3	19.9	20.3	0.5	4.8	87.5	17.3	17.9	12.4	2.8	0.5	4.5	50.5	10.6	4.1	208.1
Southeast Asia			3.2	0.2		27.3		30.7	0.6	0.2	1.0					1.5	9.5	43.5
East Asia & Pacific Islands	[illegible]	[illegible]	[illegible]	216.9	14.9	95.1	28.8	1164.3	5.9	9.4	1.9	30.3	2.0	41.1	32.7	5.8	71.6	1365.0
Total	[illegible]	[illegible]	[illegible]	675.8	85.2	173.7	40.3	2783.4	76.2	36.8	16.6	76.7	24.5	91.4	100.8	28.7	90.8	3325.9
World total imports	[illegible]	159.1	2308.4	998.7	281.4	552.7	63.0	4786.7	325.6	43.0	17.4	236.8	52.5	420.9	229.4	48.3	169.6	6330.2

Note: Includes trade of vegetable oils listed in ch. 1 under Basic Definitions, plus seasame oil, linseed oil, and other minor vegetable oils. The absence of data indicates little trade flow or trade flows of less than 50 metric tons.

1/ European Free Trade Association.

Source: (42)

Table 9.--World trade in oilseeds, oil-equivalent basis, by region, average 1963-65

Exporting regions \ Importing regions	Developed								Central plan			Less developed						World total exports
	United States	Canada	EC	EFTA 1/	O.E.E.	Japan	Aus.-N. Zea. & S. Afr. Rep.	Total Developed	Eastern Europe	USSR	Communist Asia	Latin America	East & West Africa	North Africa & West Asia	South Asia	Southeast Asia	East Asia & Pacific Is.	
	1,000 metric tons																	
United States		83.1	415.1	101.6	25.9	244.5	0.4	869.6	10.8	3.1		6.3		34.6	0.6		25.6	950.6
Canada	4.0		97.7	13.8	7.9	66.5		189.0	9.8			.1		2.6	2.7		1.0	185.3
EC	1.4	.2	35.6	7.4	.3	.3		44.1	2.1	.1				22.8				69.1
EFTA 1/	.9		20.9	4.8	.6	.2		32.8	4.1					.2				37.1
O.E.E.			.4	.2	.1			.7										.7
Japan																		
Australia-New Zealand & South Africa, Rep.	.2	.6	11.7	7.4	.3	1.2	.6	22.2						.2			.7	23.1
Total	6.7	83.9	587.4	173.6	34.1	312.7	1.0	1139.5	26.8	3.2		6.4		60.4	3.3		27.3	1265.9
Eastern Europe	.4		27.4	3.5	.1	10.0		41.4	3.4	.3				.3				45.4
USSR			.2	.2	.1	.1		.6	34.3								0.3	35.2
Communist Asia		1.4	20.7	5.8	3.8	48.8	0.6	81.1									6.3	87.4
Latin America	4.7	3.3	24.7	4.8	2.8	26.2		65.4	0.3			14.0					0.6	80.3
East and West Africa	1.2	0.3	399.8	236.4	14.5	19.2	0.2	666.6	28.3	2.4	0.7	4.9	2.8	5.3	6.8	4.9	2.6	725.3
North Africa & West Asia	0.4		47.5	18.8	3.8	6.4		77.0	11.4	3.9			0.1	22.0	0.5		2.0	117.0
South Asia	0.2	0.5	3.5	2.6		0.2		7.0	3.5	6.9				0.3	37.3			55.0
Southeast Asia			3.2	0.2		27.3		30.7	0.6	0.2	1.9					0.8	8.2	41.5
East Asia & Pacific Islands	163.0	0.2	330.7	122.5	10.0	77.0	20.9	730.2	1.9	6.8	0.4	29.7		3.3	12.1	0.5	47.1	832.0
World total imports	176.8	88.3	1387.1	567.6	69.2	526.9	23.7	2838.6	110.5	23.7	2.1	55.0	2.9	91.6	60.0	6.2	94.4	3285.0

Note: Includes trade of vegetable oils listed in ch. 1 under Basic Definitions, plus sesame oil, linseed oil, and other minor vegetable oils. The absence of data indicates little trade flow or trade flows of less than 50 metric tons.

1/ European Free Trade Association.

Source: (40).

Table 10.--World trade in vegetable oils, by regions, average 1963-65

Exporting regions \ Importing regions	Developed								Central plan			Less developed						World total exports
	United States	Canada	EC	EFTA 1/	O.W.E.	Japan	Aus.-N. Zea. & S. Afr. Rep.	Total Developed	Eastern Europe	USSR	Communist Asia	Latin America	East & West Africa	North Africa & West Asia	South Asia	Southeast Asia	East Asia & Pacific Is.	
	1,000 metric tons																	
United States		34.7	100.2	20.0	104.0	7.0	7.0	272.9	64.0			92.6	12.3	235.3	125.3	15.3	25.7	843.4
Canada			0.3	16.3				16.6										16.6
EC	23.8	1.1	86.5	30.1	18.1		4.8	164.4	6.8			16.5	8.1	19.8		1.0	1.0	217.6
EFTA 1/	5.1	5.9	23.9	22.4	7.8	0.4	3.7	69.2	8.0			4.4	7.6	3.4		1.3	0.7	94.6
O.W.E.	12.0	1.0	44.0	11.6			4.0	72.6	2.5	1.0		4.7		3.7				84.5
Japan	2.0		0.3				1.0	3.3			0.1						6.9	10.3
Australia-New Zealand & South Africa, Rep.		0.6	0.8	0.4	0.8		0.3	2.9									7.7	10.6
Total	42.9	43.3	256.0	100.8	130.7	7.4	20.8	601.9	81.3	1.0	0.1	118.2	28.0	262.2	125.3	17.6	42.0	1277.6
Eastern Europe			35.7	21.0	0.3			57.0	9.6	1.7		0.5		6.7				75.5
USSR			35.7	13.3	26.7			75.7	93.7		0.7	35.0						205.1
Communist Asia			1.7	4.7	0.3			6.7	0.3							2.0	2.7	11.7
Latin America	0.3		41.7	5.3	10.0			57.3	5.3	0.7		18.7		0.3	0.7	0.3		83.3
East & West Africa	21.9	3.6	336.9	152.0	16.6		6.5	537.6	2.1		0.2	5.7	18.4	12.5	9.5	5.3	0.3	591.6
North Africa & West Asia	2.7		69.7	22.3	23.2			117.9	5.0	2.3	0.3	0.3	0.7	5.7		0.3		132.5
South Asia		10.1	27.7	17.2	20.2	0.3	4.8	80.3	13.7	11.0	12.4	2.8	0.5	4.3	13.1	10.6	4.1	152.8
Southeast Asia																0.8	1.3	2.1
East Asia & Pacific Island	178.9	13.7	116.2	94.4	4.9	18.1	7.9	434.1	4.0	2.6	1.4	0.6	2.0	37.8	20.6	5.3	24.5	532.9
World total imports	246.7	70.7	921.3	431.0	232.9	25.8	40.0	1968.5	215.0	19.3	15.1	181.8	49.6	329.5	169.2	42.2	74.9	3065.1

Note: Includes trade of vegetable oils listed in ch. 1 under Basic Definitions, plus sesame oil, linseed oil, and other minor vegetable oils. The absence of data indicates little trade flow or trade flows of less than 50 metric tons.

1/ European Free Trade Association.

Source: (42).

Table 11.--World net trade of lard, butter, and marine oils, by region, averages 1955-57 and 1963-65, and annual rate of change

Region	1955-57				1963-65				Annual rate of change
	Lard	Butter	Marine oils	Total	Lard	Butter	Marine oils	Total	
	1,000 metric tons								Percent
United States	-258	-57	-26	-341	-294	-44	-45	-383	1.5
Canada	6	-1	-4	1	8	-9	-2	-3	1/
EC	-53	0	221	168	-42	-9	220	169	.1
United Kingdom	97	344	131	572	234	446	172	852	5.1
O.W.E.	-1	-153	-22	-176	-19	-154	-33	-206	2.0
Japan	5		-69	-64	40	0	-125	-85	3.6
Australia & N. Zealand		-234	-14	-248	-	-271	-1	-272	1.2
South Africa		-2	-15	-17	-	6	-48	-42	12.0
Total	-204	-103	202	-105	-73	-35	138	30	2/
Eastern Europe	54	41	-3	92	13	26	34	73	-2.9
USSR	3	-20	34	17	-10	-40	-9	-59	1/
Total	57	21	31	109	3	-14	25	14	23.4
LDC's plus Communist Asia	136	75	-223	-12	69	46	-149	-34	13.4

Note: Minus = exports.

1/ Changed from a net importer to a net exporter.
2/ Changed from a net exporter to a net importer

Sources: (17)

4.--PRODUCTION OF VEGETABLE OILS

World vegetable oil production data are prepared by various organizations including the Foreign Agricultural Service (FAS) of the U. S. Department of Agriculture and the United Nations Food and Agriculture Organization (FAO). The data, however, are presented on a commodity rather than a regional basis. To obtain regional estimates, a world production series, by country, for each of the oilseeds of primary interest to this report was first prepared. For these data, estimates of regional vegetable oil production on an oil-equivalent basis were developed.

Production of Parent Materials

Annual increases in world production 8/ of vegetable oil-bearing materials during 1954-56 through 1965-67 were greatest for sunflowerseed and soybeans and lowest for palm oil, palm kernels, copra, and cottonseed (table 12). The last four products are grown primarily in the less developed countries.

Procedure for Computing Vegetable Oil Production

Deriving estimates of world vegetable oil production presents many problems inasmuch as the United States is practically the only country that reports national production systematically. For other countries, estimates of vegetable oil production were derived from the oilseed production figures compiled for each region. Estimates of the percentage of the crop crushed and a percentage oil-yield factor were applied to the quantity of oilseed to complete the estimate of vegetable oil production. The percentage of oilseed crops crushed varies widely among commodities and among countries. The crushing levels adopted for this report are those used by FAS. These levels, in turn, are based on world crushing levels developed by FAO (22).

A production crushing level of 100 percent was assumed for palm kernels because palm kernels are saved only when they are to be sold for eventual crushing and the unsalvaged kernels are not counted as produced. All copra produced was also considered available for crushing because copra represents the first stage in preparing coconuts for oil processing. In the absence of specific information, it is assumed that some 10 percent of each year's production of rapeseed, sunflowerseed, cottonseed, peanuts, and soybeans is retained for seed or is lost during marketing. Since very little of the rapeseed or sunflowerseed production is used directly for human or animal consumption, some 90 percent of the production of these crops was considered available for crushing. The crushing levels used for cottonseed, soybeans, and peanuts were generally below 90 percent, the differences being the amounts estimated as consumed directly by humans and/or livestock. Olive oil and palm oil production are reported on an oil basis and thus no crushing percentage level is required for them. Olive oil production is reported regularly by the major producing countries. Since palm oil output is especially difficult to determine, estimates of domestic consumption were added to commercial output.

Variations in the oil yields of oilseeds are not as divergent from country to country as are the variations in percentages of the crop crushed. The conversion rates for oilseeds to oil equivalent used in this study were adopted from an ERS

8/ The level of production of each oil-bearing product for 1954-56, 1960-62, and 1965-67, plus the rates of change for each region and for the world, are presented in the tables in app. B. Each oilseed is discussed in app. C.

report published in 1968 (42, table 94). These rates are a marriage of the rates used by FAS and FAO. Because the rates used in this report are not the rates used across the board by either FAS or FAO, the oil-equivalent levels of production vary somewhat from the levels of production contained in the reports of these two organizations.

Time Reference

Calendar year production of vegetable oils from domestic materials is officially reported in the United States and such data were used in this report. For all other countries, the net oil equivalent of an entire crop was allocated to the calendar year during which the crop's processing chiefly occurred. The oil equivalents of peanuts, soybeans, cottonseed, and sunflowerseed from oilseeds harvested in, say 1959, were included in the oil production of 1960. The oil equivalents of palm kernels, copra, and rapeseed were assigned to the calendar years in which the crops were harvested. Palm oil was also assigned to the year in which the palms were harvested. Olive oil production was assigned to the calendar year following the harvest season. Exceptions to the above were Canada, where the rapeseed oil equivalent was assigned to the year following rapeseed harvest, and South America, where the oil-equivalent production of the annual crops, except for rapeseed, was assigned to the year of harvest.

Assigning production to calendar years, of course, allows one to measure annual production with trade and consumption in the same time period. There is no easy division of supplies into one year or the next, inasmuch as oilseeds are grown throughout the world and harvest months vary from continent to continent. But trade is generally reported on a calendar year basis and by having production estimated on a calendar year basis, it is possible to arrive at apparent availability.

The net oil equivalent is assigned to the country where the oilseed is harvested. Often this is not the country where the oilseed is processed since many countries export a large portion of their oilseeds.

Regional Production of Vegetable Oils, Oil-Equivalent Basis

The less developed countries' share of total world vegetable oil production fell from 51 percent during 1955-57 to 45 percent by 1966-68 (table 13). This downward shift occurred primarily because of the slow growth of oil palms in the LDC's and the rapid increases in soybean production in the United States and sunflowerseed in Russia. During 1966-68, the United States accounted for 24 percent of the world's total vegetable oil production, while Russia accounted for an estimated 14 percent.

Data for 1955-68 production of oilseeds and their oil equivalent, by region, are presented in appendix B. A brief discussion of oilseed and oil-equivalent production in the major producing regions, and countries within the regions, follows herewith. Production data on cottonseed are presented in a separate report (43) and are not included here.

United States

Vegetable oils in the United States are derived almost exclusively from cottonseed, peanuts, and soybeans (app. table B-10).

Cottonseed production is controlled by acreage allotments on cotton production. Peanuts are also controlled by acreage allotments. Soybean production is not controlled, except soybeans may not be grown on land diverted from other crops under governmental control programs. Since 1956, the annual peanut acreage allotment has

been 2.4 million hectares. Because of increasing yields, however, production has been steadily increasing. The average yield per hectare harvested increased from 462 kilograms during 1955-57 to 775 kilograms during 1965-67--an annual rate of increase of 4.5 percent. The increase resulted primarily from improved varieties, better cultural practices, and more use of fertilizer. Based on present peanut technology, increases in peanut yields are expected to continue.

Peanuts in the United States are grown primarily for direct human consumption. The Government support price is for edible grade peanuts and is well above world prices for peanuts. The United States has a small role in the world trade of peanuts for crushing into oil and meal. Domestic crushings consist of low-quality peanuts and Government surplus peanuts. In the other major producing countries, peanuts are grown mainly for their oil and meal.

The phenomenal increase in U. S. soybean production since the early 1950's is well known. Production averaged 25 million tons during 1965-67, an average annual increase of 7.6 percent over the 1955-57 level (app. table B-3). The sharp increase in production has come about primarily through increased area planted. During 1955-57 through 1965-67, area planted increased at an average annual rate of 6.2 percent, compared with a 1.5 average annual increase for yields per hectare.

The level of soybean production is greatly influenced by the Government price support program. The key feature in the price support for soybeans is that the USDA's Commodity Credit Corporation (CCC) stands ready to make loans to farmers at rates corresponding to the support price and accepts the commodity as collateral. A farmer then has the option of redeeming the loan at any time up to maturity date, or of delivering the commodity at maturity in full satisfaction of the loan, regardless of the market price.

In general, market prices for soybeans have been above the support price; consequently, Government-held supplies are small. At the end of 1968, however, the quantity of soybeans placed under the CCC loan program reached an alltime high. To make U. S. soybeans more competitive, USDA in March 1969 lowered the soybean support price from $2.50 a bushel (No. 2 beans) to $2.25 (No. 2 beans). Presently, the United States is using more beans for domestic use and exporting more than in 1969.

Canada

Rapeseed production in Canada has continued to increase since 1955, with the exception of several years when plantings were reduced following low prices. Production, which is largely exported, reached a record level of 586,000 tons in 1966. Inasmuch as no support program operates in Canada, production is most sensitive to the world price of rapeseed oil to that of wheat, an alternative crop. In recent years, the rapeseed/wheat price ratio appears to have been generally favorable to rapeseed. Extensive cultivation with fairly low yields, but also low production costs, has meant that Canadian rapeseed production has been profitable at world market prices. Canada is the only major producing country where there are no support price measures in favor of rapeseed production.

European Community

EC production of vegetable oils--primarily olive oil and rapeseed oil--has increased steadily since 1955. France and Germany are the major producers of rapeseed oil. Under the EC's fats and oils regulations, which came into effect on July 1, 1967, there is a fixed "norm price" intended to represent a fair return to producers for their products, and an "intervention price" at which intervention agencies will buy all seed offered. The price at which EC crushers can buy domestic rapeseed is

free to vary between these two prices. For internal sales, deficiency payments equal to the difference between the norm price and the most favorable world price for rapeseed of the same quality are made to community buyers. For exports to third countries, a refund equal to the difference between actual community price and the world market prices is made. Beginning July 1, 1967, the EC "norm price" was $202.50 a ton and the "basic intervention price" was $176.50 a ton.

Prior to July 1, 1967, the German and French support prices were 15 percent below the present basic intervention price. The world price for rapeseed in 1967 averaged $122 a ton (Canadian 40 percent, c.i.f. European ports). Because of the increased producer price and recent improvements in rapeseed processing, EC rapeseed production has increased sharply in recent years--46 percent from 1966 to 1968.

Olive oil is produced primarily in Italy, where the number of specialized olive groves has been steadily increasing. The EC's fats and oils regulations also establish a norm price and a basic intervention price for olive oil. As with rapeseed, this policy isolates the producer price from the market price through guaranteed deficiency payments to producers. The guaranteed high price for the olive oil producer will most likely increase supply in the longrun. There are also support prices to EC producers for sunflowerseed, butter, butterfat, and pork.

Other Western Europe

The major vegetable oils produced in the O.W.E. countries are rapeseed oil and olive oil. The major producer of rapeseed is Sweden, where production and exports have continued to increase moderately.

The olive oil producers in this region, in order of importance, are Spain, Greece, and Portugal. The number of olive trees in these countries has increased only slightly since the early 1950's. Linear least squares trend analysis shows that olive oil production has been declining slightly in Spain and Portugal. There have been slight production increases in Greece, primarily because of improvements in yields per tree cultivated and some improvement in the oil yield of olives pressed.

Japan

Soybeans and peanuts produced in Japan are consumed directly as food. Rapeseed oil is the only domestically produced oil of significance. Yields per hectare of rapeseed have been relatively stagnant. The area planted to rapeseed during 1954-56 through 1966-68 declined--especially the irrigated area, where there has been a substitution to rice. Rapeseed production, oil-equivalent basis, declined 10.1 percent a year from 1954-56 through 1966-68.

Other Developed Countries

The remaining regions of the developed world include the United Kingdom, Australia-New Zealand, and the Republic of South Africa.

The United Kingdom produces practically none of the vegetable oils of primary concern in this report. Vegetable oil production in Australia-New Zealand consists of very small quantities of peanut oil and cottonseed oil. South Africa produces sunflowerseed oil and peanut oil. The South African Government encourages the production of both commodities through the use of price incentives. The goal is first to meet domestic needs and then to export what small quantities may be remaining.

Central Plan Countries

Vegetable oil in Russia and Eastern Europe is derived primarily from cottonseed and sunflowerseed. Production of sunflowerseed oil in the region from 1955 to 1968 increased nearly fourfold. The bulk of the expansion occurred in the USSR, but Bulgaria, Romania, and Yugoslavia also increased output markedly.

By area sown, sunflowerseed is now the most important crop of Soviet agriculture after grain and potatoes. The Russian Government has encouraged sunflowerseed production through economic incentives to producers. The increased production of sunflowerseed oil has come about as the result of four factors: (1) the area planted has increased notably; (2) of more significance, yields of seed per hectare have increased, largely following improved cultural practices; (3) new varieties with a much higher oil content have evolved; (4) the crushing industry has been modernized. More efficient extraction methods have led to higher oil yields at mills. In 1966, 72 percent of the sunflowerseed processed was solvent extracted, compared with 28 percent in 1958. The increase in sunflowerseed oil production in the East European countries has not been as great as that in Russia, although the new high-oil-yielding varieties are now extensively used in the East European countries.

Production of vegetable oils in Communist Asia declined an estimated 1.1 percent a year from 1955 to 1968. With respect to policies regarding agricultural production in Mainland China, first priority is given to grains, second priority to cotton, and third to oilseeds. Attempts to increase grain and cotton production have been primarily through area expansion. It is believed that this expansion may have come about at the expense of some of the oilseed crops (app. table B-19).

Latin America

Countries in Latin America produce all nine of the vegetable oils of primary interest in this report. The oil production of these crops increased at an average annual rate of 6.7 percent from 1955 to 1968. The great bulk of the oil produced is consumed within the region. From a trade point of view, the most important oils are sunflowerseed, soybeans, and peanuts.

The largest producer of sunflowerseed is Argentina. Production has not shown any distinct long-term expansion. There have been large year-to-year fluctuations, partly because of weather variations and changes in area planted often following changes in Government price support policies for sunflowerseed and alternative crops. Sunflowerseeds produced in Argentina are low in oil content compared with Russian sunflowerseed varieties.

Brazil is the region's major producer of soybeans and peanuts. Soybean production has expanded greatly since 1960. Production has been encouraged by favorable price supports. The increased production has come about primarily through expansion of area planted. Soybeans have become a good foreign exchange earner for Brazil, and the Government is expected to encourage further production. Brazil currently produces about four times as many peanuts as it did in the early 1950's. Increased area accounts for about three-fourths of the increase, while increased yields account for the remaining fourth. Price support for peanuts has been increased in recent years.

East and West Africa

The East and West Africa region is the world's largest exporter of peanuts and oil-palm products. The region's production of other oilseed products is considerably smaller and, in general, does not enter world markets.

The African oil palm is thought to be indigenous to West Africa, where it is found mainly in a belt 200-300 miles wide along the coast from Gambia to Angola. Most of the total area under oil palm consists of natural palm groves with very low yields. Modern plantations have been prominent in the Congo (Kinshasa) and West Cameroon. In recent years, plantation plantings have increased sharply--from 17,807 hectares in 1960 to 88,629 in 1968--in the Cameroon, Dahomey, Ivory Coast, and Sierra Leone.

Newly planted palms will begin producing at 4-5 years of age, but 9-10 years are required for maximum yields. The key factor in the replacement of natural groves by a "managed" system of new planting or rehabilitation has been the genetic breakthrough making available improved varieties. The new varieties have a yield potential exceeding that of unimproved strains by seven to ten times. In Africa, selection and breeding has concentrated on the Tenera type of palm, a hybrid from a cross of genetically different strains, namely Dura and Pisifera. The increased yields result from an earlier bearing age and from increases in the number of bunches, the percentage of fruit on the bunch, and the percentage of pulp in the fruit.

The change from traditional to modern methods of processing could result in a doubling of palm oil production without increasing the input of fruit. Thus, the economic importance of efficiency in processing is perhaps as great as that of the improvement in productivity of newly planted areas. At present, the bulk of the palm oil from the natural groves is processed by traditional methods. The old method of boiling and squeezing results in an extraction rate of approximately 30 percent, compared with 60 percent from the hand-screw press. Pioneer mills (digester-centrifuge-type processing units) have increased the oil yields up to 80 percent, but investment and labor requirements for the mills are high. With efficient processing, a modern plantation at full bearing level should produce about 15 tons of fresh fruit bunches per hectare, which in turn would yield 3.0 tons of palm oil and 0.75 tons of palm kernels. It is logical to assume that in future years an increasing portion of the produce from natural groves will be processed by modern methods.

Nigeria is one of the world's major sources of palm oil. Prior to the civil unrest in Nigeria, the Eastern region produced approximately 65 percent of the country's total palm oil. 9/ Practically all the palm oil is from wild or semiwild trees. In the former Eastern region, there are an estimated 1.1 million hectares of natural palm groves that vary widely in density. Yields of palm oil are very low, estimated at 109 kilograms a hectare. In the former Western and Mid-Western regions, there are an estimated 700,000 hectares with an average yield per hectare of 88 kilograms. Ownership of most of Nigeria's land resides with the tribes, and tribal chiefs assign to individuals the right to harvest the fruit from the natural palm trees. Thus, small holders harvest most of the palm fruit. Because of these practices, the trees in general are not well cared for, and there is little incentive for individual farmers to plant additional trees. In a study by Johnson (37), it has been argued that the low level of producer prices also retards the incentive for increased production. At past levels of producer prices, there have been unharvested areas of oil-bearing palms. The level of future production will depend heavily on new planting and rehabilitation schemes.

9/ The four regions of Nigeria were divided into 12 states in 1967. However, since historical data are available only in reference to the four regions, the discussion herein refers to the former Eastern, Mid-Western, Western, and Northern regions.

Oil palms in the Congo (Kinshasa) are primarily in plantations. In 1958, there were 235,000 hectares in plantations. After independence in 1960, new plantation plantings were sharply curtailed. Because of the rebellions of 1964 and 1965, many planters were forced to leave their plantations and as a consequence production fell sharply--from 245,000 tons in 1959 to 130,000 tons in 1965. Without a major replanting program, the Congo will not attain preindependence levels of palm oil and palm kernel production. There are various reasons for this. World prices for palm oil were so low in 1968-69 that young people in various areas of the Congo have not considered it worthwhile to gather the wild palm fruit. Also, plantations are experiencing difficulties in keeping a labor force--partly because of low wages and low palm fruit prices and partly because young men prefer not to do field work. The plantations that were abandoned will probably never attain previous levels of output because the trees are now older and they receive less management and care. Also, crop research and selection of high-yielding varieties adapted to the Congo have advanced little since 1960, while progress has been made in other countries. Only a small percentage of the present plantations are planted to the high-yielding Tenera cross variety.

In Africa, palm kernels from natural groves constitute about 7 percent of the total weight of the palm bunch. In the case of the Dura Pisifera cross, the palm kernel accounts for only 5 percent of the total weight of the bunch. However, because of increased per hectare yields of bunches, under favorable conditions the hybrid yields around 181 kilograms of kernels per hectare, compared with generally less than 136 kilograms for natural palm groves.

West Africa is one of the world's largest producing areas of peanuts. Nigeria and Senegal rank third and fourth, after India and Mainland China, among the world's largest producers. Other large producers of peanuts in West Africa include Niger, Cameroon, and Gambia. Nigeria and Senegal together account for about [illegible] of the world exports.

Nigeria's peanut industry is centered in the former Northern Region. Although the region comprises 79 percent of Nigeria's total land area, only about 12 percent of the region is in farm crops. The amount of additional land that could be brought under cultivation is unknown, but it is several times that currently cultivated. Land use is largely based on shifting cultivation. Near large urban areas, permanent cultivation is practiced. Around Kano, for example, about 405,000 hectares are cultivated without periods of fallow. The use of the land in the Northern Region is generally alloted to family groups, and a given family usually retains its rights to again cultivate a specific plot after it has lain fallow.

Accurate figures on peanut area and yield are not available. The Nigerian Government has estimated the increase in area to be at 2 percent per annum. The acreage planted to peanuts varies from year to year depending on planting and growing conditions early in the season. If the rainy season arrives early, and if the farmer can plant his food crops early and get the crops off to a good start, he will probably plant an increased hectarage to peanuts. If the rains come late and the crop outlook is poor, he will first plant his food crops and devote more hectarage to them. The result is that the peanuts will be planted later and the area will be reduced. High yields depended greatly on getting the crop planted early.

The Marketing Board establishes the producer price and controls the marketing process of peanuts in Nigeria. Through 1968, prices were announced after the planting season.

The Senegalese economy relies fundamentally on the production and export of peanuts. Of the total cultivated area in Senegal, approximately 50 percent is devoted to peanuts. Peanuts provide nearly 75 percent of the country's exportable resources;

and some 85 percent of the labor force is employed in production and marketing of the crop. The implements used for cultivation are largely hand tools. Individual titles to agricultural land are almost nonexistent. Most farms are farmed by individual families. Senegal's association with the EC led to the abolition of the privileged tariff (20 percent above the world price) that was enjoyed by countries exporting peanuts on the French market.10/ Alignment of the price of exported peanuts with the world price has required a reduction in producer prices. However, peanuts are one of the rare exportable items of the savannah regions of Africa and it is likely that their production will continue to increase in face of declining producer and export prices.

North Africa and West Asia

Vegetable oil production in North Africa and West Asia has been increasing steadily since 1955. Cottonseed, olive oil, peanuts, and sunflowerseed have all contributed to this increase.

The major producers of cottonseed are the United Arab Republic, Sudan, and Turkey. The only sunflowerseed producer of significance in the area is Turkey. Turkey's sunflowerseed production was relatively low in the early 1960's because of pest infestation. Production reached a record high in 1967 because of the use of more resistant Russian varieties with a significantly higher oil yield. Very little of the cottonseed oil or sunflowerseed oil produced in the region enters into world markets.

Production of peanuts is centered in Sudan, where they are grown almost exclusively for export. In 1963, peanuts became the second most important earner of foreign exchange. The principal production areas have been the sandy provinces of Kordofan and Darfur, where there are large variations in rainfall and yields. A recent development, the production of peanuts on the irrigated soils of the Gezira, was a result of attempts to increase the output of the Gezira by replacing with alternative crops some of the fallows in the original cotton-orientated rotations. Peanuts were found to be suitable and profitable. Peanut acreage in the Gezira increased from 14,286 hectares in 1962/63 to 50,426 hectares in 1965/66. In the absence of unfavorable changes in the world market situation, expansion of production in the future will be large, especially in the Gezira and in the large areas expected to come under irrigation during the 1970's. The level of producer prices in the country has been largely determined by the level of world prices.

Production of olive oil in the North Africa and West Asia region is centered primarily in Turkey, Tunisia, and Morocco. In Turkey, the total number of olive trees has been doubled since the end of World War II. Since the early 1960's olive tree plantings in Turkey have been increasing at the rate of about one and a half million trees a year. In Tunisia, the total number of olive trees has been increasing around 2.8 percent annually since 1950. The number of productive trees in Morocco has increased only slightly since 1950.

Pacific Islands and Asia, excluding West Asia

Four of the 18 regions in this study are in Asia. South Asia's oilseed production from 1955 to 1968 increased 2.2 percent annually, or approximately at the same rate as population. Practically all of the vegetable oil produced in this region is for domestic consumption. India is the largest producer of peanuts in the world.

10/ The loss of this privileged tariff applies to all of the African countries that were former French colonies and that are now associated with the EC.

In Southeast Asia and the Other Asia and Pacific Islands regions, oilseed production from 1955 to 1968 increased an average of 2.0 percent annually. The major crops produced for export are coconuts and oil palms.

Production of coconuts is concentrated in the Philippines, where they are the country's leading commercial crop. There are some 440,000 coconut farms in the country with a total area of some 1.9 million hectares. The average farm size is 4.4 hectares. During 1955-66, production increased 3.9 percent annually. Production dropped sharply in 1967 because of typhoon damage. The area planted to coconut trees has increased substantially since 1960. Approximately 66 percent of the trees were in various stages of bearing in 1968. Productivity per hectare continues to be rather low; contributing factors have been the slow rate of replanting of old trees in the smaller sized farms and the dreaded "cadang-cadang" disease of coconut.

Malaysia and Indonesia are the major producers of oil palms in the region.

Malaysian oil palm plantings began increasing sharply in 1961. The area under oil palm nearly tripled from 57,000 hectares in 1961 to 160,000 hectares by 1967. In 1966, Malaysia became the world's largest exporter of palm oil. Production is mainly on large estates that have adjacent processing facilities. Oil palm production has been encouraged by the Government, primarily because of declining rubber prices. The rate of future expansion in area will most likely be governed by the relative profitability of oil palm to rubber since there is a potential large area having suitable soils and climate for both. Oil palm plantings since 1960 have been of the higher yielding Tenera cross variety (Deli dura x Pisifera), which has a much higher proportion of pulp to kernel. Palm oil production has been increasing much more rapidly than palm kernel production.

Indonesia has been the world's second largest exporter of palm oil since 1965. As in Malaysia, the bulk of the palm oil is produced on estates. There were only limited increases in production during 1955-66 because of inadequate replanting and lack of financial resources to purchase fertilizer and other necessary inputs to maintain established estates. In recent years, however, more attention has been given to replanting. In 1963, 34 percent of about 105,000 hectares under oil palms were over 20 years of age, while by 1967 the proportion had been reduced to 24 percent.

World Production of Edible Fats and Oils

World production of fats and oils that are used primarily for edible purposes increased at an estimated average annual rate of 2.9 percent from 1955-57 through 1966-68. Inasmuch as the world population was increasing 2.0 percent a year during this period, there was an apparent increase on a global basis in the per capita availability of fats and oils. During the period, production of the soft edible vegetable oil group increased at the fastest rate, 4.3 percent a year. Butter, lard, and marine oils each increased at an average rate of 1.9 percent, while production of palm oil was practically constant.

During 1955-57 through 1966-68, the soft edible vegetable oils' share of world production increased from 45 to 53 percent. The increase is primarily attributable to increases in soybean and sunflowerseed production. The other fats and oils' share of total production declined. Palm oil's share of the total declined from 20 to 16 percent, butter and lard's share from 31 to 28 percent, and marine oils' from 4.4 to 4.0 percent.

World Production of Animal Fats and Marine Oils

Data on production of butter, lard, and marine oils were obtained on a regional basis for the same periods as data on regional trade, 1955-57 and 1963-65 (table 15).

Developed countries supplied some 61 percent of the world's production of animal fats and marine oils during 1955-57, compared with 54 percent in 1963-65. Overall production in developed countries increased only 0.4 percent annually, primarily because production declined in the United States and the United Kingdom.

Production in the USSR increased an estimated 6.9 percent a year. In the LDC's and Communist Asia, production increased an estimated 1.7 percent annually--well below the rate of population increase.

Table 12.--World production of selected vegetable oilseeds, by region, average 1954-56 and 1965-67, and annual rate of change

Commodity	Developed		Central plan		Less developed		Total		Annual rate of change from 1954-56 to 1965-67			
	1954-56	1965-67	1954-56	1965-67	1954-56	1965-67	1954-56	1965-67	Developed	Central plan	Less developed	Total
	1,000 metric tons								Percent			
Cottonseed	5,398	4,410	5,479	6,744	7,308	9,652	18,185	20,797	-1.8	+1.9	+2.6	+1.2
Peanuts	915	1,560	3,013	2,373	8,367	12,493	12,295	16,426	+4.9	-2.2	+3.7	+2.7
Rapeseed	615	1,391	1,252	1,611	1,261	1,717	3,128	4,719	+7.7	+2.3	+2.1	+3.8
Soybeans	11,150	25,386	9,278	7,608	726	1,509	21,154	34,503	+7.1	-1.6	+6.2	+4.5
Sunflowerseed	72	133	3,778	7,073	742	1,254	4,591	8,460	+5.7	+5.9	+4.9	+5.7
Copra	--	--	--	--	3,877	4,731	3,877	731	--	--	+1.8	+1.8
Olive oil 1/	766	1,027	4	5	184	220	954	1,252	+2.7	+2.1	+1.6	+2.5
Palm kernels	--	--	--	--	992	988	992	988	--	--	-0.1	-0.4
Palm oil 1/	--	--	--	--	1,209	1,190	1,209	1,190	--	--	-0.1	-0.1

1/ Oil basis only.

Source: App. tables B-1 - B-9.

Table 13.--World production of selected vegetable oils (oil equivalent), by region, averages for 1955-57 and 1966-68, and percentage share of total 1/

Area	1955-57		1966-68	
	Production	Share of total	Production	Share of total
	1,000 metric tons	Percent	1,000 metric tons	Percent
United States	2,642	19.0	4,773	23.5
Canada	44	.3	215	1.1
EC	295	2.1	607	3.0
United Kingdom	--	--	--	--
O.W.E.	608	4.3	724	3.5
Japan	92	.6	26	.1
Australia & New Zealand	1	--	3	--
South Africa	59	.4	93	.5
Total	3,741	26.7	6,441	31.7
Eastern Europe	298	2.1	759	3.7
USSR	1,281	9.0	2,760	13.7
Communist Asia	1,494	10.5	1,226	6.0
Total	3,073	21.6	4,745	23.4
Central America & Mexico	285	2.0	375	1.8
South America	459	3.3	987	4.8
East & West Africa	2,117	15.1	2,300	11.3
North Africa & West Asia	450	3.2	685	3.3
South Asia	1,760	12.4	2,102	10.4
Southeast Asia	145	1.0	152	.7
East Asia & Pacific Islands	1,961	13.9	2,531	12.6
Total	7,177	50.9	9,132	44.9
World total	13,991	100.0	20,318	100.0

1/ Production pertains to the vegetable oils listed in chap. 1 under Basic Definitions.

Sources: App. tables B-10 - B-26.

Table 14.--Estimated world production of selected fats, oils, and oilseeds (fat or oil equivalent), averages for 1955-57 and 1966-68, and annual rate of change

Commodity	1955-57		1966-68		Annual rate of change
	Production	Share of total	Production	Share of total	
	1,000 metric tons	Percent	1,000 metric tons	Percent	Percent
Vegetable oils:					
Cottonseed	2,052	9.3	2,353	7.9	1.2
Peanut	2,169	9.9	2,881	9.6	2.6
Rapeseed	919	4.2	1,393	4.7	3.9
Soybean	2,489	11.3	4,743	15.8	6.1
Sunflowerseed	1,294	5.9	3,126	10.4	8.4
Olive oil	957	4.3	1,252	4.2	2.5
Total	9,880	44.9	15,748	52.6	4.3
Palm oils:					
Coconut	2,627	12.0	3,077	10.3	1.5
Palm kernel	440	2.0	419	1.4	-.4
Palm	1,233	5.6	1,235	4.1	.1
Total	4,300	19.6	4,731	15.8	.9
Animal fats:					
Butter (fat content)	3,583	16.3	4,342	14.5	1.8
Lard	3,246	14.8	3,930	13.1	1.8
Total edible	6,829	31.1	8,272	27.6	1.8
Marine oils:					
Whale	388	1.7	103	.4	-11.0
Sperm whale	100	.5	143	.5	3.3
Fish (including liver)	481	2.2	936	3.1	6.2
Total	969	4.4	1,182	4.0	1.8
World total	21,978	100.0	29,933	100.0	2.9

Sources: App. tables B-1 - B-9 for vegetable oils, USDA bulletins for animal fats and marine oils.

Table 15.--Estimated world production of lard, butter, and marine oils, by region, averages for 1955-57 and 1963-65, and annual rate of change

Region	1955-57				1963-65				Annual rate of change
	Lard	Butter	Marine oils	Total	Lard	Butter	Marine oils	Total	
	1,000 metric tons								Percent
United States	1,192	694	82	1,968	995	603	84	1,682	-2.0
Canada	59	148	27	234	57	162	33	252	.9
EC	347	877	51	1,275	391	1,180	36	1,607	2.9
United Kingdom	10	34	93	137	10	39	23	72	-7.7
O.W.E.	102	486	313	901	108	512	299	919	.3
Japan	22	8	136	166	59	23	185	267	6.2
Australia & N. Zealand	4	402	18	424	1	441	5	447	.7
South Africa	11	45	49	105	12	48	76	136	3.3
Total	1,747	2,694	769	5,210	1,633	3,008	741	5,382	.4
Eastern Europe	535	300	1	836	639	413	3	1,055	2.9
USSR	400	552	54	1,006	667	898	155	1,720	6.9
Total	935	852	55	1,842	1,306	1,311	158	2,775	5.3
LDC's plus Communist Asia	563	924	146	1,533	855	725	198	1,778	1.7
World total	3,246	4,370	969	8,585	3,794	5,044	1,087	9,935	1.9

Sources: USDA bulletins on world production and (17).

5.--CONSUMPTION OF FATS AND OILS

In general, regional patterns of consumption of fats and oils reflect regional patterns of production. For example, the United States uses mostly soybean and cottonseed oils in margarine, cooking, and salad oils; in Russia, cottonseed and sunflowerseed oils are major edible oils. Coconut and palm oils are prominent in the diet in East Asia, while in West Africa, palm oil is a major source of edible oils. Scandinavians consume primarily rapeseed oil and marine oils and in Australia and New Zealand, animal fats predominate. The locally produced fats and oils are generally in a favored position because of a combination of protective economic policies, lower transportation costs, and consumer habits and preferences that favor the local products (28, p. 7).

In the major importing regions, such as Western Europe and Japan, the number of edible fats and oils of importance is quite large. As would be expected, consumption in the high-income countries is generally spread over a wider range of fats and oils than in the countries with low and medium incomes.

The level of consumption of all fats and oils is largely determined by the level of incomes (26, pp. 41-42). As illustrated in figure 2, per capita consumption of fats and oils in countries with a per capita GDP in excess of $1,000 is generally more than 20 kilograms. In countries with a per capita GDP below $500, consumption is generally below 10 kilograms. 11/ In these low- and medium-income countries that have had a substantial increase in income since the middle 1950's, there has been a significant increase in fats and oils consumption. This, of course, indicates that the income elasticity of demand is high in countries where the per capita consumption is low. In the high-income countries, where consumption of fats and oils is approaching saturation levels, there is little increase in total consumption with increased income. However, while total consumption has not been increasing markedly in these countries, there have been some important variations in the patterns of consumption. These variations have been caused by a number of factors, including relative prices, consumer habits, health considerations, protection granted to domestic producers and manufacturers, regulations affecting margarine production, technical and financial characteristics of the highly integrated fats and oils processing industries, and traditional links with suppliers.

Consumption of Vegetable Oils

For this study, figures on total and per capita consumption, or availability, of vegetable oils were developed for each region from 1955 to as far forward as data permitted. For the United States, the consumption series is based on actual human consumption. For all other regions, consumption is based on domestic production plus or minus the region's net trade. The latter definition excludes consideration of stock changes and includes production for both edible and industrial purposes. A consistent time series on vegetable oil inventories was available for only the United States. However, the effects of annual oil stock variations on consumption have probably been relatively small for most regions. While it was recognized that a portion of the nine oils of prime concern to this report were used for industrial purposes, data were not available that would permit a division of oils in each region into industrial and edible categories. In the United States, for which such data were available, less than 2 percent of the total utilization of the nine vegetable oils was for industrial purposes; coconut oil formed the bulk of this use. Utilization data for other countries also showed a very small proportion of the oil being used for industrial purposes. The share used for industrial purposes was much higher for the animal and marine fats and oils. While some of the nine vegetable oils are used more for industrial purposes

11/ This is "visible" consumption because it excludes consumption of fats and oils obtained through the eating of meat and fish and through the direct consumption of oilseeds as such.

than others are (for example, coconut oil and palm kernel oil), overall demand for the nine oils as a group is primarily for edible purposes.

Total world availability of vegetable oils during 1955-57 through 1963-65 grew at a rate of some 3.1 percent a year (table 16). For the developed regions as a whole, the annual growth rate was 3.2 percent, compared with 3.0 percent for the central plan countries and 3.2 percent for the less developed countries. On an actual consumption basis, per capita availability of vegetable oils during 1963-65 averaged 11.8 kilograms for the developed regions, 3.3 kilos for the central plan countries, and 4.5 kilos for the LDC's.

As a percentage of total world vegetable oil consumption, some 43 percent is consumed in the developed countries, 20 percent in the central plan countries, and 37 percent in the LDC's. The world's major consuming region is the United States, followed by the EC, South Asia, the USSR, and Latin America, respectively.

Consumption of Animal Fats and Marine Oils

The less developed countries lag considerably behind the more economically advanced countries in consumption of animal fats and marine oils. In the LDC's plus Communist Asia, estimated per capita availability of these products during 1963-65 was only 0.76 kilos. For the developed regions, average per capita consumption was 8.2 kilos. This was about the same level as that in Eastern Europe and Russia--8.0 kilos.

Among the developed regions, per capita consumption declined in the United States, Canada, Other Western Europe, Australia-New Zealand, and South Africa during 1955-57 through 1963-65. The annual rate of decline was greatest in the United States, 4.3 percent, and least in Other Western Europe, 1.0 percent. In contrast, increases in per capita consumption occurred in the EC, the United Kingdom, and Japan. Although per capita availability in Japan increased 6.4 percent a year, apparent consumption was still only 1.9 kilos during 1963-65. In the United Kingdom, consumption has been increasing 2.7 percent annually, but per capita availability was 17 kilos during 1963-65.

In Russia, per capita consumption of lard, butter, and marine oils was an estimated 7.3 kilos in 1963-65, compared with 5.1 kilos in 1955-57. Per capita consumption in Eastern Europe increased by 1.6 percent annually during 1955-57 through 1963-65, reaching 9.4 kilos by 1963-65.

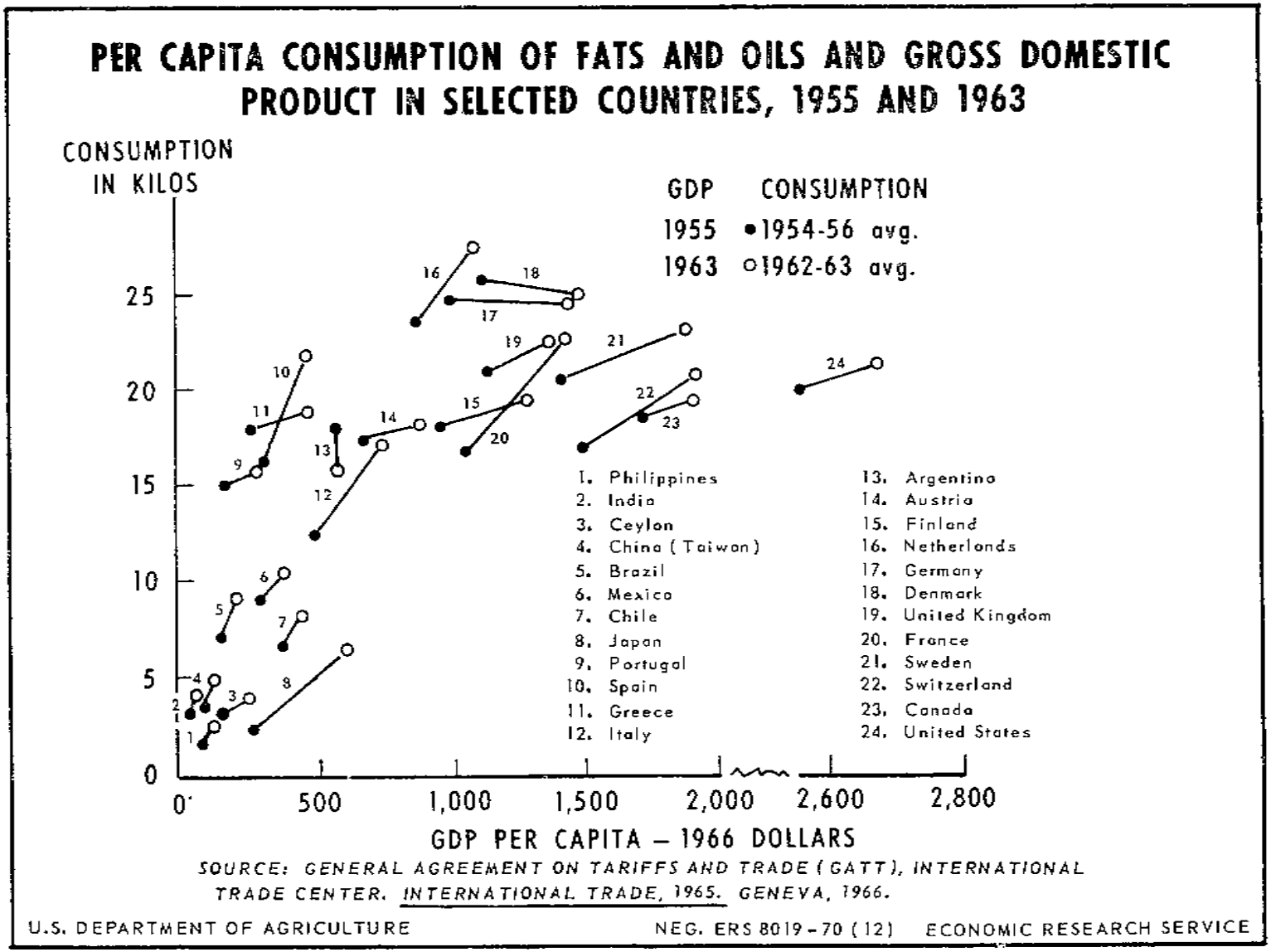

PER CAPITA CONSUMPTION OF FATS AND OILS AND GROSS DOMESTIC PRODUCT IN SELECTED COUNTRIES, 1955 AND 1963
CONSUMPTION IN KILOS
GDP CONSUMPTION
1955 •1954-56 avg.
1963 ○1962-63 avg.
1. Philippines
2. India
3. Ceylon
4. China (Taiwan)
5. Brazil
6. Mexico
7. Chile
8. Japan
9. Portugal
10. Spain
11. Greece
12. Italy
13. Argentina
14. Austria
15. Finland
16. Netherlands
17. Germany
18. Denmark
19. United Kingdom
20. France
21. Sweden
22. Switzerland
23. Canada
24. United States
0
5
10
15
20
25
0
500
1,000
1,500
2,000
2,600
2,800
GDP PER CAPITA – 1966 DOLLARS
SOURCE: GENERAL AGREEMENT ON TARIFFS AND TRADE (GATT), INTERNATIONAL TRADE CENTER. INTERNATIONAL TRADE, 1965. GENEVA, 1966.
U.S. DEPARTMENT OF AGRICULTURE
NEG. ERS 8019-70 (12) ECONOMIC RESEARCH SERVICE

Figure 2

Table 16.--Total and per capita availability of vegetable oils (oil equivalent), by region, averages 1955-57 and 1963-65

Region	Average 1955-57		Average 1963-65		Annual rate of change	
	Total	Per capita	Total	Per capita	Total	Per capita
	1,000 M. tons	Kilograms	1,000 M. tons	Kilograms	Percent	
United States	2,170	12.84	3,098	16.73	4.3	3.3
Canada	123	7.61	171	8.88	4.2	1.9
EC	1,823	11.02	2,327	12.96	3.1	2.1
United Kingdom	595	11.57	497	9.17	-2.2	-2.9
OWE	988	12.08	1,134	13.03	1.7	0.9
Japan	280	3.02	442	4.57	5.9	5.3
Australia-New Zealand	33	2.86	56	3.96	7.1	4.1
South Africa	33	2.23	55	3.25	7.1	4.8
Total	6,045	10.08	7,780	11.78	3.2	2.0
Eastern Europe	356	3.15	758	6.89	9.9	10.3
USSR	1,403	7.03	1,960	8.61	4.3	2.6
Communist Asia	1,212	1.86	1,033	1.31	-2.0	-4.3
Total	2,971	3.06	3,751	3.33	3.0	1.1
Latin America	819	4.33	1,255	5.24	5.5	2.4
East & West Africa	1,133	6.49	1,067	5.03	-.7	-3.1
North Africa & West Asia	409	3.17	846	5.34	9.5	6.7
South Asia	1,666	3.20	2,197	3.53	3.5	1.2
Southeast Asia	167	2.58	160	2.03	-.5	-3.0
East Asia & Pacific Islands	1,024	6.15	1,185	6.12	1.8	-.1
Total	5,218	4.22	6,710	4.46	3.2	0.7
World total	14,234	5.08	18,241	5.53	3.7	1.1

Sources: Tables in app. A and app. B, except for the U.S. Actual levels of oil consumption in the U.S. obtained from USDA bulletins.

Table 17.--Total and per capita availability of lard, butter, and marine oils, by region, averages 1955-57 and 1963-65

Region	1955-57				Per capita availability	1963-65				Per capita availability	Annual rate of change	
	Lard	Butter	Marine oils	Total		Lard	Butter	Marine oils	Total		Total	Per Capita
	1,000 metric tons				Kg.	1,000 metric tons				Kg.	Percent	
United States	934	637	56	1,627	9.63	701	559	39	7,299	6.77	-2.7	-4.3
Canada	65	147	23	235	14.55	65	153	31	249	12.95	.7	-1.4
EC	294	877	272	1,443	8.72	349	1,171	256	1,776	9.89	2.6	1.6
United Kingdom	107	378	324	709	13.79	241	485	195	924	17.03	3.3	2.7
EFTA	101	333	291	725	8.87	89	358	266	713	8.20	-.2	-1.0
Japan	27	8	67	102	1.14	99	23	60	182	1.88	7.4	6.4
Australia & New Zealand	4	168	4	176	15.10	1	170	4	175	12.70	-.1	-2.1
South Africa	11	-3	31	88	6.08	12	54	28	94	5.37	.8	-1.5
Total	1,543	2,391	972	5,105	9.31	1,560	2,973	879	5,412	8.20	.7	-1.5
Eastern Europe	589		-1	928	8.22	652	439	37	1,128	9.37	2.5	1.6
USSR	403		88	1,023	5.13	657	858	146	1,661	7.30	6.2	4.5
Total	992		86	1,951	6.25	1,309	1,297	183	2,789	8.01	4.6	3.2
LDCs plus Communist Asia	699		-77	1,521	.85	924	771	49	1,744	.76	1.7	-.6
World total	234		980	8,577	3.06	3,793	5,041	1,111	9,945	3.02	1.9	-.2

Sources: Tables 11 and 15.

6.--DEMAND ANALYSIS AND PROJECTIONS FOR VEGETABLE OILS

Analysis

Theoretically, per capita demand for a commodity depends on its own price, price of its substitutes, level of income of the consumer, and factors that affect demand over time, such as tastes and preferences. Thus, $Q^d = f(P, P_{sb}, I, T)$, where:

Q^d = quantity demanded

P = price of commodity

P_{sb} = price of substitutes

I = income

T = trend

To measure the effects of the above economic factors on demand for vegetable oil, least squares estimates of a single equation were used. Arguments for this procedure in estimating the demand for agricultural products are given by Fox and Ezekiel (25, ch. 24). A demand analysis was made for each of the 18 regions. To provide a sound basis for projecting demand, several functions were developed for each region.

The dependent variable was per capita consumption of vegetable oil and, except for the United States, represented the sum of a region's production and net trade divided by the region's population. For the United States, actual per capita consumption data were used.

The independent variables taken into consideration were:

(1) Price of the commodity. A representative retail or wholesale price series was found for only the United States; the series began with 1955. For the other regions the available partial retail or wholesale price series of individual oils was compared with the international price series shown in table 3. In general, these two price series were found to move in the same direction. This finding supported our contention that developments in the production of a particular vegetable oil in one part of the world affect the price, and thus the demand, for other vegetable oils there and elsewhere. Thus, regional average price series, weighted by the volume and international price of each oil imported, or exported if a net exporting region, were constructed. For some regions, the international price series of the most significantly exported, or imported, oil provided a better statistical fit. These price series were deflated by a representative regional consumer price index where available. For regions for which such a price index was not available, the import or export price index (as published by the International Monetary Fund (36)) of a major country within the region was used.

(2) Price of substitutes. For each region, the price of a competing product--generally either lard, butter, or fish oil--was also introduced as an explanatory variable. To the extent possible, retail or wholesale prices for the major competing commodity within the region were used. Where data on such prices were not available, data on international prices were used. International prices of the substitute commodity were deflated in the same manner vegetable oil prices were deflated.

(3) Income. The following measures of national income growth were taken largely from Moe (44) and used as the income variable: For developed regions, per capita consumer expenditure in constant prices; for Eastern Europe, a deflated index of the "dis-

tributed national income" of Poland; for the USSR, deflated "net material product"; and for Communist Asia, an income series developed by the Committee on the Economy of China (6).

(4) Trend. Changes in tastes, in the composition of the population, and in the distribution of employment between the urban and rural sectors may alter the composition of consumption. Since most of these changes are gradual, they might be explained as trend. However, the income and trend variables are so strongly intercorrelated that it is not possible to introduce both. When trend is excluded from the analysis, the income coefficient represents not only income but also the trend effect. (54, pp. 41-45).

The following functions were used in the demand analysis for vegetable oil: 12/

(a) $Q_o^d = a + b\,P_o + c\,P_{sb} + d\,I + e$

(b) $\log Q_o^d = a + b \log P_o + c \log P_{sb} + d \log I + e$

(c) $Q_o^d = a + b \log P_o + c \log P_{sb} + d \log I + e$

(d) $\log Q_o^d = a + \frac{b}{P_o} + \frac{c}{P_{sb}} + \frac{d}{I} + e$

where:

Q_o^d = per capita consumption of vegetable oil measured in kilograms

P_o = price of vegetable oil

P_{sb} = price of substitute product

I = per capita income

e = unobservable random term

a, b, c, and d = parameters

log denotes common logarithms (base 10)

No lagged relationships were considered in any of the functions. As with most food product studies that use annual data, it is assumed that the adjustment in consumption following a change in price or income takes place in the same year, and that price or income changes in previous years or expected in future years have no effect on current consumption.

Table 18, which shows the various demand regressions that were developed for each region, contains for each function (1) the value of the "F" statistic and a notation on whether the statistic is statistically significant at the 5-percent confidence limit, (2) the value of the Durbin-Watson statistic, (3) the value of the standard error of the estimate, and (4) "t" values for each of the independent variables. The price, cross, and income elasticities, as obtained from the various regressions, appear in table 19. The elasticities that are significant at the 1-, 5-, and 10-percent levels are noted. Further discussions of these regressions are incorporated in the following section on projections.

12/ For a description and interpretation of these functions, see Goreux (29).

Projections

The vegetable oil demand projections, which are based on the statistical equations developed earlier in this chapter, are presented in table 20. Vegetable oil prices and the price of vegetable oil substitutes were assumed constant at average 1963-65 prices. (The assumption of constant prices, however, is relaxed in the projections of supply and demand made in part IV of this report.)

Income and population data used in the projections appear in appendix D. In the selection of a regional equation for projection purposes, consideration was first given to the reasonableness of the signs of the coefficients. In accordance with economic theory, one would expect a negative sign for price and a positive sign for both price of substitutes and income. The statistical significance of the "F" and "t" values were important guides in selecting a function. Further guides included the values of the Durbin-Watson statistic and the coefficient of determination, and measures to evaluate heteroscedasticity. Multicollinearity was taken into account only when the standard error seemed unreasonably large relative to the coefficients.

As indicated in chapter 5, while there have been important variations in the consumption patterns of fats and oils in the developed regions, total consumption there is approaching saturation levels. For these regions, a slowing down in the percentage rate of increase is likely as more people move into the higher income groups where per capita consumption levels off. For this reason, the log-inverse or semi-log function is most applicable for projections for these regions. For regions where per capita consumption of fats and oils is quite low and is not expected to level off before 1980, the linear or double-log function is the more appropriate for projecting consumption.

The final selection of a function for projection purposes should also, of course, include reasonableness, and here judgment must be introduced. For instance, data on the United Kingdom indicate per capita consumption of vegetable oil has been declining. Is it reasonable to assume that such consumption will continue to decline through 1980? No objective procedure was found for making the decision, but it was decided on a judgment basis that consumption would not continue to decline, considering indications from other studies (see below, p. 53).

A number of separate studies provided demand projections for vegetable oil in many countries. These are noted in the Literature Cited (p. 134). The findings of these studies were taken into consideration in arriving at projected regional estimates of vegetable oil consumption.

Regional Demand

United States.--The U.S. price variables consist of the wholesale index price of vegetable oil and the wholesale index price of lard.

All three of the functions developed for the United States were statistically significant with high R^2s. The income elasticity for all functions was around 1.0, which seems much too high for a developed country. Therefore, a regression was made on the consumption of animal fats and marine oils and per capita expenditures during 1955-67. The regression indicates that while total per capita consumption of fats and oils was relatively constant, there was a steady increase in vegetable oil consumption at the expense of animal fats and marine oils.

For the period of fit, any of the three functions seems reasonable. The log-inverse function, which provides for a saturation level, was selected primarily because it gave what seems the most reasonable projection--a slightly lower consumption level than projected under the other two functions. The projected per capita consumption

level of 18.2 kilos of vegetable oil by 1980 assumes a continual substitution of such oils for animal fats and marine oils plus a moderate increase in total per capita consumption of fats and oils.

Canada.--Several vegetable oil price series were tried in the mathematical functions for Canada. The best price series, from a statistical point of view, were obtained by weighting the quantity of vegetable oil imports by the value of such imports. For the price of substitutes, butter prices were used. The statistical significance of the explanatory variables was greatly improved when rapeseed oil was deleted (around 1 kilo per capita annually) from the consumption level. The initial result may have been due to rapeseed stock variations and special factors affecting industrial use.

The semi-log function was selected for projection purposes. Per capita consumption is projected to reach 10.2 kilograms by 1980 (excluding per capita consumption of rapeseed oil). Income was the most statistically significant variable, while the coefficient of determination (R^2) was 0.73.

European Community.--The EC price variable was the price of soybean oil, c.i.f. Hamburg, and the price of substitutes was lard prices. Income was significant at the 1-percent level. The price coefficients were not significant.

The semi-log function was selected for projection purposes. The "F" value was 16.5 and the R^2 was 0.85. Per capita consumption for the EC for 1980 is estimated at 16.7 kilos, which is in line with the estimates of other studies projecting vegetable oil consumption for the EC.

United Kingdom.--The U.K. vegetable oil price variable was a weighted average price of annual vegetable oil imports. As a price for substitutes, lard prices were a much better explanatory variable than butter prices were.

For all three functions developed for the United Kingdom, the sign of the income coefficient was negative. This was as expected, however, since per capita vegetable oil consumption has been declining while income has been increasing. With a negative income sign and the assumption of constant prices, the projected level of vegetable oil consumption becomes lower than it was during the historical period.

U.K. consumption of animal fats (lard and butter) has increased, primarily because their prices have been favorable relative to those of most vegetable oils. The price relationship has existed, in large part, because of the surplus supply of animal fats and oils in the EC and the surplus of butter in New Zealand, a country which enjoys Commonwealth trade preferences.

A continuation of declining vegetable oil consumption and increasing animal fat consumption through 1980 seems questionable. Supporting this opinion is an FAO study that projects constant per capita consumption of vegetable oils and moderate increases in butter consumption in the United Kingdom through 1985 (14). An OECD study projects constant per capita consumption of butter in the United Kingdom (47). The FAO study assumes constant prices, while the OECD study assumes continuation of past trends in prices.

One assumption of the present report is that a large surplus supply of animal fats in the EC and New Zealand will not continue through 1980. Therefore, per capita consumption of vegetable oil in the United Kingdom will probably increase in the future because the price relationships between vegetable oils and substitutes will change. By 1980, the price of substitutes will increase by an estimated 10 percent relative to that of vegetable oil. Based on this assumption and the semi-log function, per capita vegetable oil consumption is estimated to increase from some 9.2 kilos in 1963-65 to 9.8 kilos by 1980.

Other Western Europe.--A large number of functions were developed for the O.W.E. region, most of them yielding statistically unsatisfactory results and/or wrong signs. Consequently, the olive oil consuming countries (Spain, Greece, and Portugal) were treated as a separate area because their oil consumption habits and levels are quite different from the other O.W.E. countries. The resulting equations for the two areas had correct signs and provided better statistical fits. Olive oil prices were used for Spain, Greece, and Portugal, while soybean oil and lard prices were used for the other countries.

For the three olive oil consuming countries, the log-log function was selected for projection purposes. Consumption is estimated to increase from 17 kilos in 1963-65 to 19.4 kilos by 1980. For the other countries, a semi-log function best met the criteria of statistical fit and reasonableness. The equation indicates that per capita consumption for these countries will approach 8.8 kilos by 1980.

With the two demand projections, combined per capita consumption for the region is estimated to reach 14.3 kilos by 1980, compared with 13.0 kilos during 1963-65.

Japan.--The most meaningful price series for Japan was a weighted average price of vegetable oil imports. Fish oil, lard, and butter prices were all tried as price of substitutes but none yielded the correct sign in accordance with economic theory. The demand functions developed for Japan therefore excluded the price of substitutes.

The semi-log function was selected for projection purposes. The income variable, as expected, was highly significant. Per capita consumption is projected to reach 7.0 kilos by 1980.

Australia and New Zealand.--The international price of coconut oil--the main imported oil--was the price of oil. Butter prices were used as the price of substitutes.

The linear function was used for projecting because consumption is expected to increase in line with past linear trends. The "F" value was significant at the 5-percent level. The income variable was also significant at this level, while the price variables were not. Per capita availability is projected to increase from 4.0 kilos during 1963-65 to 7.0 kilos by 1980.

Butter consumption in these two countries is very high, but appears to be declining on a per capita basis. Australia places quotas on table margarine production. However, since there are no restrictions on margarine use in baking, its use for this purpose has been steadily increasing. The above projection assumes a loosening of table margarine production quotas and a continued increase in the use of vegetable oils, except in table margarine.

South Africa.--Peanut oil prices were chosen to represent the price of oil, and butter prices were used as the price for substitutes.

The linear function, which gave the best statistical fit for this region, was selected for the projections. By 1980, per capita vegetable oil consumption will reach 4.5 kilos.

Eastern Europe.--Consumption levels in the central plan countries are largely determined by policy and administrative measures. Thus, estimating future consumption by a trend analysis is hazardous. On the assumption that income is an indication of consumer demand and has some influence on actual consumption, a linear function was developed using sunflowerseed oil prices and income as independent variables. The variables had the correct signs according to economic theory and yielded a significant "F" statistic. Based on this function, per capita consumption is projected to reach 8.8 kilos by 1980.

As an alternative, an equation with consumption as a function of production was developed. The equation was highly significant, yielded an R^2 value of .89, and projects per capita consumption to increase sharply, reaching 12.2 kilos per capita by 1980. The rapid increase would probably occur because (1) vegetable oil production is projected to increase faster than population; and (2) historically, the region has been an importing region--thus, domestic production has been consumed almost entirely within the region.

A review of agricultural studies and the stated goals of these countries suggests that the function using vegetable oil prices and income yielded a reasonable projected level of consumption (8.8 kilos per capita).

USSR.--In Russia, the retail price of vegetable oil has not changed since 1956. Since the price of vegetable oil is determined by the Government, price variables were not considered in equations developed for the USSR. Functions that were developed to see if a crude relationship existed between income and consumption were not statistically significant. A regression was made to ascertain the relationship between domestic production and consumption. Production is a reasonable variable to use for projecting consumption in an exporting region, provided the level of exports has not fluctuated sharply. The regression equation, which was significant at the 5-percent level and yielded an R^2 value of 0.79, was selected for projection purposes. It indicates that per capita consumption will reach 13.0 kilos by 1980, compared with 8.6 kilos in 1963-65. Upon considerations similar to those for Eastern Europe, it was concluded that this projection was reasonable.

In Russia, there undoubtedly are people who would like to improve domestic consumption levels and others who want to hold domestic consumption down and earn foreign exchange through the sale of oil. By projecting consumption as a function of production, the assumption is implicitly made that future Soviet policy will not change significantly with respect to the share of production the consumer was allowed to have during 1955-65.

Communist Asia.--As expected, income was not a good explanatory variable of vegetable oil consumption in Communist Asia. Communist Asia apparently gives first priority to meeting its export commitments of oilseeds and oilseed products, and the remaining production is consumed domestically. Therefore, a linear function was developed with production as the independent variable. The function had a highly significant "F" value of 40.1. Based on this function, a 1980 per capita consumption level of 1.4 kilos is projected.

Central America and Mexico.--Peanut, soybean, sunflower, and cottonseed prices were all used as a price for vegetable oil but none yielded a correct sign. Lard prices were used as the price of substitutes. Equations 12 and 12b in table 18 are for cottonseed oil prices.

A function with production and income as the independent variables gave the best statistical fit and was selected for projection purposes. Per capita consumption by 1980 is projected to increase by 1 kilo over the average of 5.0 kilos during 1963-65.

South America.--Of the three functions developed for South America, the linear form provided the most reasonable projection. The "F" value was 17.5 and the R^2 value was 0.88. The price variables were more significant in this region than they were in most other regions. Based on the linear function, the projected level of per capita consumption for 1980 is 6.2 kilos.

The price variables used were soybean oil and lard prices.

East and West Africa.--Available data indicate that vegetable oil production and consumption have been increasing at a rate lower than the rate of population increase. Thus, regression analysis, with per capita consumption as the dependent variable, results

in a negative coefficient for both income and production. If used for predictive purposes, therefore, the regression equations would indicate a continued decline in consumption. The authors do not believe such a decline is possible, nor is it considered possible in available studies that have projected vegetable oil consumption for East and West Africa, or parts of the region.

FAO's 1966 report on commodity projections uses an income elasticity of around 0.7 in projecting vegetable oil demand for East and West Africa (14). Based on this elasticity and the income projections for this region (44), per capita consumption would reach 7.8 kilos by 1980, compared with 5.0 kilos in 1963-65. The projected level, however, may be considered potential demand, not actual consumption. These two measures are the same only if supplies are available to meet the projected demand.

Berg estimated total vegetable oil consumption and production in the three main vegetable oil producing countries of West Africa to increase by some 2.9 percent a year from the early 1960's through 1975 (3). FAO's Indicative World Plan, Regional Study on Africa, South of the Sahara (16) makes an intensive analysis of 24 countries. The study establishes production targets by countries. If a series of recommended practices is followed, vegetable oil production is estimated to increase by some 3.3 percent a year, and total consumption by an equivalent rate. Based on FAO's total consumption figure, per capita consumption would reach 5.7 kilos by 1980.

It is our estimate that from 1963-65 to 1980, vegetable oil consumption in East and West Africa will increase by an average of 2.8 percent a year, while production will increase by 2.6 percent.

To assume that total consumption will increase in line with production, or at 2.6 percent, would mean that there would be relatively no increase in consumption per capita because population is projected to increase by 2.5 percent per year. An implied income elasticity of practically 0 seems unreasonable during the next decade because (1) a portion of the population is expected to cross over from the subsistence to the market economy, and (2) the population in urban areas is expected to increase at a rate twice as fast as the total population. Vegetable oil consumption among the rural and urban populations will probably increase rather substantially by 1980. Therefore, total consumption is placed slightly above total production.

The difference between the growth rates of vegetable oil production and consumption is expected to be increasingly met by exporting countries within the region. Increased intraregional trade does not mean reduced export levels for the exporting countries, but it does mean the net export level of the region will decline.

North Africa and West Asia.--A weighted average price of cottonseed, soybean, and peanut oil imports was used as the price variable. No price substitute was introduced since there is little commercial trade in products competing with the region's vegetable oil.

Price and income variables were very good explanatory variables. Based on the linear equation, which had an R^2 value of 0.94 and a "F" value of 62.3, per capita consumption is projected to increase from 4.7 kilos in 1963-65 to 6.4 kilos in 1980.

South Asia.--The price variables were peanut oil and lard.

Linear and double-log functions were developed, both yielding an R^2 value of around 0.30. Income was a better explanatory variable than were the price variables. Based on the log-log function, a per capita consumption level of 4.8 kilos is projected for 1980. Per capita consumption during 1963-65 averaged 3.5 kilos. The 4.8 kilos projection appears reasonable in comparison with FAO and various country study projections.

Southeast Asia.--Coconut oil is the major oil consumed in Southeast Asia and consequently its prices were used as the price for vegetable oil. Lard prices represented the changes that have been occurring in prices of substitutes.

Prices and income were both weak explanatory variables. Production of vegetable oil has been increasing slowly, while the region has switched, on a net basis, from an exporter, to an importer, to an exporter. Primarily because of such trade variations, there have been rather sharp changes in the annual per capita availability figures. The variation in availability is most likely a major reason for the rather poor statistical fit of the different functions. However, based on the linear function, the projected level was considered to be reasonable and was therefore accepted. During 1963-65, Southeast Asia had the lowest per capita consumption level of vegetable oils among the less developed countries--2.0 kilos. For 1980, per capita consumption is projected to reach 2.3 kilos.

East Asia and Pacific Islands.--This region, like the East and West Africa region, was characterized by declining per capita consumption during 1955-65. Production used as an explanatory variable for consumption was statistically unsatisfactory. Income, of course, had a negative sign when used as an explanatory variable. The possibility of a continued decline in consumption was based on the following considerations.

In the FAO commodity projections study (14), the income elasticity coefficients used for projection of vegetable oil consumption were: Philippines, 1.2; Taiwan, 1.0; South Korea, 1.5; Indonesia, 1.0; and Malaysia, 0.7. The elasticity coefficient FAO used for Malaysia was most likely based on a Malaysian agricultural economy study (8) that develops an income elasticity of .66 for vegetable oils. FAO's Indicative Plan, Regional Study on Asia and the Far East, makes a detailed analysis of various countries including Taiwan, Korea, Malaysia, and the Philippines. That report proposes targets for increases in vegetable oil consumption of some 1.9 percent per capita for 1962-75. In the present report, the proposed FAO target is considered as the upper limit for possible future increases in vegetable oil consumption. Based on the 1.9-percent annual increase, consumption would reach 8.8 kilos per capita by 1980.

Upon consideration of the supply and demand factors of vegetable oil in the major countries in East Asia and the Pacific Islands, it was concluded that the rate of increase in per capita consumption will be about 1.0 percent a year, or reaching 7.3 kilos by 1980. Based on the expected rate of population increase, 2.4 percent a year, total consumption for the region is therefore projected to increase by 3.4 percent annually.

Inasmuch as the growth in total availability during 1955-65 was less than 2 percent, an estimated growth rate of 3.4 percent appears high at first glance. However, vegetable oil production in the region is expected to increase sharply in the years ahead, which will result in increased availability. Also, the increase in per capita consumption of 7.3 kilos implies an income elasticity coefficient of only 0.2. The implicit use of such a low elasticity would indicate that the subjective judgment made herein is not overly optimistic.

World Demand

Total world demand for vegetable oil is projected to reach 29.7 million tons by 1980, an average annual increase of 3.1 percent from the 1963-65 consumption level. Total consumption is projected to increase by 4.0 percent a year in the less developed countries, 3.3 percent in the central plan countries, and 2.1 percent in the developed countries.

During 1955-57 through 1963-65, world demand also increased at 3.1 percent a year. But in the developed countries, demand grew 3.2 percent annually, compared with 3.0 percent in the central plan countries and 3.2 percent in the LDC's. Thus, while the rate of increase in world demand is the same for the historical and projected periods, a lessening in the rate of increase is projected for the developed countries and a higher rate of increase is expected in the LDC's and the central plan countries.

Table 16.--Summary of regression analysis of regional per capita consumption of vegetable oils

Region	Time period	Durbin-Watson statistic	R^2	F-value	$\bar{S}$	Function	Multiple regression 1/
1. United States	1955-67	2.107	0.93	40.832**	0.450	2/	$Q_o^d = 1.91312 - \underset{(1.22270)}{0.02519}\ P_o + \underset{(0.81241)}{0.01321}\ P_{sb} + \underset{(10.71409)}{0.00767}\ I$
1a. United States	1955-67	2.254	0.94	46.002**	0.425	3/	$\log Q_o^d = -90.85296 - \underset{(1.\ \ 34)}{4.\ \ 31}\ \log P_o + \underset{(0.76443)}{2.48290}\ \log P_{sb} + \underset{(11.37702)}{33.66729}\ \log I$
1b. United States	1955-67	2.062	0.94	44.597**	0.012	4/	$\log Q_o^d = 1.57808 + \underset{P_o}{\underset{(2.04173)}{5.43030}} - \underset{P_{sb}}{\underset{(0.68525)}{2.55239}} - \underset{I}{\underset{(11.11119)}{798.32342}}$
2. Canada	1959-67	2.058	0.71	4.086	0.373	2/	$Q_o^d = 4.46636 - \underset{(2.27316)}{0.01346}\ P_o + \underset{(1.51010)}{0.00816}\ P_{sb} + \underset{(3.29658)}{0.00395}\ I$
2a. Canada	1959-67	2.018	0.73	4.692	0.354	3/	$\log Q_o^d = -23.53896 - \underset{(2.50299)}{8.29400}\ \log P_o + \underset{(1.72921)}{5.36280}\ \log P_{sb} + \underset{(3.52382)}{12.47450}\ \log I$
2b. Canada	1959-67	1.984	0.75	5.112	0.027	4/	$\log Q_o^d = 1.14583 + \underset{P_o}{\underset{(2.66050)}{48.47706}} - \underset{P_{sb}}{\underset{(1.84835)}{32.45104}} - \underset{I}{\underset{(3.69134)}{380.01676}}$
3. EC	1955-67	2.634	0.85	17.423**	0.547	2/	$Q_o^d = 7.85262 - \underset{(0.90221)}{0.00709}\ P_o + \underset{(0.34734)}{0.00240}\ P_{sb} + \underset{(4.58339)}{0.00834}\ I$
3a. EC	1955-67	2.551	0.85	16.493**	0.560	3/	$\log Q_o^d = 20.67811 - \underset{(0.88664)}{4.45177}\ \log P_o + \underset{(0.46974)}{2.07472}\ \log P_{sb} + \underset{(4.51247)}{13.69175}\ \log I$
3b. EC	1955-67	2.518	0.84	15.022**	0.026	4/	$\log Q_o^d = 1.26345 + \underset{P_o}{\underset{(0.88793)}{18.30452}} - \underset{P_{sb}}{\underset{(0.48967)}{9.00385}} - \underset{I}{\underset{(4.38702)}{140.59384}}$

Footnotes at end of table.

--Continued

Table 18.--Summary of regression analysis of regional per capita consumption of vegetable oils--Con.

Region	Time period	Durbin-Watson statistic	R^2	F-value	$\bar{S}$	Function	Multiple regression 1/
4. United Kingdom	1955-67	1.997	0.69	6.624**	0.624	2/	$Q_o^d = 8.61591 - \underset{(0.25198)}{0.00379}\ P_o + \underset{(2.07176)}{0.01476}\ P_{sb} - \underset{(0.36020)}{0.00177}\ I$
4a. United Kingdom	1955-67	1.952	0.70	6.656**	0.623	3/	$Q_o^d = 9.05345 - \underset{(0.31421)}{2.99887}\ \text{Log}\ P_o + \underset{(1.88520)}{9.08481}\ \text{Log}\ P_{sb} - \underset{(0.45298)}{4.68282}\ \text{Log}\ I$
4b. United Kingdom	1955-67	1.936	0.68	6.420**	0.026	4/	$\text{Log}\ Q_o^d = 1.00467 + \frac{\underset{(0.21531)}{10.50629}}{P_o} - \frac{\underset{(1.63280)}{41.63416}}{P_{sb}} + \frac{\underset{(0.58169)}{100.49371}}{I}$
5. O.W.E. 6/	1955-66	2.377	0.3[illegible]	1.182	0.944	2/	$Q_o^d = 3.77280 - \underset{(0.25554)}{0.00240}\ P_o + \underset{(1.65639)}{0.01300}\ P_{sb} + \underset{(0.42601)}{0.00171}\ I$
5a. O.W.E. 6/	1955-66	2.423	0.32	1.286	0.931	3/	$Q_o^d = -18.47599 - \underset{(0.27460)}{1.68625}\ \text{Log}\ P_o + \underset{(1.71033)}{8.80420}\ \text{Log}\ P_{sb} + \underset{(0.45377)}{3.2793}\ \text{Log}\ I$
5b. O.W.E. 6/	1955-66	2.342	0.34	1.364	0.049	5/	$\text{Log}\ Q_o^d = -.60815 - \underset{(0.25650)}{0.08218}\ \text{Log}\ P_o + \underset{(1.76592)}{0.48003}\ \text{Log}\ P_{sb} + \underset{(0.50937)}{0.18846}\ \text{Log}\ I$
5c. O.W.E. 7/	1955-67	1.580	0.34	2.525	2.489	2/	$Q_o^d = 15.76103 - \underset{(1.35505)}{0.00793}\ P_o + \underset{(1.71743)}{0.01417}\ I$
5d. O.W.E. 7/	1955-67	1.687	0.38	3.827	2.410	3/	$Q_o^d = 17.58591 - \underset{(1.39776)}{13.63241}\ \text{Log}\ P_o + \underset{(1.98349)}{14.28928}\ \text{Log}\ I$
5e. O.W.E. 7/	1955-67	1.569	0.45	4.020	0.064	4/	$\text{Log}\ Q_o^d = 1.22199 + \frac{\underset{(1.45400)}{119.70122}}{P_o} - \frac{\underset{(2.42525)}{76.46016}}{I}$
5f. O.W.E. 7/	1955-67	1.437	0.41	3.483	0.066	5/	$\text{Log}\ Q_o^d = 1.15721 - \underset{(1.41910)}{0.37927}\ \text{Log}\ P_o + \underset{(2.17954)}{0.43042}\ \text{Log}\ I$

Footnotes at end of table.

—Continued

Table 18.--Summary of regression analysis of regional per capita consumption of vegetable oils--Con.

Region	Time period	Durbin-Watson statistic	R^2	F-value	$\bar{S}$	Function	Multiple regression 1/
6. Japan	1959-67	3.025	0.86	17.955**	0.256	2/	$Q_o^d = 2.33536 - \underset{(1.10481)}{0.00222}\ P_o + \underset{(5.79700)}{0.00764}\ I$
6a. Japan	1959-67	2.809	0.83	14.673**	0.278	3/	$Q_o^d = -7.82139 - \underset{(0.67722)}{0.57134}\ \text{Log}\ P_o + \underset{(5.32046)}{5.40489}\ \text{Log}\ I$
6b. Japan	1959-67	2.806	0.80	11.782**	0.030	4/	$\text{Log}\ Q_o^d = 0.84922 + \underset{(0.48830)}{\frac{3.16303}{P_o}} - \underset{(4.83157)}{\frac{70.38602}{I}}$
7. Aus.-N. Zealand	1955-65	2.325	0.65	4.354**	0.352	2/	$Q_o^d = -5.60792 - \underset{(0.11281)}{0.00032}\ P_o + \underset{(0.37097)}{0.00213}\ P_{sb} + \underset{(3.2007)}{0.00736}\ I$
7a. Aus.-N. Zealand	1955-65	2.352	0.65	4.317	0.353	3/	$Q_o^d = -56.54936 - \underset{(0.05795)}{0.11704}\ \text{Log}\ P_o + \underset{(0.31483)}{4.33581}\ \text{Log}\ P_{sb} + \underset{(3.17645)}{15.87524}\ \text{Log}\ I$
7b. Aus.-N. Zealand	1955-65	2.204	0.62	3.833	0.049	4/	$\text{Log}\ Q_o^d = 1.58817 - \underset{(0.09667)}{\frac{3.59237}{P_o}} - \underset{(0.17635)}{\frac{152.15629}{P_{sb}}} - \underset{(2.97715)}{\frac{842.35434}{I}}$
8. South Africa	1955-65	3.294	0.52	2.567	0.690	2/	$Q_o^d = 0.23809 - \underset{(1.04574)}{0.00757}\ P_o + \underset{(0.80077)}{0.00197}\ P_{sb} + \underset{(1.22310)}{0.00809}\ I$
8a. South Africa	1955-65	3.241	0.51	2.405	0.701	3/	$Q_o^d = -15.89099 - \underset{(1.01955)}{5.43902}\ \text{Log}\ P_o + \underset{(0.86280)}{5.52970}\ \text{Log}\ P_{sb} + \underset{(1.26717)}{6.10450}\ \text{Log}\ I$
8b. South Africa	1955-65	3.201	0.45	1.914	0.125	4/	$\text{Log}\ Q_o^d = 0.77727 + \underset{(1.10483)}{\frac{142.56691}{P_o}} - \underset{(0.85361)}{\frac{466.94351}{P_{sb}}} - \underset{(1.12454)}{\frac{129.23922}{I}}$
9. East Europe	1955-65	1.425	0.59	74.048**	62.206	2/	$Q_o^d = 21.84071 + \underset{(8.60515)}{1.29992}\ P_{rod}$
9a. East Europe	1955-65	1.312	0.34	2.027	0.579	2/	$Q_o^d = 5.89745 - \underset{(1.43150)}{0.01420}\ P_o + \underset{(1.52903)}{0.01138}\ I$

Footnotes at end of table.

--Continued

Table 18.--Summary of regression analysis of regional per capita consumption of vegetable oils--Con.

Region	Time period	Durbin-Watson statistic	R^2	F-value	S	Function	Multiple regression 1/
10. USSR	1955-65	1.653	0.79	33.163**	0.637	2/	$\hat{c}_o^d = 3.29457 + 0.00260\ P_{rod}$ (5.75873)
10a. USSR	1955-65	2.430	0.34	4.685	0.965	5/	$\text{Log}\ \hat{c}_o^d = -0.12892 + 0.41649\ \text{Log}\ I$ (2.16452)
10b. USSR	1955-65	2.416	0.35	4.798	1.114	2/	$\hat{c}_o^d = 4.34381 + 0.01233\ I$ (2.19033)
10c. USSR	1955-65	1.324	0.91	60.699**	0.336	2/	$\hat{c}_o^d = 2.84508 + 0.95426\ P_{rod} - 0.00947\ I$ (10.54378) (4.63025)
11. Communist Asia	1955-65	1.046	0.82	40.860**	0.107	2/	$\hat{c}_o^d = 0.17457 + 0.00107\ P_{rod}$ (6.39226)
11a. Communist Asia	1955-65	0.320	0.08	0.777	0.066	5/	$\text{Log}\ \hat{c}_o^d = 0.76615 - 0.53196\ \text{Log}\ I$ (0.88143)
11b. Communist Asia	1955-65	0.557	0.33	4.529	0.205	2/	$\hat{c}_o^d = -0.26723 + 0.05663\ I$ (2.12809)
12. Central America & Mexico	1955-65	1.823	0.47	2.040	0.386	2/	$\hat{c}_o^d = -0.77914 + 0.00806\ P_o + 0.00090\ P_{sb} + 0.01090\ I$ (1.68992) (0.25704) (1.88362)
12a. Central America & Mexico	1955-65	2.283	0.71	10.085**	0.263	2/	$\hat{c}_o^d = -0.87725 + 0.87596\ P_{rod} + 0.00597\ I$ (4.08362) (2.00880)
12a. Central America & Mexico	1955-65	1.829	0.50	2.185	0.379	3/	$\hat{c}_o^d = -27.84027 + 5.38684\ \text{Log}\ P_o + 0.56626\ \text{Log}\ P_{sb} + 7.39174\ \text{Log}\ I$ (1.78410) (0.25346) (1.92159)

—Continued

Footnotes at end of table.

Table 18.--Summary of regression analysis of regional per capita consumption of vegetable oils--Con.

Region	Time period	Durbin-Watson statistic	R^2	F-value	$\hat{S}$	Function	Multiple regression 1/
13. South America	1955-65	2.425	0.88	17.514**	0.286	2/	$Q_o^d = -6.40403 - 0.01821\ P_o + 0.02105\ P_{sb} + 0.03923\ I$ (5.47156) (4.76976) (3.16289)
13a. South America	1955-65	1.646	0.74	11.582**	0.395	2/	$Q_o^d = 5.69753 + 0.89895\ P_{rod} - 0.0174\ I$ (3.25856) (0.87385)
13b. South America	1955-65	2.772	0.90	21.005**	0.264	3/	$Q_o^d = -53.16178 - 13.19461\ \text{Log}\ P_o + 14.1366\ \text{Log}\ P_{sb} + 22.99207\ \text{Log}\ I$ (6.19053) (5.21199) (3.20724)
14. East and West Africa	1955-65	1.604	0.92	28.285**	0.218	2/	$Q_o^d = 11.67821 - 0.00025\ P_o + 0.00243\ P_{sb} - 0.07500\ I$ (0.11437) (1.30609) (5.13896)
14a. East and West Africa	1955-65	1.771	0.40	5.629**	0.829	2/	$Q_o^d = 10.03543 + 1.07199\ P_{rod}$ (2.37257)
14b. East and West Africa	1955-65	2.301	0.90	23.460**	0.065	5/	$\text{Log}\ Q_o^d = 1.86953 + 0.52390\ \text{Log}\ P_o + 0.96004\ \text{Log}\ P_{sb} - 3.12761\ \text{Log}\ I$ (0.83233) (2.34898) (3.43606)
15. North Africa & West Asia	1955-65	1.418	0.94	62.179**	0.248	2/	$Q_o^d = 4.28397 - 0.00481\ P_o + 0.05525\ I$ (2.45960) (9.58276)
15a. North Africa & West Asia	1955-65	1.506	0.92	44.660**	0.030	5/	$\text{Log}\ Q_o^d = -3.77630 - 0.36991\ \text{Log}\ P_o + 2.35341\ \text{Log}\ I$ (2.45194) (7.92391)
16. South Asia	1955-65	1.751	0.29	0.944	0.205	2/	$Q_o^d = 0.76679 - 0.00042\ P_o + 0.00136\ P_{sb} + 0.03006\ I$ (0.19155) (0.52334) (1.42768)
16a. South Asia	1955-65	1.913	0.32	1.109	0.022	5/	$\text{Log}\ Q_o^d = -0.83280 - 0.06951\ \text{Log}\ P_o + 0.13437\ \text{Log}\ P_{sb} + 0.66131\ \text{Log}\ I$ (0.39801) (0.70541) (1.60672)

Footnotes at end of table.

--Continued

Table 18.--Summary of regression analysis of regional per capita consumption of vegetable oils--Con.

Region	Time period	Durbin-Watson statistic	R^2	F-value	$\bar{S}$	Function	Multiple regression 1/
17. Southeast Asia	1955-65	2.449	0.21	0.624	0.602	2/	$Q_o^d = 0.31429 - \underset{(0.73703)}{0.00351}\ P_o + \underset{(1.02820)}{0.00659}\ P_{sb} + \underset{(0.26770)}{0.00810}\ I$
17a. Southeast Asia	1955-65	2.390	0.26	0.826	0.121	5/	$\text{Log } Q_o^d = 6.2819 - \underset{(0.67489)}{0.46464}\ \text{Log } P_o + \underset{(0.98503)}{0.86196}\ \text{Log } P_{sb} - \underset{(0.02486)}{0.03383}\ \text{Log } I$
18. East Asia & Pacific Is.	1955-65	2.213	0.43	1.740	0.487	2/	$Q_o^d = 12.77256 - \underset{(1.47803)}{0.01291}\ P_o + \underset{(0.16357)}{0.00067}\ P_{sb} - \underset{(1.14532)}{0.02447}\ I$
18a. East Asia & Pacific Is.	1955-65	1.956	0.21	2.389	0.504	2/	$Q_o^d = 12.18258 - \underset{(1.54567)}{0.46322}\ P_{rod}$
18b. East Asia & Pacific Is.	1955-65	2.223	0.42	1.758	0.032	5/	$\text{Log } Q_o^d = 2.96755 - \underset{(1.51849)}{0.48724}\ \text{Log } P_o + \underset{(0.22644)}{0.04549}\ \text{Log } P_{sb} - \underset{(1.11283)}{0.51911}\ \text{Log } I$

** Representing significance at 5 percent level.

S = Standard error of estimate.

1/ The figures in parentheses below or above the partial regression coefficients are "t" values. See p. 52-57 for discussion of the variables.
2/ Linear.
3/ Semi-log.
4/ Log-inverse.
5/ Double-log.
6/ Includes Greece, Spain, and Portugal.
7/ Includes O.W.E. countries minus Greece, Spain, and Portugal.

Table 19.--Elasticities computed from regression equations on per capita consumption of vegetable oils 1/

Regions	Function	Income	Price	Cross
1. United States	2/	0.95***	-0.16x	0.10x
1a. United States	3/	1.00***	-0.07x	0.11x
1b. United States	4/	0.99***	-0.01x	0.02x
2. Canada	2/	0.62***	-0.41**	0.26*
2a. Canada	3/	0.64***	-0.42**	0.27x
2b. Canada	4/	0.66***	-0.43**	0.27x
3. EC	2/	0.49***	0.00	0.00
3b. EC	3/	0.47***	0.00	0.00
3c. EC	4/	0.45***	0.00	0.00
4. United Kingdom	2/	-0.15x	-0.10x	0.40**
4a. United Kingdom	3/	-0.12x	-0.12x	0.38**
4b. United Kingdom	4/	-0.25x	-0.09x	0.34x
5. O.W.E.	2/	0.18x	-0.08x	0.48*
5a. O.W.E.	3/	0.17x	-0.08x	0.47*
5d. O.W.E.	3/	0.40x	-0.37x	--
6. Japan	2/	0.56***	-0.10x	--
6a. Japan	3/	0.53***	-0.05x	--
6b. Japan	4/	0.50***	-0.02x	--
7. Australia & New Zealand	2/	2.05***	-0.03x	0.66x
7a. Australia & New Zealand	3/	2.07***	-0.01x	0.56x
7b. Australia & New Zealand	4/	2.07***	-0.02x	0.32x
8. South Africa, Republic of	2/	0.98**	-0.89x	0.81x
8a. South Africa, Republic of	3/	1.00*	-0.89x	0.91x
8b. South Africa, Republic of	4/	0.92x	-1.03x	0.96x
9b. East Europe	2/	0.58**	-0.89x	--
10a. USSR	5/	0.42**	--	--
10b. USSR	2/	0.43**	--	--
11b. Communist Asia	2/	1.17**	--	--
12a. Central America & Mexico	2/	0.72**	0.00	0.00
12b. Central America & Mexico	3/	0.70**	-0.47*	0.00
13. South America	2/	2.30***	-1.12***	1.17***
13b. South America	3/	2.10***	-1.21***	1.30***
14. East & West Africa	2/	-1.18***	-0.01x	0.15x
15. North Africa & West Asia	2/	1.09***	-0.27**	--
16. South Asia	2/	0.70**	-0.04x	0.12x
17. Southeast Asia	2/	0.38x	-0.52x	0.98x
18. East Asia & Pacific Islands	2/	-0.51x	-0.46**	0.04x

1/ Elasticities computed at mean values. 2/ Linear. 3/ Semi-Log. 4/ Log-Inverse. 5/ Double-Log.

*** Represents significance at the 1-percent level.
** Represents significance at the 5-percent level.
* Represents significance at the 10-percent level.
x Not significant at the 10-percent level.

Source: Computed from equations in table 18.

Table 20.--Total and per capita availability of vegetable oils, by region, average 1963-65, and projections to 1980

Region	Average 1963-65		Share of total	Function 1/	1980 projected		Share of total	Annual rate of change	
	Total	Per capita			Total	Per capita		Total	Per capita
	1,000 M. T.	Kilograms	Percent		1,000 M. T.	Kilograms	Percent	Percent	
United States	3,098	16.13	16.0	2/	4,388	18.20	15.0	2.2	.8
Canada	171	8.88	.9	3/	266	10.23	.9	2.8	.9
EC	2,327	12.96	12.9	3/	3,134	15.80	10.8	1.8	1.2
United Kingdom	497	9.17	2.8	3/	594	9.78	1.9	1.1	.4
O.W.E.	1,134	13.03	6.3	3/4/	1,395	14.31	4.6	1.3	.6
Japan	442	4.57	2.5	3/	782	7.01	2.5	3.6	2.8
Australia-New Zealand	54	3.96	.3	5/	127	6.97	.4	5.4	3.6
South Africa, Republic of	57	3.25	.3	5/	121	4.53	.4	4.6	2.0
Total	7,780	11.78	42.0		10,807	14.09	36.5	2.1	1.1
East Europe	758	6.29	4.2	5/	1,221	8.80	3.5	3.1	2.2
USSR	1,960	8.61	10.9	5/	3,615	13.03	11.8	3.9	2.6
Communist Asia	1,033	1.31	5.7	5/	1,460	1.35	6.7	2.2	0.2
Total	3,751	3.30	20.8		6,296	4.22	22.0	3.3	1.5
Central America & Mexico and Caribbean	397	5.12	2.2	5/	776	6.04	2.5	4.3	1.1
South America	858	5.31	4.7	3/	1,537	6.22	5.0	3.9	1.0
East and West Africa	1,067	5.03	5.9	6/	1,799	5.70	7.0	3.4	0.8
North Africa and West Asia	846	5.34	4.7	5/	1,618	6.37	5.7	4.0	1.1
South Asia	2,197	3.53	12.2	4/	4,404	4.82	14.5	4.4	2.0
Southeast Asia	160	2.03	.9	5/	269	2.28	.8	3.2	0.7
East Asia and Pacific Is.	1,185	6.12	6.6	6/	2,182	7.30	6.0	3.4	1.0
Total	6,710	4.46	37.2		12,585	5.53	41.5	4.0	1.4
World total	18,241	5.53	100.0		29,868	6.57	100.0	3.1	1.1

1/ See table 18 for the mathematical function. 2/ Linear. 3/ Semi-log. 4/ Log-inverse. 5/ Double-log. 6/ Projected value based on the income elasticity obtained from linear function.

PART III.--WORLD DEMAND FOR OILCAKES

The oilcakes to which this report gives primary attention are soybean, peanut, cottonseed, rapeseed, linseed, sunflowerseed, copra, and palm kernel.

For purposes of analyzing the world market for such oilcakes, nine of the 18 regions used in the vegetable oil demand analysis were aggregated into four regions. This was done because individually the nine regions were relatively unimportant markets for oilcakes. Of the developed countries, Australia and New Zealand were combined with South Africa to form one region. Of the less developed countries, Central America was combined with South America to form a Latin American region; the North Africa and West Asia region was combined with the East and West Africa region to form an Africa and West Asia region; and the South Asia, Southeast Asia, and East Asia and Pacific Islands regions were combined to form "Other Asia." No changes were made in the regional classifications of the central plan countries.

Oilcakes are principally used as protein supplements to livestock feed, and are consumed primarily in the industrially advanced regions of the world, where there is a high effective demand for meat, milk, and eggs. In the less developed countries, where a substantial proportion of the world's supply of oilcakes is produced, most of the meal is exported rather than used as livestock feed within the country.

In addition to their use in feed, some oilcakes are used directly as human food and others used as fertilizer. Direct human consumption is restricted to relatively small quantities of peanuts and soybeans. Research is being done to increase the direct utilization of oilcakes in human consumption, but little has been accomplished so far. Significant successes in the research could drastically alter the pattern of world trade. Use of oilcakes for fertilizer is very limited and is restricted to certain areas and to certain meals, principally rapeseed meal because of its low palatability.

With respect to the use of oilcakes in livestock feeding, animal feeds may be considered as consisting of roughages and concentrates. Roughages, such as hay and silage, are consumed primarily by ruminants. Concentrates consist of low- and high-protein concentrates. The low-protein concentrates provide a concentrated source of energy and consist primarily of feedgrains. Oilcakes are the major component of high-protein concentrates. Products competing with oilcakes include fishmeal, tankage, skim milk powder, brewer grains, dried blood, and synthetics such as urea. Urea is suitable for ruminant feed only; in contrast, the other products are fed primarily to nonruminants. The main oilcake-competing product traded is fishmeal and in the 1956-65 review of trade, production, and consumption, attention is given only to this product. In the demand analysis of the major consuming regions, consideration is also given to other competing products.

Oilcake utilization is directly related to the growth of the compound feed industry. Only in the past few decades have farmers come to realize that feeding a balanced compound feed can raise a beef cow to 1,000 pounds in 18 months and a broiler to 3 pounds in 7 weeks. Thus, to meet a strong demand for meat products, the compound feed industry in most developed countries has expanded sharply and oilcakes have served as the principal protein concentrate. Appendix C discusses the uses of the various oilcakes.

For the analysis of oilcake demand, trade and production statistics were obtained by commodity and region from 1955 to 1966 for trade and to 1968 for production. For presentation purposes, changes are made in averages for 1955-57 and 1963-65. The period 1963-65 was selected because it coincides with the 3-year average used in the tables presenting changes in vegetable oil trade, supply, and demand. As indicated in the section on vegetable oil, complete 1966 trade data on vegetable oil were not available for some of the less developed countries. Thus, for the sake of consistency, changes in all regions were presented on a 1963-65 basis.

7.--INTERNATIONAL TRADE IN OILCAKES

Level of Trade

World imports of oilcakes, meal-equivalent basis, averaged 15.6 million tons during 1963-65 (table 21). This was an annual increase of 7.5 percent over the 1955-57 level of 8.8 million tons. Of the 6.88 million-ton net increase in total oilcake imports, the developed regions accounted for 78 percent and the less developed regions, for some 17 percent. The central plan countries showed only a very moderate increase over the period.

In terms of oilcake exports, those from the central plan regions declined during 1955-57 through 1963-65 by 5.4 percent annually, while exports from the developed countries increased by 12.1 percent a year. LDC exports increased by 8.6 percent a year.

Soybean meal comprised 54 percent of total 1966 trade in oilcakes (table 22). Peanut meal and cottonseed meal were next in importance, accounting for 12 and 9 percent of the total, respectively. Compared with 1960-64 average levels, 1966 soybean meal exports increased 8 percent, but peanut meal decreased 5 percent and cottonseed meal, 1 percent. Soybean meal has increased its market share. Soybeans, relative to other oilseeds, have a high meal-to-oil ratio, and since the market for meal has been growing much faster than the market for oil, developed importing countries prefer soybeans to other oilseeds. Large quantities and consistent quality of soybeans and soybean meal have always been available, so large cargo vessels can be used and the products can be bulk loaded. The quality of the oilcake makes it particularly well suited for feed for poultry.

Meal, as such, comprised 45 percent of total world oilcake trade in 1966, compared with 42 percent during 1960-64. Conversely, meal trade in the form of oilseeds was 55 percent of the 1966 total oilcake trade and 58 percent of the 1960-64 trade.

Importance of Trading Regions

Exporting Regions

During 1955-57, the less developed countries accounted for approximately 51 percent of world oilcake exports. The developed countries accounted for approximately 36 percent, and the central plan countries made up the remaining 13 percent. By 1963-65, the developed countries had increased their share of the export market to 52 percent, with most of the increase coming at the expense of the central plan countries. Annual percentage growth rates during 1955-57 through 1963-65 were 12.1 for the developed countries and 4.9 for the LDC's. A negative rate of change for the central plan countries was due to a large drop in exports from the Communist Asia region.

Rankings among the individual regions were altered only slightly during the review period. During 1955-57, the top four exporters of oilcakes were, in descending order, the United States, Other Asia, Africa and West Asia, and Communist Asia. During 1963-65, the only change was that Latin America replaced Communist Asia in fourth place.

Importing Regions

During 1955-57 through 1963-65, considerable change occurred in the relative importance of regions that imported meal. The top five regions in order of importance during 1955-57 were the EC, the United Kingdom, the Other Western European countries, Japan, and Canada. By 1963-65, the O.W.E. region had replaced the United Kingdom in second place. Japan had moved to third place, the United Kingdom had dropped to fourth place, and Eastern Europe had replaced Canada in fifth place.

On a percentage basis, the developed countries accounted for 77 percent of total world imports during 1963-65, while the central plan countries accounted for 7 percent and the LDC's for 16 percent. The annual growth rate in imports for the developed regions during 1955-57 through 1963-65 was 7.6 percent, compared with 4.0 percent for the central plan countries and 8.6 percent for the LDC's.

Changes in Trade Levels

Net Exporting Regions

On a net exporting basis, rather than a gross exporting basis, the United States ranked first in 1955-57 in oilcake exports, with net exports of over 2.0 million tons. The Africa and West Asia region ranked second with 1.5 million tons, Other Asia third with 1.0 million tons, Communist Asia fourth with 0.7 million tons, and Latin America fifth with 0.7 million tons.

In 1963-65, the United States, with net exports of 6.9 million tons, was still the largest net exporter, while Africa and West Asia, with average net exports of 2.0 million tons, retained second place. Latin America, with net exports of 1.4 million tons, climbed to third place. Fourth and fifth place were occupied by Other Asia and the USSR, respectively.

Total net oilcake exports for 1955-57 were 6 million tons. Of this, the United States accounted for 33 percent, Africa and West Asia for 25 percent, Other Asia for 16 percent, and Communist Asia for 15 percent. By 1963-65, total net exports had grown to 11.1 million tons. The United States accounted for 62 percent of the total, Africa and West Asia accounted for 18 percent, and Latin America for 13 percent. The remaining four exporting regions accounted for 7 percent of the total.

Net Importing Regions

Changes in the rankings of the net importing regions followed the same general pattern as changes in the ranking of the net exporting regions; that is, there was no change in the top position but considerable change thereafter. Thus, the EC, with 2.1 million tons of net imports in 1955-57 and 5.0 million tons in 1963-65, was the largest net importer at both the start and end of the period. In 1955-57, the United Kingdom, with 1.4 million tons, held second place; the O.W.E. region was in third place; Japan in fourth; and the USSR, with imports of just over 0.4 million tons, was in fifth place. In 1963-65, the O.W.E. region ranked second and Japan ranked third. The United Kingdom, with 1.6 million tons of imports, had slipped to fourth place and Eastern Europe had moved to fifth place. The former fifth place country, the USSR, changed from a net importer to a net exporter during 1963-65.

Annual growth rates for the net importers varied from a high of 18 percent for the Eastern Europe region to a low of 1.1 percent for the United Kingdom. Net imports for the EC increased 11.7 percent annually. For Japan, the rate was 11.8 percent and for the O.W.E. region, 8.9 percent.

Total net oilcake imports for 1955-57 were 6.1 million tons, of which the EC accounted for 34 percent; the United Kingdom, 23 percent; the Other Western Europe region, 18 percent; Japan, 12 percent; and the USSR, 7 percent. In 1963-65, net oilcake imports totaled 11.4 million tons. The EC accounted for nearly 44 percent of that total. Second place was occupied by Other Western Europe, with 19 percent of the total, and third place was held by Japan, with 16 percent of the total. Thus 79 percent of total net oilcake imports was taken by the three top regions.

Trade in Substitutes

Although a variety of products compete with oilcakes as a protein supplement, fishmeal is the main competitive product exchanged through international trade. Fishmeal imports increased from an average of 0.5 million tons in 1955-57 to an average of 2.1 million tons in 1963-65--an average annual increase of 17.1 percent (table 23). The developed regions accounted for 85 percent of 1963-65 imports, while the central plan regions accounted for 10 percent. The largest importers by region in 1963-65 were the EC, the United Kingdom, and the United States. The EC alone accounted for over a third of all fishmeal imports.

Six countries--Peru, Norway, South Africa, Iceland, Chile, and Denmark-- provide approximately 93 percent of the world's exports of fishmeal. Peru is easily the world's leading exporter (table 24).

Table 21.--World trade in oilcakes, including meal equivalent of oilseeds traded, by region, averages for 1955-57 and 1963-65, and annual rates of change

Region	1955-57 average		1963-65 average		Annual rate of change		Net trade		Annual rate of change in net trade
	Imports	Exports	Imports	Exports	Imports	Exports	1955-57	1963-65	
	1,000 metric tons				Percent		1,000 metric tons		Percent
United States	228	2,262	143	7,011	-5.6	14.2	2,034	6,868	16.5
Canada	381	189	600	220	5.8	1.9	-192	-380	-8.8
EC	2,589	531	5,587	580	10.1	1.1	-2,058	-5,007	-11.7
United Kingdom	1,443	10	1,665	46	1.7	1/	-1,433	-1,619	-1.5
O.W.E.	1,250	144	2,191	1	7.3	2/	-1,106	-2,190	-8.9
Japan	769	13	1,863	18	11.7	4.2	-756	-1,845	-11.8
Australia-New Zealand and South Africa	24	29	27	47	1.3	6.2	5	20	18.9
Total	6,684	3,178	12,076	7,923	7.6	12.1	-3,506	-4,153	2.1
East Europe	225	71	708	130	15.4	7.8	-154	-578	-18.0
USSR	552	150	48	177	2/	2.1	-402	129	3/
Communist Asia	13	895	326	407	1/	-7.8	882	81	2/
Total	790	1,116	1,082	714	4.0	-5.4	327	-368	4/
Latin America	53	711	58	1,495	1.1	9.8	658	1,437	10.2
Africa and West Asia	141	1,597	325	2,293	11.0	4.6	1,456	1,968	3.8
Asia	1,092	2,138	2,099	2,737	8.5	3.1	1,046	638	-6.0
Total	1,286	4,446	2,482	6,525	8.6	4.9	3,160	4,043	3.3
World total	8,760	8,740	15,640	15,162	7.5	7.2			

1/ Computed percent not relevant because of very small base in 1955-57.
2/ Computed percent not relevant because of very large base in 1955-57.
3/ Changed from a net importer to a net exporter.
4/ Changed from a net exporter to a net importer.

Source: (17).

Table 22.--Percentage distribution of world imports of oilcakes, by commodity, average 1960-64, annual 1964-67 1/

Item	Average 1960-64	1964	1965	1966	1967 2/
			Percent		
Soybean meal	9.7	12.1	13.8	15.8	15.7
Soybeans, meal equivalent	35.9	38.1	37.5	38.0	41.3
Subtotal	45.6	50.2	51.3	53.8	57.0
Peanut meal	10.7	10.1	9.0	7.8	7.4
Peanuts, meal equivalent	6.3	5.8	5.1	4.7	4.7
Subtotal	17.0	15.1	14.1	12.5	12.1
Cottonseed meal	8.9	8.4	9.3	8.6	7.4
Cottonseed, meal equivalent	1.6	1.5	1.5	1.2	1.0
Subtotal	10.5	9.9	10.8	9.8	8.4
Linseed meal	5.0	5.2	4.7	3.7	3.0
Flaxseed, meal equivalent	3.3	3.2	2.7	2.8	2.2
Subtotal	8.3	8.4	7.4	6.5	5.2
Copra meal	2.9	3.5	3.2	2.9	3.0
Copra, meal equivalent	4.8	3.8	3.4	3.1	2.8
Subtotal	7.7	7.3	6.6	6.0	5.8
Sunflowerseed meal	3.3	1.9	2.5	3.7	4.0
Sunflowerseed, meal equivalent	1.3	1.0	.8	.9	1.5
Subtotal	4.6	2.9	3.3	4.6	5.5
Palm kernel meal	.4	.6	.6	.7	.8
Palm kernel, meal equivalent	3.0	2.6	2.3	1.8	1.1
Subtotal	3.4	3.2	2.9	2.5	1.9
Rapeseed meal	1.3	1.1	1.2	1.6	1.4
Rapeseed, meal equivalent	1.6	1.1	2.4	2.7	2.7
Subtotal	2.9	2.2	3.6	4.3	4.1
Total as meal	42.2	42.9	44.3	44.8	42.7
Total as seed	57.8	57.1	55.7	55.2	57.3
Grand total	100.0	100.0	100.0	100.0	100.0

1/ Includes meal equivalent of oilseed imports, but excludes exports of meal from crushings of imported seed.

2/ Partly estimated.

Source: (64, table 1)

Table 23.--Fishmeal imports, by region, averages 1956-57 and 1963-65, and annual rates of change

Region	Average 1956-57	Percentage of world total	Average 1963-65	Percentage of world total	Annual rate of growth
	1,000 metric tons	Percent	1,000 metric tons	Percent	Percent
United States	83	--	329	--	17.6
Canada	0	--	2	--	--
EC	241	--	788	--	15.0
United Kingdom	131	--	342	--	12.0
Japan	0	--	100	--	--
O.W.E.	52	--	193	--	16.6
Australia-New Zealand	0	--	8	--	--
Total	507	94	1,764	85	15.8
Eastern Europe	9	--	205	--	47.0
USSR	0	--	9	--	--
Communist Asia	0	--	0	--	--
Total	9	2	205	10	47.0
Less developed countries	24	4	109	5	19.6
World total	540	100	2,078	100	17.1

Source: FAO Yearbook of Fishery Statistics No. 25, 1967.

Table 24.--Fishmeal exports by major producer-exporters, average 1960-64, annual 1962-69

Country	Average 1960-64	1962	1963	1964	1965	1966	1967	1968	1969
	,000 metric tons								
Peru	984	1,066	1,160	1,417	1,260	1,304	1,592	2,083	1,850
Norway	115	60	104	183	260	258	495	436	325
South Africa 1/	199	207	214	280	233	174	289	366	325
Iceland	84	70	102	124	141	153	133	63	--
Chile	78	73	87	146	67	183	103	179	--
Denmark	61	62	68	70	81	82	102	185	--
Rest of the world	133	139	128	174	272	209	194	492	--
World total	1,654	1,677	1,863	2,394	2,214	2,363	2,908	3,54[illegible]	[illegible],150

1/ Includes South West Africa.

Source: (66).

8.--PRODUCTION OF OILCAKES

Production of Parent Materials

World oilseed production was discussed on pages 31-39 in chapter IV of this report. Regional production levels are shown in appendix tables B-1 - B-26. These tables show that 1955-68 production increases were greatest for soybeans and sunflowseed. The lowest rates of increase were for palm kernels, copra, and cottonseed, all of which are grown primarily in the less developed countries.

Procedure for Computing Oilcake Production

Oilcake production estimates were obtained by first applying the crushing levels contained in appendix B to the estimates of oilseed production in each country. The levels used varied between crops and between countries.

Once estimates of the quantity of each oilseed crushed were obtained, that quantity was converted to a meal-equivalent basis by application of the meal yield factors shown in appendix B. The meal equivalent of each oilseed in each region was allocated to the calendar year during which the crop's processing chiefly occurred. The meal equivalent was credited to the country where the seed was grown rather than to the country where the crushing actually took place.

World Production

World oilcake production increased from an average of 28.2 million tons in 1955-57 to an average of over 41.5 million tons in 1965-67 (table 25). The difference, over 13 million tons, represents nearly a 50-percent increase over the period, or a 4.0 percent annual growth rate.

During 1960-62 through 1965-67, world production increased nearly 8 million tons--a 24-percent increase, or an annual increase of 4.4 percent. The central plan region had a sharp increase in its annual growth rate, while the developed and less developed areas showed moderate declines.

Regional Production

On a regional basis during 1955-57 through 1965-67, oilcake production increased 5.9 percent annually in the developed regions, 1.2 percent in the central plan regions, and 3.2 percent in the less developed regions. The developed countries, whose rate of increase was more than double that of the rest of the world, increased their share of world production from 43 to 52 percent. Seven of those nine percentage points came from the central plan countries, while the remaining two points came from the LDC's.

The United States accounted for 48 percent of 1965-67 world oilcake production. Other Asia and the USSR ranked second and third, respectively, with 12 and 11 percent of the total. During 1955-57, the top three producing regions were the United States, Communist Asia, and Other Asia.

During 1955-57 through 1965-67, only Japan and South Africa among the developed countries had annual growth rates below the 4.0-percent world average. In the central plan region, Communist Asia and the USSR had growth rates smaller than the world average. Among the less developed countries, Latin America was the only region whose growth rate surpassed the world average. Japan and Communist Asia were the only regions to have lower production at the end of the period. The United Kingdom was the only region producing no significant quantities of meal.

Production of Fishmeal

Fishmeal production increased 12 percent annually during 1955-57 through 1963-65 (table 26), compared with a 4-percent rate of increase for all oilcakes. World fishmeal production averaged approximately 3.4 million tons in 1963-65, while total oilseed meal production averaged some 42 million tons. Thus, fishmeal production during 1963-65 was approaching 8 percent of total oilcake production.

During 1955-57 through 1963-65, production ranking changed considerably. In 1955-57, the United States was the leading fishmeal producer, Norway was second, and Japan was third. In 1963-65, Peru had moved into first place and was producing more than four times as much as the United States, which had moved to second place. Japan and South Africa maintained their relative positions, ranking third and fourth, respectively, while Norway dropped to fifth place.

Table 25.--Oilcake production, by region, averages for 1955-57, 1960-62, and 1965-67, and annual rates of change

Region	1955-57 average	1960-62 average	1965-67 average	Share of total		Annual rates of change	
				1955-57	1965-67	1955-57 to 1965-67	1960-62 to 1965-67
	1,000 metric tons			Percent		Percent	
United States	11,186	15,479	20,024	39.7	48.2	6.0	5.2
Canada	433	487	745	7.5	1.9	5.6	8.9
EC	147	162	325	0.5	0.8	8.3	15.0
United Kingdom	0	0	0	0.0	0.0	--	--
O.W.E.	162	225	265	0.6	0.6	5.1	3.2
Japan	165	147	57	0.7	0.1	-10.0	17.2
Australia, New Zealand, and South Africa	103	131	155	0.3	0.3	4.1	3.4
Total	12,196	16,631	21,571	43.3	51.9	5.9	5.4
Eastern Europe	768	886	1,297	2.7	3.1	5.4	7.9
USSR	3,001	3,297	4,395	10.7	10.6	3.9	5.9
Communist Asia	4,350	3,505	3,505	15.4	8.4	-2.1	0.0
Total	8,119	7,688	9,197	28.8	22.1	1.2	3.7
Latin America	1,783	2,386	2,850	6.3	6.9	4.8	3.6
Africa and West Asia	2,120	2,474	3,062	7.5	7.3	3.7	4.4
Other Asia	3,956	4,471	4,885	14.1	11.8	2.1	1.7
Total	7,859	9,331	10,797	27.9	26.0	3.2	3.0
World total	28,174	33,650	41,565	100.0	100.0	4.0	4.4

Source: Tables in app. B.

Table 26.--Fishmeal production averages for major producers, 1955-57 and 1963-65, and annual rate of change

Country	1955-57 average	1963-65 average	Annual rate of change
	1,000 metric tons		Percent
United States	349	304	-1.7
Canada	62	83	3.7
Norway	217	214	-0.1
Japan	133	271	9.3
South Africa	85	260	14.9
United Kingdom	78	80	0.4
West Germany	26	81	15.3
Denmark	50	116	11.1
Peru	39	1,382	56.2
Iceland	19	131	27.3
Chile	15	114	30.0
Total	1,073	3,036	13.9
World total	1,340	3,383	12.2

Source: FAO Yearbook of Fishery Statistics No. 25, 1967.

9.--CONSUMPTION OF OILCAKES

Regional estimates of oilcake consumption were developed from 1955 to as far as data permitted. Except for the United States, such estimates were the sum of a region's production and net trade. The United States was the only region for which a usable series of actual oilcake consumption data was available.

During 1955-57 through 1963-65, world oilcake consumption expanded at an average annual rate of 4.3 percent, or from an average of 28.2 to 39.5 million tons. The developed countries maintained the largest annual growth rate, 5.7 percent, with the result that they accounted for 62 percent of total consumption by 1963-65. As a group, the less developed countries had an annual growth rate of 3.5 percent; and in 1963-65, their annual level of oilseed meal consumption was 6.2 million tons. For the central plan region, the annual growth rate was 1.4 percent and annual consumption was 8.7 million tons.

During 1963-65, the United States, using 12.3 million tons of oilcakes, accounted for 32 percent of total world consumption. The EC was the second largest consuming region, 5.2 million tons, followed by Other Asia, 4.3 million tons, and the USSR, 3.8 million tons.

The EC, with an annual increase of 11.5 percent, had the highest consumption growth rate of any region. Japan was second, at 9.5 percent. The Other Western Europe region at 8.8 percent, was third; the Eastern Europe region, at 7.3 percent, was fourth; and Other Asia, at 4.9 percent, was fifth.

The major consuming region, the United States, had a growth rate lower than that of a number of other regions--primarily because the U. S. level of concentrate feeding per animal unit is quite high. Since the early 1960's, the increase in demand for oilcakes in the United States has moved in line with the increase in total livestock numbers. In the regions of the world where demand has been increasing the fastest, there has been an increase in the number of livestock fed plus a heavier feeding of concentrates per animal unit.

Regional Use of Individual Oilcakes

The type of oilcake consumed within an exporting region is largely determined by the type of oilcake produced within that region. The types of meal consumed within an importing region are, as one would expect, more varied. Some countries have preferences for particular types of cakes; for example, in the Netherlands, linseed meal is preferred in most compound feeds. But in general, the cake utilized is the one that can meet the required nutritional levels at the lowest price. A wide variety of cakes can be used for cattle feed because of the ability of ruminants to convert nitrogenous matter to amino acids. For poultry and swine feeds, the fiber content, the amino acid pattern, the toxicity, and the vitamin and mineral content all have a strong bearing on the type of cake selected. The variables to be considered to arrive at the most economical and nutritive feed formula are so many that more and more compound feed manufacturers are utilizing a computer.

Shifts in the kinds of cakes being consumed in the major markets are most important to regions that export, in quantity, only one or two types of cakes. For this reason, a short discussion follows regarding the types of cakes plus fishmeal consumed in the six major developed regions of the world during 1955-57 and 1963-65.

United States

In both 1963-65 and 1955-57, soybean meal accounted for over three-fourths of total U. S. meal consumption (table 28). Cottonseed meal was the second most important meal consumed. In 1963-65, fishmeal ranked third. Linseed meal ranked third in 1955-57.

During the review period, peanut meal had the largest annual rate of increase--13.3 percent. Fishmeal increased 6.9 percent annually and soybean meal, 4.7 percent. The comparable rate for cottonseed meal was 2 percent, while fourth-ranked linseed meal exhibited a negative trend.

Canada

Oilcake consumption in Canada was comprised principally of linseed meal and soybean meal during 1955-57. By 1963-65, soybean meal was in first place and linseed meal in second. The largest annual rate of increase, however, was in the consumption of rapeseed--12.8 percent. This rate was more than two times the overall meal consumption rate of increase and was approximately double the rate of increase for both soybean meal and fishmeal.

EC

Soybean meal is the dominant meal consumed in the EC, where nearly 2.4 million tons were consumed annually during 1963-65. Soybean meal consumption increased 20 percent annually from 1955-57 to 1963-65. Fishmeal consumption, with an annual rate of increase only slightly below 30 percent, ranked second in terms of quantity. Third place was held by linseed meal--annual consumption averaged three-quarters of a million tons during 1963-65. Peanut meal consumption, which ranked fourth, was only slightly less than linseed meal consumption, and had a faster rate of growth than linseed meal during the review period.

O.W.E.

Soybean meal was also the major meal consumed in this region during 1963-65. Cottonseed meal, ranked second in terms of quantity, did not rank among the top five meals in annual growth rates. Fishmeal ranked third in both annual growth rate and quantity of consumption. Peanut meal, though it ranked fourth in quantity consumed, ranked second behind soybean meal in annual growth rate.

United Kingdom

Consumption of peanut meal, the principal meal utilized in the United Kingdom, averaged 600,000 tons during 1963-65. Soybean meal consumption, nearly one-half million tons, ranked second and fishmeal consumption ranked a close third. Fishmeal had the highest annual growth rate during 1955-57 through 1963-65--13 percent. Soybean meal, at 6.5 percent, and peanut meal, at 5.8 percent, were second and third, respectively. Most of the other meals had negative rates of change; consequently, growth of the U. K. meal industry was just over 3 percent a year during 1955-57 through 1963-65 period.

Japan

In Japan, meal consumption centers on soybean meal, which accounts for three-fourths of all oilcake consumption. Soybean meal consumption averaged 1.4 million tons in 1963-65. Fishmeal was in second place, with consumption at less than 0.4 million tons. Consumption of all other oilcakes averaged 0.3 million tons in 1963-65. From 1955-57 through 1963-65, consumption of fishmeal and soybean meal had annual growth rates of 14.6 and 9.0 percent, respectively.

Consumption of Fishmeal

As shown in table 28, world consumption of fishmeal has been increasing at a rate more than three times that for oilcakes. Nearly all of the increase occurred in the developed regions. The main reason for the rapid growth of fishmeal consumption has been its low cost relative to that of oilcakes as a source of protein. Fishmeal is consumed primarily in poultry rations, where it can constitute up to 10 percent of the mixed feed ration.

Table 27.--Oilcake and fishmeal availability, by region, averages for 1955-57 and 1963-65, and annual rates of change

Region	Average 1955-57			Average 1963-65			Annual rate of change		
	Oilcake	Fishmeal	Total	Oilcake	Fishmeal	Total	Oilcake	Fishmeal	Total
	1,000 metric tons			1,000 metric tons			Percent		
United States	9,155	380	9,535	12,294	648	12,942	3.7	6.9	3.9
Canada	630	22	652	880	37	917	4.3	6.7	4.3
EC	2,205	132	2,337	5,269	885	6,132	11.5	29.4	12.9
C.W.E.	1,268	179	1,447	2,479	400	2,481	8.8	10.5	8.9
United Kingdom	1,433	158	1,591	1,619	418	2,081	1.5	13.0	3.1
Japan	921	141	1,062	1,915	420	2,130	9.5	14.6	10.3
Australia, New Zealand, & South Africa	99	40	139	119	60	179	2.3	5.2	3.2
Total	15,711	1,052	16,763	24,575	2,868	26,863	5.7	13.4	6.3
East Europe	923	2	925	1,623	260	1,883	7.3	1/	10.7
USSR	3,405	40	3,445	3,768	175	3,943	1.2	20.5	.9
Communist Asia	3,472	0	3,472	3,333	0	3,333	-0.5	0.0	-0.5
Total	7,800	42	7,842	8,724	435	9,159	1.4	1/	2.0
Latin America	1,125	23	1,148	1,136	100	1,236	0.1	20.1	1.1
Africa and West Asia	664	31	695	833	20	853	2.8	-5.2	3.2
Asia	2,910	8	2,918	4,254	32	4,286	4.9	14.9	5.0
Total	4,699	62	4,761	6,223	152	6,375	3.5	11.9	3.7
World total	28,210	1,156	29,366	39,522	3,455	42,977	4.3	14.7	4.8

1/ Computed percent not relevant because of small base in 1955-57.

Source: Table 28, 30, and FAO Yearbook of Fishery Statistics No. 25, 1967.

Table 28.-- Availability of oilcakes in major developed regions, by type of cake, averages for 1955-57 and 1963-65, and annual rates of change

Oilcake	United States			Canada			EC			O.W.E.		
	1955-57	1963-65	Annual change	1955-57	1963-65	Annual change	1955-57	1963-65	Annual change	1955-57	1963-65	Annual change
	1,000 metric tons		Percent	1,000 metric tons		Percent	1,000 metric tons		Percent	1,000 metric tons		Percent
Cottonseed meal	2,071	2,426	2.0	5	3	-6.2	103	103	--	335	550	6.4
Copra meal	53	2	-33.1	4	--	--	236	461	8.7	143	115	-2.7
Linseed meal	424	278	-5.1	243	280	1.8	439	741	6.8	108	111	0.3
Palm kernel meal	--	--	--	--	--	--	205	336	6.4	59	11	-19.0
Peanut meal	31	86	13.6	19	24	3.0	392	719	7.9	122	345	13.9
Rapeseed meal	--	--	--	68	157	11.1	172	310	7.6	113	155	4.0
Soybean meal	6,576	9,502	4.7	286	408	4.5	549	2,389	20.2	283	738	12.7
Sunflowerseed meal	--	--	--	5	8	6.1	94	188	9.1	70	56	-2.8
Not specified	--	--	--	--	--	--	15	22	4.9	35	398	35.0
Total oilcake	9,155	12,294	3.7	630	880	4.3	2,205	5,269	11.5	1,268	2,479	8.8
Fishmeal	380	648	6.9	22	37	6.7	132	885	26.0	179	400	10.5
Total oilcake and fishmeal	9,535	12,942	3.9	652	917	4.3	2,337	6,154	12.9	1,447	2,879	8.9

Oilcake	United Kingdom			Japan			Total		
	1955-57	1963-65	Annual change	1955-57	1963-65	Annual change	1955-57	1963-65	Annual change
	1,000 metric tons		Percent	1,000 metric tons		Percent	1,000 metric tons		Percent
Cottonseed meal	332	254	-3.3	26	90	16.8	2,872	3,426	2.2
Copra meal	33	22	-4.9	17	34	9.0	486	634	3.4
Linseed meal	150	99	-5.1	42	62	5.0	1,406	1,571	1.4
Palm kernel meal	167	104	-5.8	13	13	--	444	464	.6
Peanut meal	382	600	5.8	6	14	11.2	952	1,788	8.2
Rapeseed meal	3	41	38.7	118	101	-1.9	474	764	6.1
Soybean meal	290	479	6.5	698	1,392	9.0	8,682	14,908	7.0
Sunflowerseed meal	79	64	-2.6	1	4	18.9	249	320	3.2
Not specified	-3	-44	40.0	--	205	--	47	581	
Total oilcake	1,433	1,619	1.5	921	1,915	9.5	15,612	24,456	5.7
Fishmeal	158	418	12.9	141	420	14.6	1,012	2,808	13.6
Total oilcake and fishmeal	1,591	2,037	3.1	1,062	2,335	10.3	16,624	27,264	6.3

10.--DEMAND ANALYSIS AND PROJECTIONS FOR OILCAKES 13/

Analysis

The establishment and development of commercial livestock feeding enterprises is highly correlated with the level of overall economic development in a region. In the most less developed regions, livestock enterprises tend to be of a subsistence nature. Frequently, the livestock depend on what feed they can forage for themselves.

In those developed regions where livestock feeding has developed into a highly complex industry, livestock are fed scientifically formulated balanced rations that contain the necessary quantities and proportions of amino acids, vitamins, minerals, heat and energy, and bulk. Because different animal species, and even the same animals at different stages of growth, require different feed formulations, mixed feed industries have developed for the purpose of producing concentrate feed rations to meet the exacting nutrient requirements of the various types and ages of livestock. In the economically advanced regions that have highly developed commercial livestock feeding industries, the major portion of world consumption of oilseed meals occurs.

Livestock feeding enterprises based on formula feeding of premixed concentrate feeds are largely limited to Western Europe, North America, and Japan. In 1965, nearly 95 percent of world production of mixed feeds was produced in these regions. The United States alone produced 52 percent of the world total in 1965 and 68 percent in 1957. Western Europe produced 37 percent of the total in 1965, while Japan produced 7 percent; these two figures compare with 28 percent and 2 percent, respectively, for 1957 (10, vol. IV, ch. VI). Although mixed feed output increased significantly in all the developed regions from 1957 to 1965, the very rapid increase in Western Europe and Japan caused the U.S. percentage of world output to decline.

World trade in mixed livestock feed is negligible--partly because feed specifications vary in different countries and regions. In addition, each consuming region will have some feed components available from domestic production, and will import additional ingredients to complement domestic production. It is advantageous for feed deficit regions to purchase feed ingredients on the world market and then formulate concentrate feeds to meet domestic requirements. Thus, the major trade in feedstuffs is in such ingredient commodities as oilseed meals, coarse grains, and protein supplements from such sources as fishmeal and milling byproducts.

Because of the interrelationship between oilseed meals and feed grains in the advanced livestock feeding regions, an analytical model that jointly considered the demand relationships for both of these major mixed feed ingredients was developed. The model was designed to estimate regional demand relationships that could be used as the basis for projecting the regional demand for oilseed meals. Because of the dominance of the developed countries in oilseed meal consumption, the following analysis is limited to the major consumers--Western Europe, North America, and Japan. The demand for oilseed meals in the remaining regions is analyzed separately under a different model.

The Model, Major Developed Regions

A two-stage least squares regression model was used to analyze the demand for oilseed meal in the major consuming regions of Western Europe (the EC, the United

13/ The analysis and projections of demand for oilcakes in the major developed regions was prepared by Donn R. Reimund, Marketing Economics Division, Econ. Res. Serv., U.S. Dept. of Agr.

Kingdom, and O.W.E.), North America (the United States and Canada), and Japan. The model consists of two behavioral equations for oilseed meal demand and for feed grain demand: One, an identity equation that specifies concentrate feed consumption as the sum of feed grain, oilseed meal, and other high-protein meal consumption; and the other, an identity establishing supply-demand equilibrium. The model is given in equations a through d.

(a) Oilseed meal demand $Q_m = f\ (p_m, p_g, Q_{os}, L^p_{t-1})$

(b) Feed grain demand $Q_g = f\ (p_m, p_g, L^p_{t-1})$

(c) Total mixed feed consumption $q^d_t = Q_m + Q_g + Q_{os}$

(d) Supply-demand equilibrium $Q^d_t = Q^s_t$

Where:

Q_m = consumption of oilseed meal (endogenous)

p_m = import price of soybean meal (endogenous)

p_g = domestic price of feed grain (endogenous)

Q_{os} = consumption of other high-protein supplements (exogenous)

Q_g = consumption of feed grain (endogenous)

L^p_{t-1} = meat production in previous year (exogenous)

Q^d_t = consumption of total concentrate feed (exogenous)

Q^s_t = supply of concentrate feed (exogenous)

All quantity variables are in metric tons per 1,000 population and price variables are expressed in U.S. dollars per metric ton.

The model contains no provision for stock variation in either oilseed meals or feed grains. It is implicitly assumed that stocks in net importing regions consist primarily of working inventories and consequently are relatively stable and quite small in comparison with consumption.

The demand equation for oilseed meal expresses consumption as a function of oilseed meal price, feed grain price, the quantity of other high-protein concentrates consumed, and the production of meat lagged 1 year. The feed grain demand equation expresses consumption as a function of the prices of oilseed meal and feed grain and the lagged production of meat.

The exogenous variable Q_{os}, which represents the consumption of nonoilseed protein feed supplements, requires some clarification. The variable is a heterogeneous composite that includes fishmeal, meat meal and tankage, milling byproducts, and urea. Its composition varies considerably from region to region and, to some extent, over time within each region. The variable was treated as exogenous primarily because its components, with the exception of urea, are produced either entirely or in part as byproducts of other industries. Its availability, therefore, is largely determined by the level of output of the primary products of the meat slaughtering, milling, and edible fish industries. Only a small part of the fishmeal consumed as livestock feed, however, is produced as a byproduct from edible fish.

Meat production, which includes poultry meat, was considered to be a better explanatory variable than either animal units or total production of livestock products. It appears logical to assume that consumption of feed concentrates is more closely associated with output of livestock products than with the total animal population in a region. Meat production was favored over the total production of livestock products because the per capita output of eggs and dairy products is quite stable. Thus, the growth in output of livestock products is primarily attributable to the growth in meat production. Consequently, the variability of oilseed meal consumed by livestock is considered to be a direct response to per capita variations in meat production. The meat production variable used in the model was lagged 1 year because preliminary analysis showed a better correlation between lagged meat production and meal consumption than between current meat production and meal consumption. This is probably because the requirements for oilseed meal are determined in advance of consumption, and are based on per capita production of livestock products of the previous year.

The consumption series for oilseed meals in all regions except the United States was constructed by adding net meal imports and the meal equivalent of net seed imports to the meal equivalent of domestic seed production. For the United States, actual consumption figures were used. Trade data were compiled from various issues of the FAO Trade Yearbook. Production data are from the FAS and the FAO. For the analysis of oilseed meal demand, all meal consumption data were converted to metric tons per 1,000 population.

For all regions other than the United States, the consumption series for feed grains was compiled from OECD food balance statistics. Actual consumption was used for the United States. The consumption series for other high-protein feed supplements was constructed from FAO and FAS data, and the meat production series was compiled from the OECD data. Like the oilseed meal consumption data, consumption data for feed grains and other high-protein supplements and production data for meat were converted to metric tons per 1,000 population.

Soybean meal price was used to represent the price of oilseed meals in the demand analysis. The primary reason for using soybean meal price rather than a weighted average meal price was the dominance of soybean meal as a high-protein feed supplement. In addition, there is a high correlation between the price of soybean meal and the prices of other oilseed meals. Consequently, a weighted average oilseed meal price would closely approximate the price of soybean meal.

London prices, as quoted in the Daily Ledger, were used to represent the price of soybean meal in the three European regions and Japan. U. S. prices were used for the United States and Canada. The prices were deflated by an appropriate price index; and in the case of the EC and O.W.E. regions, by the price index of a major importing country within the region. These indexes are as follows:

EC	-	cost of living index (France)
United Kingdom	-	cost of living index
Japan	-	cost of living index
O.W.E.	-	cost of living index (Denmark)
United States	-	cost of feedstuffs index
Canada	-	wholesale price index

Feed grain prices were represented by the internal price of a major domestically produced feed grain. The price of barley was used for all regions except the United States, for which corn prices were used. Wholesale prices were used in most cases. However, when adequate wholesale price series were not available, producer prices were used. Feed grain prices were deflated by the same deflators as were soybean meal prices.

The parameters of the structural demand equations for oilseed meal were estimated using a two-stage least squares procedure.[14] In this procedure, the endogenous explanatory variables in any structural equation are adjusted for correlation with the disturbance term by regressing each endogenous variable on all exogenous variables in the system. The adjusted endogenous explanatory variables are then substituted into the structural equation in place of the original variables and least squares is applied to the adjusted equation. This procedure makes use of all the predetermined exogenous variables in the model to estimate the parameters of a single structural relation, but does not require a detailed specification of the other relations in the model. The demand equations derived from the above model for each region are:

EC: $Q_m = -151.5578 - .6603\ p_m + 2.0731\ p_g + .2164\ Q_{os} + 1.7570\ L^p_{t-1}$

U.K.: $Q_m = 325.4974 - 1.2980\ p_m - 1.5072\ p_g + .4926\ Q_{os} - 1.7246\ L^p_{t-1}$

O.W.E.: $Q_m = 345.2654 + 4.6625\ p_m - 9.7326\ p_g + 1.6066\ Q_{os} - 3.8104\ L^p_{t-1}$

Japan: $Q_m = 19.1063 - .0844\ p_m - .0684\ p_g + .3832\ Q_{os} + 1.4984\ L^p_{t-1}$

U.S. [15]: $Q_m = 140.2853 + .4671\ p_m - 1.0823\ p_g - 1.0710\ Q_{os}$

Canada [15]: $Q_m = 111.5534 + 1215\ p_m - 1.073\ p_g + .1293\ Q_{os}$

In the six regions analyzed, the demand for oilcake is related to the demand for feed grains since both are inputs to the same enterprise--the livestock industry. In some areas, the relationship between feed grains and oilseed meal is predominantly complementary, while in others it might be competitive. Results from the analysis of the EC indicated that the relationships between feed grains and oilseed meal were competitive because of the high price of grains relative to meal prices. But in the other five regions, the results indicated that a complementary relationship existed. The direct price coefficients for Other Western Europe, the United States, and Canada were positive rather than negative.[16] This result is apparently caused by the interrelationship between oilseed meals and feed grains in the manufacture of mixed feeds in these regions. These ingredients are combined in rather stable proportions, with no significant competitive relationship existing between them. The price of feed grains, the major ingredient in mixed feeds, thus appears to have more influence than

---

[14] A description of the two-stage least squares estimating procedure is given in (38, pp. 258-260).

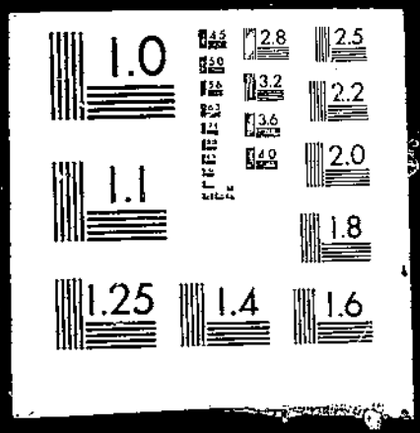
[15] L^p_{t-1} was taken out of these equations because of intercorrelation problems

[16] The results obtained in this analysis differ from those obtained by other analysts. For example, Houck (32) in a model taking into account the complex interrelationships of the U.S. oilseeds economy, estimated a demand price elasticity of -0.33 for soybean meal, compared with -0.28 estimated by Vandenborne (68) in another study. These studies, however, did not consider the cross price relationships between feed grains and oilseed meals.

USDA/FAER-71

WORLD SUPPLY AND DEMAND PROSPECTS FOR OILSEEDS AND OILSEED PRODUCTS IN 1980 WITH EMPHASIS ON TRADE BY THE LESS DEVELOPED COUNTRIES. (Foreign Agricultural Economic Report). /_Lyle E. Moe (and others). Washington, DC: Economic Research Service, Mar. 1971. (NAL Call No. A281.9/Ag8F)

2 OF 3
USDA
FAER-71



the price of meal in determining the level of oilseed meal use. For the United Kingdom and Japan, the oilseed meal price coefficient carried the expected negative sign.

The United States was the only region in which nonoilseed protein supplements appeared to substitute for oilseed meals. In the remaining five regions, a competitive relationship between protein feed supplements from oilseed and nonoilseed sources was not statistically apparent during 1955-66. The coefficients obtained for the nonoilseed protein supplement, in fact, indicate a complementary relationship between protein supplements from oilseed and nonoilseed sources. This phenomenon can largely be accounted for by the fact that pork and poultry products made up about 40 percent of the increase in output of livestock products in importing regions during 1955-66 (21, par. 615). Formula rations for these livestock call for the use of both oilseed meal and protein supplements of animal origin.

Lagged meat production was included as an explanatory variable in the oilseed meal demand equations for the United Kingdom, O.W.E., the EC, and Japan. The variable was excluded from the meal demand equations for the United States and Canada because it resulted in poor estimating equations. The meat production coefficients obtained were positive, as expected, for the EC and Japan, but were negative for the United Kingdom and O.W.E. This negative relationship is probably due to the fact that throughout the analytical period, oilseed meals became more expensive relative to livestock products in the United Kingdom and in Denmark, a major O.W.E. producer of livestock products (22, pars. 620-622). It is unlikely that this situation will hold in the future. Therefore, the estimated demand equations for the United Kingdom and O.W.E. were not used for projection purposes.

Estimated versus actual consumption of oilseed meals in each of the six regions during 1955-66 is shown in figure 3.

The Model, Other Regions

It is widely recognized that there is not an intensive use of oilcakes as an animal protein supplement in the less developed countries and Communist Asia. Also, use of oilcakes in Australia-New Zealand and South Africa is quite low, on an animal unit basis, compared with levels of utilization in the other developed regions. Use of oilcakes in Russia and Eastern Europe has been increasing but the levels of utilization, on an animal unit basis, are also considerably below those of the major developed regions. For regions other than the major developed regions, there is little or no interrelationship between oilseed meals and feed grains; thus, least squares estimates of a single equation, rather than two-stage least squares, were used for estimating future demand for oilcakes.

The aggregate demand for oilcakes depends on various factors including oilcake prices, total number of animal consuming units, availability of other protein products, level of income, and factors that affect demand over time, such as changes in feeding practices. Thus:

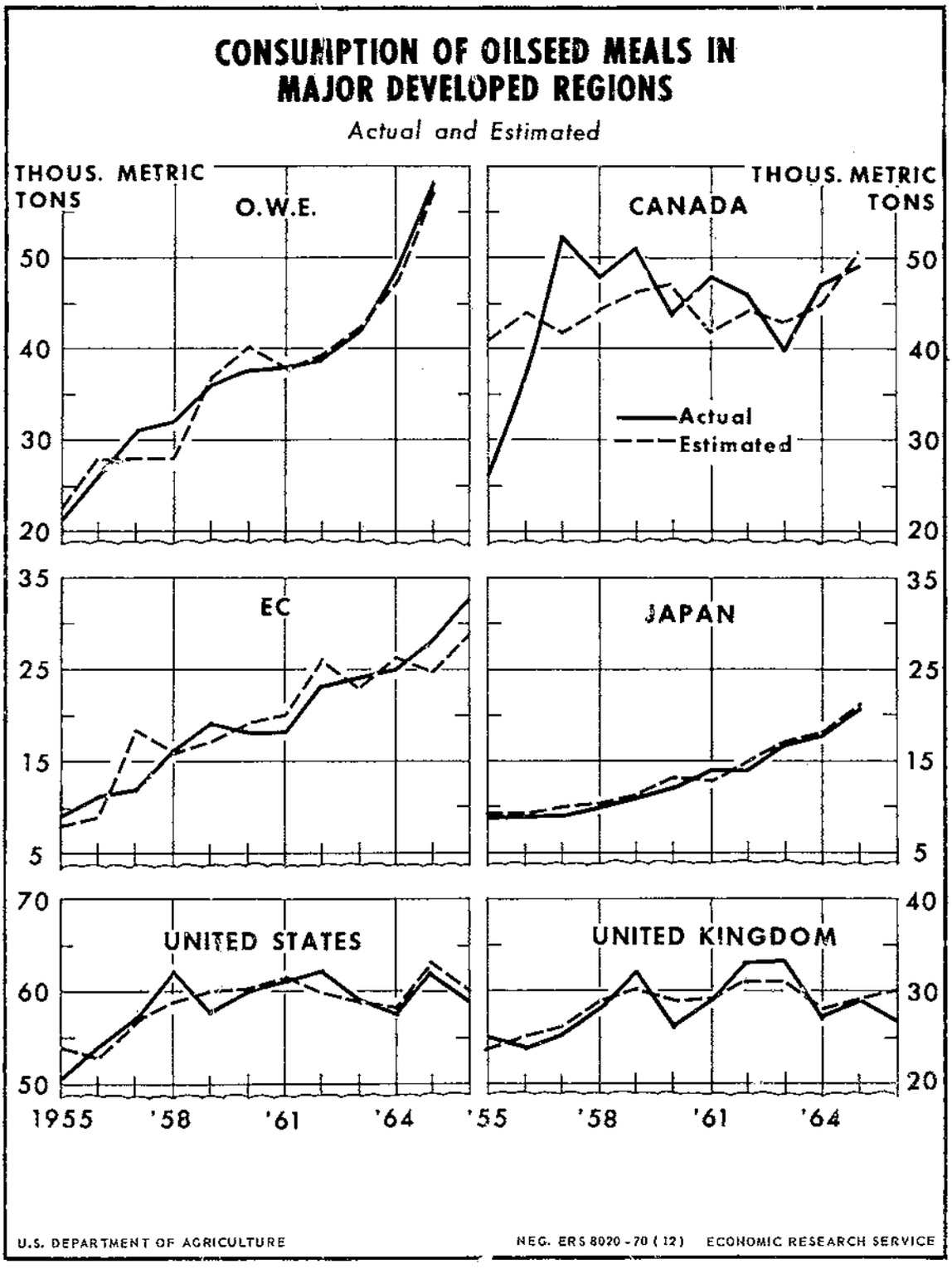

CONSUMPTION OF OILSEED MEALS IN MAJOR DEVELOPED REGIONS
Actual and Estimated
THOUS. METRIC TONS
O.W.E.
CANADA
THOUS. METRIC TONS
Actual
Estimated
EC
JAPAN
UNITED STATES
UNITED KINGDOM
1955
'58
'61
'64
'55
'58
'61
'64
U.S. DEPARTMENT OF AGRICULTURE
NEG. ERS 8020-70 (12) ECONOMIC RESEARCH SERVICE

Figure 3

$$Q^{d}_{m} = f(A^{u}, p_{m}, Q^{gr}_{prod}, I, T)$$

Where:

Q^{d}_{m} = quantity of oilcakes demanded

A^{u} = animal units

p_{m} = price of commodity

Q^{gr}_{prod} = quantity of grain produced

I = income

T = trend

Several regression equations incorporating the above variables were developed for each of the seven regions considered in the "other regions" demand analysis. The regions are: (1) South Africa and Australia-New Zealand; (2) Eastern Europe; (3) the USSR; (4) Communist Asia; (5) Latin America; (6) Africa and West Asia; and (7) Other Asia. The dependent variable in the analysis, total consumption of oilcake, was the sum of a region's production and its net trade. For the independent variables, the animal numbers as contained in (37) and the FAO Production Yearbooks were converted into animal units. 17/ The amount of oats, barley, and corn produced in a region was used for the quantity of substitutes. The international price of the major oilcake traded by the region was used for the price of the commodity. In some regions, the production of meal ($Q^{m}prod$) was used in place of the price variable. With respect to income, the historical series used were those contained in (44) . While a trend factor was considered in some of the equations, it was not used in any equation containing income because of the intercorrelation problem posed.

The various demand equations developed for each region appear in table 29. The linear function was used in all regression equations, and the time period was 1955-66. Evaluation regarding the appropriateness of each equation with respect to statistical considerations was the same as that stated in the demand analysis section for vegetable oil.

The functions developed and selected for the respective regions are discussed briefly in the following section on regional projections.

Projections

Major Developed Regions

The preceding regional demand analyses were used as the basis for projecting consumption of oilseed meals for 1980. In the projections, oilseed meal and feed grain prices are held constant at their 1963-65 average. Meat production was estimated as the mean of OECD meat production projections for 1975 and 1985 (47).

17/ Factors used for converting livestock numbers to animal units appear in (10, vol. 5, p.2).

The 1980 consumption of other high-protein supplements, the other exogenous variable in the oilseed meal demand equations, was estimated by a linear trend extrapolation for all major developed regions except the United States. For the United States, a semi-log projection of trend was used to estimate 1980 consumption.

Several factors influence the underlying structure of the other high-protein supplement variable. First, the rapid growth in fishmeal, which contributed significantly to the growth in other high-protein supplements during 1955-66, is expected to taper off. Secondly, a major growth in synthetic protein supplements that may be produced from either petroleum or natural gas is anticipated in Western Europe and Japan. Also, utilization of urea, which in the past has been limited primarily to the United States, will probably increase in cattle feeding in other regions. The growth of the synthetic protein industry in the United States is expected to be considerably slower than in the importing regions of Europe and Japan, since the United States is a major producer and exporter of oilseed meals. Consequently, the growth in nonoilseed protein supplements is projected at a lower rate in the United States than in the other five developed regions.

Projections of oilseed meal demand for the six major developed areas are given in table 30. Because of the livestock products/oilseed meal price relationship that existed in the United Kingdom and other Western Europe region during 1955-66, the demand relationships developed for these two regions were not believed valid for projection purposes. Consequently, the EC demand relationship, which was felt to be a better reflection of expected future conditions in Western Europe, was used to project for the United Kingdom and the O.W.E. region.

In the United Kingdom, where the techniques of livestock and poultry feeding have reached a high level of sophistication, demand for oilcakes during 1960-67 was quite weak, mainly because oilcakes became more expensive relative to livestock products. This price relationship reversed itself in 1968 and, consequently, oilcake imports increased rather substantially. Price relationships of 1968 rather than 1963 were used for projections.

Other Regions

The projections developed for the seven regions in this group were based on the demand equations in table 29.

South Africa and Australia-New Zealand.--Of the three equations developed for this region, the one containing grain production and income was statistically significant at the 5-percent level and was considered the most reasonable for projection purposes. The equation with trend yielded an R^2 value of only .23, compared with .52 for the one selected, while the remaining equation had a wrong sign for the meal price coefficient. Relatively little feeding of oilcakes to livestock occurs in South Africa and Australia-New Zealand. Demand, which averaged 119,000 tons during 1963-65, is projected to increase 3.8 percent annually, reaching 215,000 tons by 1980.

Eastern Europe.--Four equations were developed for the Eastern Europe region; all yielded relatively good statistical fits. The equation using animal units, grain production, and oilcake production as independent variables yielded an R^2 value of .97 (table 29). This equation, however, would be better for making shortrun rather than longrun demand estimates because of the difficulty in estimating the future quantity or levels of the independent variables. For this reason, the equation using trend, which was statistically significant at the 5-percent level, and which had an R^2 value of .84, was used for estimating the 1980 demand. Projected demand for oilcakes in Eastern Europe by 1980 is 3.0 million tons, an annual increase of 4.0 percent from the 1963-65 average consumption level (table 30).

Eastern Europe is approximately in the same position that Western Europe was a decade ago with respect to consumption of animal products. Meat production has been steadily increasing and improved feeding techniques in the form of compound feeds are being increasingly adopted. If economic policies are not changed to restrict the production of animal products in the years ahead, the level of demand projected for the Eastern Europe region appears quite reasonable.

USSR.--For the USSR, five equations were developed. The three equations containing animal units as an independent variable provided good statistical fits, one with an R^2 value of 0.98; but in all cases, a negative sign resulted for the animal unit coefficient. This, of course, negated the use of these three equations for predictive purposes.

An equation using time and an equation using meal production as the independent variable were also developed. The equation using the trend factor had an R^2 value of only 0.19. The equation with meal production had an R^2 value of 0.71 and was statistically significant at the 5-percent level; the value of its Durbin-Watson statistic, however, was only 0.9, indicating an autocorrelation problem. The latter equation indicates that Russia's meal consumption will approach 5.7 million tons by 1980. This estimate was considered to be too low.

Although Russia is a net meat importer, average per capita meat consumption levels in the country are still quite low compared with Western levels. Meat production in Russia is expected to increase steadily through 1980, as is the intensity of feeding. Production of mixed feeds has been growing rather sharply in recent years but is still probably less than 20 million tons. Also, in recent years oilcakes have comprised only around 9 percent of the mixed feed rations, compared with 20 percent in advanced Western countries. Such potentials for increased oilcake consumption are not, of course, reflected in demand equations based on historical data. In consideration of the above factors, 1980 oilcake demand was placed at 6.4 million tons, or 700,000 tons over the level obtained by using the meal production equation. This is an annual rate of increase of 3.8 percent over the 1963-65 average.

Communist Asia.--Meal production and trend were used as independent variables in the demand equations for Communist Asia. From a statistical point of view, meal production was the better explanatory variable. The equation with this variable indicates that demand by 1980 will approach 3.9 million tons. Since 1980, oilcake production for this region is estimated at 5.3 million tons, 1.4 million tons would be available for the export market. This is not a reasonable level of exports since meal exports during 1963-65 averaged 82,000 tons. It is estimated that in 1980 meal exports will be about 450,000 tons, which in turn, implies that domestic demand within the region would approach 4.8 million tons.

Latin America.--By 1980, oilcake consumption in Latin America is projected to approach 1.9 million tons, compared with a 1.1 million-ton average during 1963-65. The estimate was obtained by using an equation with income and the world price of soybean meal as explanatory variables. The income and price variables were statistically significant at the 5- and 10-percent levels, respectively. The equation resulted in a more reasonable estimate than the two alternative equations developed for this region.

As in other LDC's, the livestock population in Latin America is maintained primarily on pasture lands. If various Latin American countries move, as anticipated, toward the development of poultry and swine industries with more sophisticated techniques of animal feeding, the 1980 estimate of 1.9 should be reasonable.

Africa and West Asia.--Four equations were developed for the Africa and West Asia regions; the equation with price and income as independent variables was selected. The equation, which was statistically significant at the 5-percent level, indicates demand will approach 1.4 million tons by 1980. This represents an annual increase of 3.0 percent over the 1963-65 level and is approximately the same rate of increase maintained during 1955-57 through 1963-65.

Presently, Israel is the only country in this region that has an advanced feed compounding industry. But the demand for animal products in the region, as in the other less developed regions, is expected to increase substantially. The feeding of oilcakes, mainly to chickens, is expected to increase. The bulk of the increase is expected to occur in West Asia and North Africa.

Asia.--For Asia, an equation using world copra meal prices and trend as explanatory variables yielded an R^2 value of .90 and an "F" value of 39.8. The equation indicates that demand for oilcakes will reach 8.8 million tons by 1980, an annual increase of 4.6 percent over the 1963-65 level.

The large cattle population in Asia consumes primarily roughages. Poultry and swine production have been relatively small. Demand for meat and dairy products is expected to increase sharply in the region's growing urban centers, where future per capita income increases will be concentrated. To meet the demand, a number of countries have included in their economic development plans provisions for expanding meat and dairy production. Most of the expanded increase in oilcake consumption in the region is expected to go to poultry and swine. The countries with the greatest rate of increase will probably be Taiwan and South Korea. Substantial increased feeding of poultry is expected to occur in West Pakistan and Ceylon. A study by the Institute for Research in Agricultural Economics at the University of Tokyo goes into great detail regarding the oilcake situation in India (34). The study projects demand for oilcakes in India to increase 4.0 percent a year, or 740,000 tons, from 1969 to 1976.

World Demand

Total world oilseed meal demand projections for 1980 are summarized in table 30. The projections indicate that at constant 1963-65 price levels, the developed areas will account for about the same percentage of the world's oilseed meal consumption as in the 1963-65 base period. The LDC's are projected to increase their share from just under 16 percent of the world total in 1963-65 to 18 percent in 1980. The central plan countries' share is projected to drop from 22 to 21 percent.

Consumption in the developed regions is projected to increase 64 percent from 1963-65 through 1980, an average annual increase of 3.2 percent. This compares with a projected increase of 59 percent, or an annual growth rate of 3.0 percent, for the central plan countries; and with an increase of 92 percent, or an annual growth rate of 4.1 percent, for the LDC's. Total world consumption is projected to increase from 39.5 million tons in 1963-65 to 55.1 million tons in 1980. This represents an increase of 67 percent and an annual growth rate of 3.3 percent.

Within the developed regions, the largest percentage increase is projected for Japan. Japanese meal consumption, 1.9 million tons in 1963-65, is projected to reach 4.9 million tons by 1980, an increase of 157 percent, or an annual increase of 6 percent. Consumption in each of the three European regions will approximately double during 1963-65 through 1980. The lowest growth rate is projected for the United States, where meal consumption is projected to increase from 11.8 million tons in 1963-65 to 15.2 million tons in 1980, an increase of 24 percent. This is an annual growth rate of 1.6 percent. The U.S. share of total world consumption will decrease from 31 percent in 1963-65 to 23 percent in 1980.

Among the central plan countries, the annual growth rate for meal consumption in the USSR is projected to about equal the annual world growth rate of 3.3 percent. Consumption in the Eastern Europe region is projected to increase 86 percent during 1963-65 through 1980, from 1.6 million to 3.0 million tons, an annual growth rate of 4.0 percent. The projection for Communist Asia shows an increase from 3.3 million to 4.5 million tons. This represents an annual rate of increase of 1.9 percent, the lowest growth rate for any region except the United States.

For the less developed countries, the greatest growth in oilseed meal consumption is projected for the region comprised of South, Southeast, and East Asia, and the Pacific Islands. During 1963-65 through 1980, annual consumption is projected to increase 105 percent, from 4.3 million to 8.7 million tons. This annual growth rate of 4.6 percent is comparable to the growth rate projected for the three regions of Western Europe. Meal consumption in the following two less developed regions is projected to increase at about the same rate as total world consumption. Latin America's consumption is expected to increase from 1.1 million to 1.9 million tons, an annual growth rate of 3.2 percent. Consumption in Africa (excluding South Africa) and West Asia is projected to increase 3.0 percent annually, from 0.8 million to 1.3 million tons in 1980.

Table 29.--Summary of regression analysis of regional availability of oilcakes

Region	Time period	Durbin-Watson statistic	R^2	F-value	$\bar{S}$	Multiple regression 1/
1. South Africa, Australia-New Zealand	1955-66	2.608	.40	1.753	31.457	$Q_m^d = 24.95190 + 0.09593\ P_m - 0.00871\ Q_{prod}^{gr} + 6.29719\ T$ (0.77529) (0.75735) (1.32715)
1a. South Africa, Australia-New Zealand	1955-66	2.806	.52	4.881**	26.458	$Q_m^d = 4.39973 - 0.01445\ Q_{prod}^{gr} + 0.11594\ I$ (1.78272) (3.07314)
1b. South Africa, Australia-New Zealand	1955-66	1.980	.23	3.037	31.741	$Q_m^d = 74.01517 + 4.62587\ T$ (1.74277)
2. East Europe	1955-66	1.403	.86	15.818**	167.122	$Q_m^d = 1075.40276 - 0.32681 A^u + 0.09841\ Q_{prod}^{gr} + 128.94734 T$ (0.68947) (0.50274) (2.05316)
2a. East Europe	1955-66	1.57	.97	105.394**	69.121	$Q_m^d = -981.63360 + 0.23865\ A^u + 0.14628\ Q_{prod}^{gr} + 1.28097\ Q_{prod}^{m}$ (3.12365) (1.87191) (7.96307)
2b. East Europe	1955-66	1.093	.84	53.212**	156.532	$Q_m^d = 635.591112 + 95.48598\ T$ (7.29465)
2c. East Europe	1955-66	2.324	.93	37.115**	113.921	$Q_m^d = -1384.32522 + 10.80744\ P_m + 0.01641\ A^u + 6.72744\ I$ (2.49092) (0.05813) (2.27296)
3. USSR	1955-66	2.482	.61	4.213**	374.407	$Q_m^d = 7192.11218 - 1.12050\ A^u - 0.55047\ Q_{prod}^{gr} + 260.98164\ T$ (2.15285) (2.34638) (3.24827)
3a. USSR	1955-66	2.356	.98	223.012**	65.371	$Q_m^d = 1568.82002 - 0.74625\ A^u - 0.01006\ Q_{prod}^{gr} + 1.21059\ Q_{prod}^{m}$ (11.79873) (0.26435) (24.50600)
3b. USSR	1955-66	1.903	.19	2.278	485.422	$Q_m^d = 2984.56092 + 61.27268\ T$ (1.50944)
3c. USSR	1955-66	2.440	.34	1.372	488.724	$Q_m^d = 3058.32919 + 4.26590\ P_m - 0.73713\ A^u + 8.28233\ I_i$ (0.22965) (0.87719) (1.40469)
3d. USSR	1955-66	.900	.71	24.023**	291.612	$Q_m^d = 817.94966 + 0.74508\ Q_{prod}^{m}$ (4.90129)

--Continued

Footnote at end of table.

Table 29,--Summary of regression analysis of regional availability of oilcakes--Con.

Region	Time period	Durbin-Watson statistic	R^2	F-value	$\bar{S}$	Multiple regression 1/
4. Communist Asia	1955-66	0.856	.63	17.256**	144.358	$Q^d_m = 3661.28788 - 50.14685\ T$ (4.15403)
4a. Communist Asia	1955-66	1.627	.80	40.598**	105.951	$Q^d_m = 1745.51240 + 0.40220\ Q^m_{prod}$ (6.37173)
5. Latin America	1955-66	2.786	.33	2.232	160.995	$Q^d_m = 1150.23382 - 11.02295\ P_m + 0.29512\ I$ (1.47271) (2.08629)
5a. Latin America	1955-66	2.782	.37	2.638	156.355	$Q^d_m = 1947.26545 - 11.48017\ P_m + 49.06297\ T$ (1.59925) (2.27085)
5b. Latin America	1955-66	2.675	.19	2.352	168.092	$Q^d_m = 940.30309 + 21.5594\ T$ (1.53352)
6. Africa and West Asia	1955-66	1.704	.56	4.600**	72.399	$Q^d_m = 402.257 - 0.06733\ P_m + 0.12078\ I$ (0.02576) (2.76293)
6a. Africa and West Asia	1955-66	1.946	.45	7.990**	72.824	$Q^d_m = 303.709 + 0.18287\ Q^m_{prod}$ (2.82667)
6b. Africa and West Asia	1955-66	1.767	.51	10.251**	68.639	$Q^d_m = 643.54549 + 18.37762\ T$ (3.20172)
6c. Africa and West Asia	1955-66	1.694	.51	10.222**	68.687	$Q^d_m = 396.69937 + 0.12030\ I$ (3.19733)
7. Other Asia	1955-66	2.0724	.90	39.812**	243.868	$Q^d_m = 3859.75392 - 9.61858\ P_m + 228.03828\ T$ (1.01914) (8.59541)
7a. Other Asia	1955-66	2.30037	.89	35.266**	310.212	$Q^d_m = 95.17062 - 10.26349\ P_m + 0.89300\ I$ (1.02601) (8.08567)

** Represents significance at the 5-percent level.

$\bar{S}$ = Standard error of estimate.

1/ The figures in parenthesis below the partial regression coefficients are "t" values. See pages 81, 90, & 91 for discussion of the variables.

Table 30.--World oilseed meal consumption, 1963-65 average, and demand projections to 1980

Region	1963-65 1/ consumption	Percentage of world total	Projected 1980 consumption	Percentage of world total	Percentage increase	Annual growth rate
	1,000 metric tons	Percent	1,000 metric tons	Percent	Percent	Percent
U.S.	2/11,812	31.1	15,180	23.0	23.5	1.6
Canada	880	2.2	1,314	2.0	49.1	2.5
EC	5,249	13.4	10,429	15.8	95.7	4.4
UK	1,619	4.1	3,190	4.8	97.0	4.3
OWE	2,479	6.3	5,074	7.7	105.3	4.6
Japan	1,915	4.8	4,866	7.4	156.8	6.0
Australia, N. Zealand, & S. Africa	119	0.3	215	0.3	80.7	3.8
Total	3/24,575	62.2	40,268	61.0	66.9	3.2
E. Europe	1,623	4.1	3,024	4.6	86.3	4.0
USSR	3,768	9.5	6,348	9.6	68.5	3.3
Communist Asia	3,333	8.4	4,507	6.8	35.2	1.9
Total	8,724	22.0	13,879	21.0	59.1	3.0
Mexico, Central & South America	1,136	2.9	1,870	2.8	64.5	3.2
East, West, N. Africa & W. Asia	833	2.1	1,335	2.0	60.3	3.0
South, SE, East Asia & Pac. Is.	4,254	10.8	8,733	13.2	105.3	4.6
Total	6,223	15.8	11,938	18.0	91.8	4.1
World total	39,522	100.0	66,085	100.0	67.2	3.3

1/ All regions except U.S. are availabilities.
2/ Does not include stocks.
3/ Includes an allowance for U.S. stocks.

PART IV.--PROJECTED SUPPLY AND TRADE FOR OILSEEDS AND OILSEED PRODUCTS

11.--PRODUCTION PROJECTIONS

The degree of land, labor, capital, and management invested in increasing the production of a given commodity is determined primarily by the price producers expect to receive. Thus, one of the main procedures for influencing the production of agricultural products is through price support arrangements. Such supports also help stabilize producer incomes. The support prices of some of the major oils and oilseeds in certain countries are well above world prices, while in other countries, they are well below. To attempt to quantify the effects of these varying support prices would be a formidable task, especially since support prices, in some cases, are linked with production controls and in other cases, are financed by higher consumer prices. Also, changes in output are influenced by factors other than price; for example, by weather conditions, price changes in alternative crops, increased use of resources, and improvement in production techniques. Further compounding the difficulty of developing reasonable estimates of price elasticities of supply for oilseeds is the fact that oilseeds have joint product values that vary from commodity to commodity.

Even if price supply elasticities were available, their use for projecting oilseed production would be limited. Empirical data indicate that it is highly inaccurate to use the same elasticities for both increases and decreases in price (37, p. 42). This is especially true for tree crops such as olives and palms. For these crops, little disinvestment can be expected in response to declining prices. For annual crops, it is not unusual to find that a fall in price results in expanded production.

Because of these difficulties, this report makes no attempt to estimate the relationship between the price and supply of oilseeds. The oilseed production projections developed in this report were, in general, based on a trend analysis for the 14-year period 1955-68 for each oilseed in each region. For major commodities in regional production, a trend analysis for the 7-year period 1962-68 was also made.

The assumption underlining the projection of production by past trends is that the forces that influenced past movements in area and yield will continue to influence in the same direction and magnitude in the future. Therefore, the commodity trend extrapolations were modified for some regions and took into account expected changes in institutional and economic factors that affect the level of production. Also, oilseed production projections in FAO reports and individual country projection studies were carefully reviewed before a final regional production estimate was made.

Future production of the tree crops (oil palms and olive) depends primarily on the current number and age of trees and the replanting and rehabilitation levels that are expected to occur through 1977. While a trend analysis was made of the tree crops, the resulting projected production levels depended heavily on an analysis of the national targets and policies of the major producing countries.

The cottonseed production projections were based on the estimated levels of cotton production contained in a recent ERS report on world demand for cotton (43). For soybean production in the United States, a trend analysis of area and yield was made. Resulting projected soybean area was considered to be too high, especially in view of the 1968 reduction in the support price. Two reports by Houck and others of the University of Minnesota provided the framework for the U.S. soybean production level used in this report (31 and 32).

The equations regressing time on production for each oilseed produced in each region are contained in table 32. After the oilseed production estimates (table 33) were made, they were converted into oil and meal equivalents; that is, the percentage of the crop

crushed plus the percentage of oil yield and meal yield in each oilseed. Conversion factors were the same as those used for the historical demand and production analyses. The use of historical conversion factors for the 1980 production estimates may be questionable since these factors are almost certain to change to some degree by 1980. But, no basis could be found for projecting 1980 factors with confidence. Thus, the conversion factors represent some of the underlying assumptions that may be changed as a result of technological developments, new information, or new policies, and that may require the projections to be amended accordingly.

Vegetable Oils

World vegetable oil production is projected to increase from an average of 18.4 million tons in 1963-65 to 31.7 million tons by 1980, an annual increase of 3.5 percent (table 34). Production is projected to increase by 3.8 percent a year in the developed countries, 3.4 percent in the central plan countries, and 3.3 percent in the less developed countries. The regions with the fastest annual rates of increase on a percentage basis are projected to be Australia-New Zealand, 19.0 percent; Canada, 8.2 percent; South America, 5.1 percent; Eastern Europe, 5.1 percent; and North Africa and West Asia, 4.3 percent. The regions with the largest projected annual quantity increases are the United States, 3.8 million tons; East Asia and Pacific Islands, 1.7 million tons; USSR, 1.6 million tons; South Asia, 1.3 million tons; and South America, 1.0 million tons.

On a commodity basis, the greatest annual rates of increase are expected to be for rapeseed oil, 4.7 percent; soybean oil, 4.5 percent; palm oil, 4.3 percent; and sunflowerseed oil, 4.1 percent. Olive oil production is projected to increase 1.4 percent annually; palm kernel oil, 1.8 percent; cottonseed oil, 2.8 percent; and peanut oil, 3.4 percent. The vegetable oils with the greatest projected annual quantity increases are soybean, 3.8 million tons; sunflower, 2.2 million tons; peanut, 1.9 million tons; and cottonseed, 1.4 million tons. Rapeseed, palm, and coconut are all projected to increase by around 1.2 million tons.

Oilcakes

World oilcake production is projected to increase by an average annual rate of 3.4 percent during 1963-65 through 1980. For the developed countries, production is projected to increase by 3.6 percent annually, compared with 3.1 percent for the central plan countries and 3.3 percent for the LDC's (table 35). The regions with the fastest annual growth rates are projected to be the EC, 6.7 percent; Eastern Europe, 5.0 percent; Canada, 4.1 percent; South Africa and Australia-New Zealand, 3.6 percent; and the United States, 3.6 percent. On a quantity basis, the regions with the largest annual increases are projected to be the United States, 14.0 million tons; Other Asia, 3.7 million tons; the USSR, 2.5 million tons; Africa and West Asia, 2.0 million tons; and Latin America, 1.8 million tons.

The oilcakes ranked in order of rate of increase are: rapeseed, sunflowerseed, soybean, peanut, cottonseed, copra, palm kernel, and linseed. The four oilcakes with the greatest projected increase in quantity are soybean, 15.3 million tons; sunflowerseed, 3.2 million tons; cottonseed, 3.1 million tons; and peanut, 2.7 million tons. These four oilcakes accounted for 88 percent of the total projected increase, leaving 12 percent of the increase for the remaining four oilcakes. Soybean meal alone accounted for 56 percent of the total projected increase in oilcake production.

Competing Products

Although projections of animal fat and marine oil production are not developed in this report, an appraisal of the probable trends is necessary to evaluate the price pressures they may bring to bear on vegetable oils.

From 1955-57 through 1966-68, world butter production increased by 1.8 percent a year. FAO's report on commodity projections (14) projects butter production to increase 2.2 percent a year during 1961-63 through 1975. An OECD report (47) that makes a rather detailed analysis of the livestock economies of member countries projects butter fat production to increase by only 1.2 percent per year from 1961-63 through 1985. The OECD countries presently produce around 60 percent of the world's butter. The central plan region's major butter-producing country, Russia, presently has a butter surplus and is not expected to increase production above past trends. In view of this and the findings of the OECD report, it would appear that the rate of increase for world production through 1980 will not exceed the past rate of 1.8 percent a year.

World lard production from the mid-1950's through 1966-68 also increased at a rate of 1.8 percent a year. The above cited FAO study (14) projects lard production to increase by some 2 percent through 1975. The report on the OECD countries projects pork production in member countries to increase 2 percent a year through 1985. In view of the trend toward meat-type hogs, however, lard production would be expected to increase at a rate lower than this. It is noted that the FAS 1970 estimate of world lard production is below the production level of 1968 and above 1969's (66). As with butter, it appears that the rate of increase in lard production through 1980 will probably not exceed the past growth rate of 1.8 percent.

Total world whale oil production trended steadily downward during the period of review, 1955-57 through 1966-68. Fish oil, however, trended sharply upward. As a result, marine oils increased at an annual rate of 2.5 percent.

The decline in whale oil production is expected to continue through 1980, but at a lower rate than in the past. In 1969, because of declining whale numbers, the International Whaling Commission reduced the 1969-70 Antarctica season quota on blue whales by 15 percent, while the North Pacific Whaling Commission reduced the 1969 sperm whale quota by 10 percent from the 1968 level (65).

Fish oil production is not expected to attain its past rate of increase, a large part of which was due to the rapid development of Peru's fishmeal industry. However, Peru's Sea Institute has indicated that in 1967 and 1968, the catch of anchovy, the main fish caught by Peru's fishing fleet, was at a level that impaired the reproduction ability of the anchovy. It appears unlikely, therefore, that fish oil production through 1980 will exceed the past annual rate of increase of 2.5 percent.

Fishmeal and urea are major competitors of oilcake as a high-protein supplement to animal feedstuffs at present. The use of fishmeal has expanded greatly since 1955, primarily because of its high portion of protein and relatively low price in relation to oilcakes. But fishmeal production is not expected to continue in line with past trends. The big growth in production is primarily attributable to Peru. But Peru, according to its Sea Institute, has already attained a level of fishmeal production that should not be exceeded if the fish resources are not to be depleted. Extended deep sea fishing is much more expensive than fishing in nearby waters.

Under the assumption that butter and lard production will increase by around 1.8 percent a year and marine oils by 2.5 percent a year through 1980, the weighted average increase for the three commodities is 1.9 percent. There will, of course, be wide regional differences with regard to production and availability of these oils and fats.

But, in general, the world availability of animal fats and marine oils, which compete with vegetable oils, are not expected to increase through 1980 at a rate in excess of the 1955-68 trend. Thus, the above competing products are not expected to bring greater pressure on vegetable oil prices than they have in the past--and may bring even less.

Urea is a synthetic nitrogenous compound that is convertible into protein by bacterial action in ruminant animals. To be of value, it must be fed with fermentable carbohydrates such as the starches in grain or the sugar in molasses. It may contribute only up to one-third of the protein equivalent in finishing rations or one-fourth in growing rations. One ton of food-grade urea combined with 6 tons of cereal grain provides the same amount of protein and nearly as much energy as 7 tons of soybean or cottonseed meal (10, chap. 2, p. 129). The use of urea has been especially prominent in the United States, where it is fed primarily to cattle. Its limited use in Europe and Japan to date is due in part to the lack of a significant feedlot fattening industry in these countries. In some European countries, urea use is regulated by law; for example Germany prohibits the sale of feed urea to farmers. However, in the years ahead the use of urea in oilcake-importing regions, especially countries which produce substantial quantities of grain, is expected to increase.

By 1980, oilcakes could well be facing substantial competition from products that are presently of minor importance. For instance, the economic feasibility of producing animal feed protein from petroleum cultures has been receiving increasing attention, especially in Europe and Japan. As of 1970, the use of such protein has been limited to experimental trials. Also, substantial production of high-lysine corn for animal feed could reduce the future market for oilcakes. Some types of high-lysine corn have a protein content of 15 percent, compared with some 9 percent for ordinary corn. High-lysine corn is expected to find its greatest use in feed for swine and to a lesser degree, in poultry rations. A major factor determining the economic feasibility of substituting high-lysine corn for oilcakes will be the high-lysine corn yield attained in relation to regular corn.

At present, data are not available that would permit quantification of the effects of the above two products. But it appears to be a safe assumption that they will have some retarding effect on the growth of oilcake demand through 1980.

Another oilcake substitute product that has been receiving increasing attention in recent years is Antarctic krill, which is used for making fishmeal. The shrimp-like krill, which are only 1 or 2 inches long at maturity, are consumed in mass by whales. The reduction in whale numbers in recent years raises the question of whether the krill themselves can be profitably harvested, processed into fishmeal by factory ships, and then transported to the principal markets. It appears that to be economically feasible, fishmeal prices would have to rise above the prices prevailing in the late 1960's (49).

Table 31.--Levels at which producer prices for selected oilseeds, oils, and fats were stabilized or supported, 1962-67

Commodity and country	Unit	1962	1963	1964	1965	1966	1967	1962	1963	1964	1965	1966	1967
		Price in national currency						U.S. dollars per quintal (100 kg.)					
Soybeans:													
Import prices 1/	L/2240 lbs.	36.5	39.9	40.1	42.3	46.0	41.7	10.06	11.00	11.05	11.66	12.68	11.48
Argentina	P./Q.	--	--	1,200	1,400	2,300	2,800	--	--	8.41	8.13	10.78	8.00
Brazil	Cr./60 kg.	--	--	6,100	6,870	8,700	--	--	--	5.78	5.99	6.53	--
Canada	C $/bu.	2.14	2.15	2.15	--	--	--	7.35	7.32	7.33	--	--	--
Ecuador	S./46 kg.	--	70	90	90	90	--	--	7.57	10.52	10.49	9.81	--
Colombia	P./m.t.	800	1,200	1,460	1,460	1,460	--	8.52	12.01	13.64	8.30	8.76	--
Japan	Y./60 kg.	3,200	3,310	3,510	3,700	--	--	14.81	15.32	16.25	17.13	--	--
Korea, Republic of	Won/60 kg.	1,350	1,730	1,730	--	--	--	17.31	22.18	12.89	--	--	--
Nigeria	L/ton	--	--	24.85	24.85	24.85	--	--	--	6.85	6.85	6.85	--
Paraguay	Gs./10 Kg.	96	96	97	80	--	--	7.62	7.62	7.70	6.35	--	--
United States	$/bu.	2.25	2.25	2.25	2.25	2.50	2.50	8.27	8.27	8.27	8.27	9.19	9.19
Yugoslavia	D/kg.	85	85	145	145	145	--	11.33	11.33	16.00	11.60	11.60	--
Peanuts:													
Import prices 2/	L/2240 lbs.	62.0	62.5	67.8	74.9	67.8	66.4	17.09	17.22	18.68	20.64	18.68	18.31
Argentina, shelled	P./Q.	1,100	1,350	1,700	1,900	2,700	3,100	9.7	9.61	11.92	13.72	12.66	8.86
Ceylon	Rs./cwt.	49.28	49.28	49.28	49.28	49.28	--	20.37	20.37	20.37	20.37	20.37	--
Dahomey	CFA Fr./kg.	15.50	16.00	15.50	15.00	15.00	--	6.28	6.48	6.28	6.07	6.07	--
Ecuador	S./46 kg.	130	150	150	150	150	--	12.38	16.22	17.54	17.49	16.35	--
Gambia	L/2240 lbs.	27	27	27	28	--	--	7.44	7.44	7.44	7.70	--	--
Israel, shelled	IL/ton	619	703	750	--	--	--	20.63	23.43	25.00	--	--	--
Madagascar	FMG/kg.	--	25.00	25.00	25.00	27.00	--	--	10.13	10.13	10.13	10.94	--
Niger, shelled	CFA Fr./kg.	22.00	21.45	22.00	--	21.80	--	8.91	8.69	8.91	--	8.83	--
Nigeria	L/ton	43.60	40.25	42.72	42.56	42.56	38.35	12.02	11.09	11.77	11.73	11.73	10.57
Senegal	CFA Fr/kg.	22.75	22.75	22.75	22.75	22.75	--	9.21	9.21	9.21	9.21	9.21	--
Togo	CFA Fr./kg.	29	30	30	30	--	27	11.75	12.25	12.15	12.15	--	10.94
United States	¢/lb.	11.07	11.20	11.20	11.20	11.35	11.35	24.40	24.69	24.69	24.69	25.02	25.02
Upper Volta	CFA Fr./kg.	28.75	27.75	26.75	26.75	26.75	--	11.65	11.24	10.84	10.84	10.84	--
Cottonseed:													
Import prices 3/	L/2240 lbs.	32.0	33.5	36.5	37.9	37.7	--	8.82	9.23	10.00	10.44	10.39	--
United Arab Republic	P./121.3 kg.	80	--	--	--	--	--	16.48	--	--	--	--	--
United States	$/short ton	48	44	44	43	48	48	5.29	4.85	4.85	4.74	5.29	5.29

Footnotes at end of table

--Continued

Table 31.--Levels at which producer prices for selected oilseeds, oils, and fats were stabilized or supported, 1962-67--Con.

Commodity and country	Unit	Price in national currency						U.S. dollars per quintal (100 kg.)					
		1962	1963	1964	1965	1966	1967	1962	1963	1964	1965	1966	1967
Rapeseed:													
Import price 4/	L/2240 lbs.	38.6	44.0	--	44.8	47.2	45.3	10.64	12.13	--	12.35	13.01	12.48
France	Fr./100 kg.	--	--	80	80	--	--	--	--	16.20	16.20	--	--
Germany, Fed. Rep.	DM/m.t.	660	--	--	--	--	--	16.50	--	--	--	--	--
Netherlands	Fe/100 kg.	--	--	--	58	59	--	--	--	--	16.02	16.30	--
EC	U.S. $/100 kg.	--	--	--	--	--	20.25	--	--	--	--	--	20.25
Ceylon	Rs./cwt.	54	54	54	54	54	--	22.32	22.32	22.32	22.32	22.32	--
Denmark	Kr./kg.	.80	.70	.70	.70	.70	.70	11.58	10.14	10.14	10.14	10.14	--
Japan	Y/60 kg.	3,180	3,360	3,490	3,620	--	--	14.72	15.55	16.16	16.76	--	--
Poland	Zl./q.	800	800	800	--	--	--	26.66	26.66	26.66	--	--	--
Yugoslavia	D./kg.	72	72	85	120	120	--	9.60	9.60	11.33	9.60	9.60	--
Sunflowerseed:													
France	Fr./100 kg.	--	--	80	80	80	--	--	--	16.20	16.20	16.20	--
EC	US $/100 kg.	--	--	--	--	--	20.25	--	--	--	--	--	20.25
Argentina	P./q.	740	1,100	1,400	1,400	2,000	2,000	6.16	7.38	9.82	8.13	9.38	5.71
Canada	C. $/lb.	0.0422	0.0422	--	--	--	--	8.70	8.63	--	--	--	--
Yugoslavia	D./kg.	62	62	85	120	120	120	8.27	8.27	11.33	9.66	9.60	9.60
Palm Kernels:													
Import price 5/	L./2,400 lbs.	49.5	55.5	54.7	65.0	56.4	56.6 6/	13.64	15.29	15.07	17.91	15.54	15.60
Congo (Brazzaville)	CFA Fr./kg.	24	24	24	24	--	--	9.72	9.72	9.72	9.72	--	--
Congo, Dem. Rep.	Fr./C/kg.	32.00	32.00	32.00	32.00	32.00	--	--	--	--	--	--	--
Gambia	L/2,400 lbs.	30	30	30	30	30	--	8.27	8.27	8.27	8.27	8.27	--
Ghana	L./ton	36	33	37	--	--	--	8.47	9.26	10.29	--	--	--
Nigeria	L./long ton	27	28	28	28	27	27	7.44	7.72	7.72	7.72	7.44	7.44
Sierra Leone	L./ton	39	35	36	36	36	--	10.89	9.85	10.07	10.07	10.07	--
Togo	CFA Fr./kg.	--	22	21	21	21	21	--	9.11	8.51	8.51	8.51	8.51
Olive Oil:													
Import price 7/	L./m.t.	--	381.5	230.1	250.4	247.4	253.4 6/	--	106.82	64.43	70.11	69.27	70.54
Greece	Dr./kg.	16.50	18.50	19.50	20.00	21.00	21.00	54.00	61.67	63.33	66.67	70.00	70.00
Libya	LL/q.	--	21,000	21,000	22,000	22,000	--	--	58.80	58.80	61.61	61.61	--
Portugal	Es./liter	13.28	13.28	13.00	15.40	15.40	--	46.19	46.19	45.21	53.56	53.56	--
Spain	P./kg.	25.00	26.50	29.50	32.50	32.50	--	41.68	44.18	49.18	54.18	54.18	--
Tunisia	D/kg.	0.18	0.18	0.18	0.18	0.18	0.18	42.86	42.86	40.39	34.62	34.62	34.62

Footnotes at end of table.

--Continued

Table 31.--Levels at which producer prices for selected oilseeds, oils, and fats were stabilized or supported, 1962-67--Con.

Commodity and country	Unit	1962	1963	1964	1965	1966	1967	1962	1963	1964	1965	1966	1967
		Price in national currency						U.S. dollars per quintal (100 kg.)					
Butter and butterfat:													
Import price 8/	Shilling/112 lbs.	325	374	387	368	363	372	90.00	103.00	107.00	102.00	100.00	103.00
Australia	A ¢/lb.	40.6	40.6	40.6	40.6	40.6	40.6	100.25	100.25	100.25	100.25	100.25	100.25
Belgium	F/kg.	82.60	87.30	97.50	97.50	97.50	--	165.20	174.60	195.00	195.00	195.00	--
Canada	C $/lb.	0.64	0.64	0.64	0.53	0.57	0.57	131.97	130.82	108.36	116.59	120.89	124.08
Denmark	Kr./kg.	7.50	8.00	8.50	9.00	9.40	--	108.60	115.84	123.08	130.32	136.05	--
France	Fr./kg.	--	--	--	8.15	8.30	--	--	--	--	165.08	168.12	--
Ireland	S./cwt.	469	469	469	469	469	--	129.25	129.25	129.25	129.25	129.25	--
Japan	Y./kg.	478	478	600	600	600	--	132.74	132.74	166.62	166.62	166.62	--
New Zealand	d/lb.	32.0	33.5	33.9	33.9	33.9	--	81.72	85.54	86.57	86.57	86.57	--
Switzerland	Fr./kg.	--	10.73	11.10	11.10	--	--	--	248.43	256.94	256.94	--	--
United States	$/lb.	0.57	0.58	0.58	0.59	0.64	--	126.10	128.01	127.87	130.95	149.91	--

1/ United Kingdom: American No. 2, yellow, bulk, nearest forward shipment, c.i.f.
2/ European ports: Nigerian, shelled, nearest forward shipment, c.i.f.; from Dec. 1963, resellers, cash on arrival.
3/ European ports: Sudanese, nearest forward shipment, c.i.f.; 1961 through March 1964, black, bulk; from July 1963 through March 1964, Gezira Board; from May 1964, Gezira type, 23 percent.
4/ European ports: Canadian No. 1, nearest forward shipment, c.i.f., London.
5/ European ports: Nigerian, nearest forward shipment, c.i.f.; from Jan. 1964, net, resellers, cash on arrival.
6/ Jan. - Oct. only.
7/ European ports: Tunisian, edible, 1 percent, drams, c.i.f.
8/ United Kingdom: Danish, salted, spot price, London: through 1961, Ministry of Food first-hand selling price

Source: Food and Agricultural Organization of the United Nations, "Development in Agricultural Price Stabilization and Support Policies, 1961-66" (ccp: 67/9).

Table 32.--Linear trends fitted to regional oilseed production and 1980 production estimates

Region and item 1/	Trend analysis 2/		Time period	1980 trend estimate 3/	1980 adjusted estimate 3/
	Constant	Coefficient			
United States:					
Peanuts (1,000 acres)	1,440.1	-9.1	1955-68	1,280	
Peanuts (1,000 acres)	1,420.0	5.04	1962-68	1,482	1,450
Peanuts (lbs./acre)	1,339.4	33.2	1955-68	2,499	
Peanuts (lbs./acre)	1,574.0	92.0	1962-68	2,871	2,510
Soybeans (1,000 acres)	28,272.6	843.7	1955-68	57,803	
Soybeans (1,000 acres)	34,062.4	2400.4	1962-68	67,668	49,000
Soybeans (bu./acre)	23.9	0.15	1955-68	26.6	
Soybeans (bu./acre)	24.6	0.36	1962-68	29.7	29.7
Flaxseed	757.7	-13.1	1955-68	515	585
Canada:					
Soybeans	185.5	6.5	1955-68	299	300
Rapeseed	274.1	36.0	1955-68	904	900
Rapeseed	386.7	67.9	1962-68	1,337	
Sunflowerseed	12.6	0.85	1962-68	28	30
Flaxseed	518.4	5.7	1955-68	412	450
EC:					
Peanuts	9.8	-0.4	1955-68	3	3
Rapeseed	311.9	33.3	1955-68	*928	
Rapeseed	428.6	63.3	1962-68	*1,378	*1,200
Sunflowerseed	19.2	1.6	1955-68	47	50
Olive Oil	350.2	16.2	1955-68	633	600
Flaxseed	70.0	1.6	1955-68	100	100
O.W.E.:					
Peanuts	13.5	-0.13	1955-68	11	15
Rapeseed	200.1	11.4	1955-68	*412	
Rapeseed	242.7	15.1	1962-68	*521	*500
Sunflowerseed	2.7	0.45	1955-68	9	10
Olive Oil	587.6	5.4	1955-68	682	650
Flaxseed	7.6	-0.63	1955-68	0	0
Japan:					
Rapeseed	200.1	-20.0	1955-68	0	0
Flaxseed	3.1	-0.17	1955-68	0	0

Footnotes at end of table.

--Continued

Table 32.--Linear trends fitted to regional oilseed production and 1980 production estimates--Con.

Region and item 1/	Trend analysis 2/		Time Period	1980 trend estimate 3/	1980 adjusted estimate 3/
	Constant	Coefficient			
Central America & Mexico:					
Peanuts	159.6	+2.6	1955-68	204	200
Rapeseed	6.4	-0.8	1955-68	4	5
Soybeans	57.1	19.2	1955-68	393	450
Soybeans	86.4	34.5	1962-68	569	
Copra	208.6	3.6	1955-68	*276	*275
Palm kernels	24.9	0.7	1955-68	*39	*40
Palm oil	20.7	1.1	1955-68	*41	*40
Flaxseed	17.8	0.1	1955-68	21	21
South America:					
Peanuts	832.4	60.8	1955-68	*1,956	*1,900
Rapeseed	39.2	5.0	1955-68	127	100
Soybeans	366.7	55.7	1955-68	*1,397	
Soybeans	563.6	78.8	1962-68	*1,746	*1,500
Sunflowerseed	815.6	33.7	1955-68	*1,438	
Sunflowerseed	909.3	86.[illegible]	1962-68	*2,205	*1,800
Copra	14.9	0.3	1955-68	*21	*20
Olive oil	8.0	0.4	1955-68	*15	*13
Palm kernels	192.2	8.2	1955-68	*280	*300
Palm oil	3.8	0.4	1955-68	*12	*90
Flaxseed	727.4	0.6	1955-68	740	740
East and West Africa:					
Peanuts	3,900.6	129.9	1955-68	6,173	
Peanuts	4,421.0	39.1	1962-68	4,968	6,400
Rapeseed	10.4	-1.4	1955-68	0	--
Soybeans	27.3	-0.5	1955-68	36	35
Sunflowerseed	36.6	2.2	1955-68	76	75
Copra	137.1	1.7	1955-68	*169	*200
Palm kernels	775.7	-15.0	1955-68	*498	*890
Palm oil	945.4	-14.6	1955-68	*675	
Palm oil	893.3	-31.2	1962-68	*426	*1,450
Flaxseed	51.1	0.5	1955-68	60	65

Footnotes at end of table.

--Continued

Table 32.--Linear trends fitted to regional oilseed production and 1980 production estimates--Con.

Region and item 1/	Trend analysis 2/		Time Period	1980 trend estimate 3/	1980 adjusted estimate 3/
	Constant	Coefficient			
Australia-New Zealand:					
Peanuts	21.8	1.46	1955-68	47	50
Flaxseed	23.0	1.79	1955-68	36	35
South Africa:					
Peanuts	216.2	7.2	1955-68	343	340
Sunflowerseed	85.0	2.0	1955-68	120	120
Eastern Europe:					
Rapeseed	559.8	53.1	1955-68	*1,489	*1,400
Soybeans	20.8	0.9	1955-68	36	
Soybeans	23.1	7.0	1962-68	121	100
Sunflowerseed	1,071.9	74.2	1955-68	2,370	
Sunflowerseed	1,339.0	81.2	1962-68	2,476	2,200
Flaxseed	99.9	3.9	1955-68	179	175
USSR:					
Rapeseed	14.7	-1.8	1955-68	0	
Soybeans	332.6	36.4	1955-68	970	
Soybeans	472.9	30.5	1962-68	899	900
Sunflowerseed	4,395.9	239.3	1955-68	8,583	
Sunflowerseed	5,255.1	337.7	1962-68	9,983	8,000
Flaxseed	500.4	2.7	1955-68	550	550
Communist Asia:					
Peanuts	2,321.1	-52.4	1955-68	1,404	
Peanuts	2,162.1	102.4	1962-68	3,596	3,600
Rapeseed	754.6	-18.7	1955-68	427	
Rapeseed	677.9	45.9	1962-68	1,320	1,000
Soybeans	8,113.9	-234.3	1955-68	4,012	
Soybeans	7,188.9	-137.4	1962-68	5,264	10,000
Sunflowerseed	63.6	0.7	1955-68	76	90

Footnotes at end of table.

---Continued

Table 32,--Linear trends fitted to regional oilseed production and 1980 production estimates--Con.

Region and item 1/	Trend Analysis 2/		Time Period	1980 trend estimate 3/	1980 adjusted estimate 3/
	Constant	Coefficient			
North Africa and West Asia:					
Peanuts	306.3	22.7	1955-68	704	750
Peanuts	395.3	9.6	1962-68	530	
Rapeseed	4.7	0.3	1955-68	15	15
Soybeans	4.8	0.6	1955-68	6	10
Sunflowerseed	139.1	4.4	1955-68	280	
Sunflowerseed	158.9	27.5	1962-68	544	440
Olives	220.5	4.8	1955-68	305	
Olives	229.6	6.8	1962-68	325	310
Flaxseed	54.0	-0.2	1955-68	50	50
South Asia:					
Peanuts	4,868.6	77.5	1955-68	6,225	9,625
Peanuts	5,114.6	28.3	1962-68	5,511	
Rapeseed	1,492.3	34.7	1955-68	2,099	2,500
Copra	780.3	-12.8	1955-68	*1,017	1,000
Flaxseed	403.3	-0.1	1955-68	401	400
Southeast Asia:					
Peanuts	484.1	19.8	1955-68	830	850
Soybeans	37.4	0.3	1955-68	43	50
Copra	237.4	0.5	1955-68	*227	250
East Asia and Pacific Is.:					
Peanuts	472.6	14.6	1955-68	728	725
Rapeseed	7.9	1.0	1955-68	26	25
Soybeans	613.9	11.9	1955-68	822	850
Copra	2,975.1	59.6	1955-68	*4,078	
Copra	3,232.3	17.6	1962-68	*3,496	*4,900
Palm kernels	64.4	2.6	1955-68	*112	*150
Palm oil	273.6	-14.5	1955-68	*543	
Palm oil	323.3	28.9	1962-68	*756	*900

1/ Except for the U.S., unit is 1,000 metric tons. 2/ t = 0 at midyear. 3/ Mainly 1979 production which will be crushed in 1980 unless designated by an asterisk (see app. table B-27 for allocation of oilseed year).

Table 33.--Production of oilseeds, by region, average 1963-65, and projections for 1980

Region	Cottonseed		Peanuts		Rapeseed		Soybeans		Sunflowerseed	
	1963-65	1980	1963-65	1980	1963-65	1980	1963-65	1980	1963-65	1980
	1,000 metric tons									
United States	5,596	6,274	999	1,765	--	--	20,376	39,695	--	--
Canada	--	--	--	--	334	900	182	300	15	30
EC	10	--	10	3	357	1,200	--	--	31	50
O.M.E.	327	384	13	15	239	500	--	--	3	10
South Africa	31	48	216	340	--	--	--	--	83	120
Australia-New Zealand	9	78	21	50	--	--	--	--	--	--
Eastern Europe	30	45	2	--	571	1,400	10	100	1,110	2,400
USSR	3,338	4,863	--	--	5	--	376	900	4,359	8,000
Communist Asia	2,716	4,116	2,164	3,600	633	1,000	7,151	10,000	66	99
Mexico & Central America	1,295	1,416	161	200	6	5	40	450	--	--
South America	1,781	2,962	1,020	1,900	54	100	450	1,500	667	1,800
East and West Africa	833	2,032	4,410	6,000	5	--	30	35	42	75
North Africa and West Asia	2,429	4,510	400	750	7	15	5	10	150	440
South Asia	3,190	5,714	5,136	9,625	1,550	2,500	--	100	--	--
Southeast Asia	73	128	495	850	--	--	40	50	--	--
East Asia & Pac. Is.	13	8	516	725	21	25	594	850	--	--
Total	21,671	32,578	15,563	25,823	3,782	7,995	29,254	55,210	6,526	13,024

Table 34.--World production of vegetable oil, by region and commodity, oil-equivalent basis, average 1963-65, and projections to 1980, and annual rate of change

Region	Cottonseed Oil			Peanut Oil			Rapeseed Oil			Soybean Oil			Sunflowerseed Oil		
	1963-65	1980	Annual rate of change	1963-65	1980	Annual rate of change	1963-65	1980	Annual rate of change	1963-65	1980	Annual rate of change	1963-65	1980	Annual rate of change
	1,000 metric tons		Percent	1,000 metric tons		Percent	1,000 metric tons		Percent	1,000 metric tons		Percent	1,000 metric tons		Percent
United States	881	1,013	.9	64	158	5.8	--	--	--	3,321	6,828	4.6	--	--	--
Canada	--	--	--	--	--	--	65	281	9.6	26	46	3.6	4	9	5.2
EC	2	--	--	1	--	--	112	376	7.8	--	--	--	11	16	2.4
U.S.S.R.	50	52	.2	3	3	--	76	159	4.7	--	--	--	1	5	10.6
South Africa	4	7	2.1	40	74	3.0	--	--	--	--	--	--	26	34	1.7
Australia-New Zealand	1	11	2/	1	21	7.1	--	--	--	--	--	--	--	--	--
Japan	--	--	--	--	--	--	39	--	--	--	--	--	--	--	--
United Kingdom	--	--	--	--	--	--	2	--	--	--	--	--	--	--	--
Total	936	1,063	.9	115	256	4.8	294	816	6.6	3,347	6,874	4.6	42	64	2.7
Eastern Europe	4	7	3.6	--	--	--	179	439	5.8	1	9	14.7	371	789	4.5
CCCR	442	703	3.0	--	--	--	2	--	--	30	68	5.2	1,685	3,095	3.5
Communist Asia	98	165	3.3	301	558	3.9	199	315	2.9	503	342	-2.4	20	31	2.8
Total	544	875	3.0	301	558	3.9	380	754	4.4	534	419	-1.5	2,076	3,915	4.0
Mexico and Central America	182	255	2.1	7	8	.6	2	2	--	2	36	20.0	--	--	--
South America	218	365	3.6	219	408	4.0	17	39	5.3	38	127	7.8	210	567	6.4
East and West Africa	102	274	6.4	852	1,215	2.2	2	--	--	2	2	--	13	24	3.9
North Africa and West Asia	292	649	5.1	75	152	4.5	2	4	4.4	1	2	4.4	36	140	8.9
South Asia	193	316	3.2	1,120	2,021	3.3	349	563	3.0	--	--	--	--	--	--
Southeast Asia		17	4.8	23	37	3.0	--	--	--	3	3	--	--	--	--
East Asia and Pacific	2	2	--	23	34	2.4	6	7	1.0	5	7	2.1	--	--	--
Total	997	1,980	4.1	2,319	3,875	3.3	378	615	3.1	51	177	8.1	259	731	6.7
World Total	2,479	3,858	2.6	2,735	4,689	3.4	1,052	2,185	4.7	3,932	7,470	4.1	2,377	4,710	4.1

Footnotes at end of table

--Continued

Table 34.--World production of vegetable oil, by region and commodity, oil equivalent basis, average 1963-65, and projections to 1980, and annual rate of change--Con.

Region	Palm Kernel Oil			Coconut Oil			Palm Oil			Olive Oil			Total		
	1963-65	1980	Annual rate of change	1963-65	1980	Annual rate of change	1963-65	1980	Annual rate of change	1963-65	1980	Annual rate of change	1963-65	1980	Annual rate of change
	1,000 metric tons		Percent	1,000 metric tons		Percent	1,000 metric tons		Percent	1,000 metric tons		Percent	1,000 metric tons		Percent
United States	--	--	--	--	--	--	--	--	--	1	--	--	4,267	7,999	4.0
Canada	--	--	--	--	--	--	--	--	--	--	--	--	95	336	8.2
EC	--	--	--	--	--	--	--	--	--	386	630	2.2	512	992	4.2
Other	--	--	--	--	--	--	--	--	--	580	650	.7	710	869	1.3
South Africa	--	--	--	--	--	--	--	--	--	--	--	--	76	115	2.6
Australia-New Zealand	--	--	--	--	--	--	--	--	--	--	--	--	2	32	19.0
Japan	--	--	--	--	--	--	--	--	--	--	--	--	39	--	--
United Kingdom	--	--	--	--	--	--	--	--	--	--	--	--	2	--	--
Total	--	--	--	--	--	--	--	--	--	967	1,250	1.6	5,703	10,343	3.8
Eastern Europe	--	--	--	--	--	--	--	--	--	6	6	--	561	1,250	5.1
USSR	--	--	--	--	--	--	--	--	--	--	--	--	2,159	3,866	3.7
Communist Asia	--	--	--	--	--	--	--	--	--	--	--	--	1,121	1,441	1.6
Total	--	--	--	--	--	--	--	--	--	6	6	--	3,841	6,557	3.4
Mexico and Central America	13	16	2.1	135	162	1.1	24	40	3.2	--	--	--	365	521	2.2
South America	72	135	4.0	10	12	1.1	6	93	18.5	10	13	1.7	800	1,776	5.1
East and West Africa	352	456	.8	88	124	2.2	937	1,450	2.8	--	--	--	2,348	3,489	2.5
North Africa and West Asia	--	--	--	--	--	--	--	--	--	236	310	1.4	642	1,257	4.3
South Asia	--	--	--	514	620	1.2	--	--	--	--	--	--	2,176	3,522	3.1
Southeast Asia	--	--	--	115	122	.4	--	--	--	--	--	--	149	179	1.1
East Asia & Pacific Is.	23	67	5.4	2,004	3,038	2.6	230	900	7.3	--	--	--	2,359	4,055	3.4
Total	460	674	2.6	2,866	4,078	2.2	1,257	2,483	4.3	246	329	1.7	8,839	14,799	3.3
World total	460	674	2.6	2,866	4,078	2.2	1,257	2,483	4.3	1,219	1,579	1.6	18,383	31,699	3.5

1/ Over 15 percent.

Table 35.--World production of oilcakes by region and commodity, meal-equivalent basis average 1963-65, and projections to 1980, and annual rate of change

Region	Copra Meal			Palm Kernel Meal			Cottonseed Meal			Peanut Meal			Linseed Meal		
	1963-65	1980	Annual rate of change	1963-65	1980	Annual rate of change	1963-65	1980	Annual rate of change	1963-65	1980	Annual rate of change	1963-65	1980	Annual rate of change
	1,000 metric tons		Percent	1,000 metric tons		Percent	1,000 metric tons		Percent	1,000 metric tons		Percent	1,000 metric tons		Percent
United States	--	--	--	--	--	--	2,409	2,771	.6	114	190	3.3	447	318	-2.1
Canada	--	--	--	--	--	--							254	215	-1.0
EC	--	--	--	--	--	--	4	--	--	1	--	--	39	46	1.0
United Kingdom	--	--	--	--	--	--									
O.W.E.	--	--	--	--	--	--	147	164	.7	4	5	1.4	3	--	--
Japan	--	--	--	--	--	--	--	--	--	--	--	--	2	--	--
South Africa, Australia-New Zealand	--	--	--	--	--	--	24	42	7.1	56	96	3.4	23	19	-1.2
Total	--	--	--	--	--	--	2,684	2,977	6.3	175	291	3.2	768	598	-1.6
Eastern Europe	--	--	--	--	--	--	12	18	2.6	--	--	--	52	88	3.3
USSR	--	--	--	--	--	--	1,257	1,861	2.6	--	--	--	226	286	1.5
Communist Asia	--	--	--	--	--	--	285	478	3.3	361	669	3.9	--	--	--
Total	--	--	--	--	--	--	1,554	2,377	2.7	361	669	3.9	278	374	1.9
Latin America	162	323	1.2	23	41	3.7	1,063	1,359	1.5	270	478	3.7	519	473	- .6
Africa and West Asia	45	64	2.2	382	434	.8	1,096	2,084	4.7	1,112	1,640	2.5	55	61	.6
Other Asia	1,655	2,369	2.3	35	81	5.4	601	1,978	3.7	1,959	3,451	3.6	--	234	--
Total	1,802	2,556	2.2	440	556	1.5	2,760	4,708	3.4	3,341	5,569	3.2	574	768	1.8
World total	1,802	2,556	2.2	440	556	1.5	6,978	10,062	2.3	3,877	6,529	3.3	1,620	1,740	0.5

--Continued

Table 35.--World production of oilcakes by region and commodity, meal-equivalent basis, average 1963-65, and projections to 1980, and annual rate of change--Con.

Region	Rapeseed Meal			Soybean Meal			Sunflowerseed Meal			Total		
	1963-65	1980	Annual rate of change	1963-65	1980	Annual rate of change	1963-65	1980	Annual rate of change	1963-65	1980	Annual rate of change
	1,000 metric tons		Percent	1,000 metric tons		Percent	1,000 metric tons		Percent	1,000 metric tons		Percent
United States	--	--	--	15,138	28,541	4.0	--	--	--	18,198	31,820	3.6
Canada	115	498	9.6	124	220	3.6	7	16	5.3	500	949	4.1
EC	199	669	7.9	--	--	--	19	27	2.2	262	742	6.7
United Kingdom	--	--	--	--	--	--	--	--	--	--	--	--
O.N.E.	134	280	4.7	--	--	--	1	5	10.5	289	454	2.9
Japan	68	--	--	--	--	--	--	--	--	70	--	--
South Africa, Australia-New Zealand	--	28	--	--	--	--	46	60	1.7	139	245	3.6
Total	516	1,475	6.8	15,262	28,801	4.0	73	108	2.5	19,458	34,210	3.6
Eastern Europe	318	780	5.8	5	45	14.7	658	1,338	4.5	1,045	2,269	5.0
USSR	4	--	--	140	319	5.3	2,270	3,912	3.5	3,897	6,398	3.1
Communist Asia	353	586	3.2	2,380	3,168	1.8	36	56	2.8	3,415	4,957	2.4
Total	675	1,366	4.5	2,525	3,532	2.2	2,964	5,306	3.7	8,357	13,624	3.1
Latin America	34	71	4.7	191	817	9.5	372	1,004	5.3	2,574	4,366	3.4
Africa and west Asia	8	10	1.4	16	19	1.1	87	293	7.9	2,801	4,295	3.4
Other Asia	1,016	1,633	3.0	150	234	2.8	--	--	--	5,416	9,080	3.5
Total	1,058	1,714	3.1	357	1,070	7.1	459	1,297	6.7	10,791	18,251	3.3
World total	2,249	4,722	4.7	18,144	33,377	3.9	3,496	6,711	4.2	38,606	66,085	3.4

12.--TRADE PROJECTIONS

The major objective of this study was to determine the future trade prospects for oilseed products of the LDC's. To assess these prospects, projections of prices, production, consumption, and trade were developed under three alternative assumptions: (1) Projection set I assumes a continuation of present production and trade policies (with some modification) and allows for moderate gains in productivity in the LDC's; (2) set II assumes that 1980 agricultural productivity and economic growth in the LDC's would be higher than projected under set I; and (3) set III assumes that 1980 agricultural productivity and economic growth in the LDC's would be lower than projected under set I. 18/ Economic development and agricultural productivity in the developed and central plan countries remain the same under all three projection sets.

In chapters 6 and 10, respectively, separate demand projections for vegetable oils and oilcake were made under the assumption that the 1963-65 price level would continue. In chapter 11, production projections were based on extrapolation of trends, with some modifications; thus, under the assumption that past trends in prices would continue. This meant upward trending prices for oilcakes but declining prices for vegetable oils. If the demand and production projections for all the regions are combined, a world surplus of 2 million tons of vegetable oil is projected to 1980, while projected production and consumption of oilcake are about in balance.

The trade projections under sets I, II, and III assume that world prices for oilcakes and vegetable oils will be at levels that will bring projected world demand into balance with projected world production. Equilibrium prices and quantities were estimated through a series of iterations or successive approximations.19/ In this approach, the demand and production projections as well as the assumptions about prices presented in chapters 6, 10, and 11 are used as initial values; they are successively adjusted until new equilibrium values are obtained for prices and quantities consistent with the assumptions specified in each projection set.

In all three projection sets, the production levels of the developed and central plan regions do not change. The production levels change only in the LDC's. However, in each projection set, consumption levels vary for all regions.

Projection Set I

The basic assumptions underlying set I projections are that there will be no substantial changes in national production and trade policies or in relative prices of substitute commodities. Under these assumptions and given the supply projections in chapter 11, oilcake prices are projected to remain at about the 1963-65 level. Vegetable oil prices, however, would be expected to decline about 20 percent below the 1963-65 level to keep world demand in balance with supply. This drop, equivalent to 1.1 percent a year, is in line with past trends in vegetable oil prices. For example, from 1955-57 through 1965-67, world vegetable oil prices, weighted by the quantity of trade of each oil in 1963-65, declined by some 15.7 percent, or 1.3 percent a year. During the same period, however, oilcake prices increased by 1.6 percent a year in response to growing demand.

18/ These assumptions are identical to those used in companion commodity studies. For more details concerning alternatives, see Rojko and Mackie (50, pp 16-19).

19/ If a complete mathematical model consisting of the appropriate supply and demand equations could have been specified, a computer could have been used to estimate a set of equilibrium values simultaneously for each alternative--sets I, II, and III. However, construction of such a model was not feasible in this study.

Production levels of oilseed products as shown in chapter 11 (which assumed continuation of past trends in prices) were also used in set I. It is assumed that increases in productivity will temper the rise in oilcake prices. It was not within the scope of this study to develop supply responses to price. If information on supply response had been available and incorporated into the estimation process, the overall projected level of prices might be somewhat higher, particularly oilcake prices.

Vegetable Oils

Relative to the demand projections developed in chapter 6, the 20-percent price drop in vegetable oils increased quantity demanded in the developed, central plan, and less developed regions by 3, 7, and 10 percent, respectively. The percentage increase is greatest for the LDC's because of their higher price response.

The above projections include the implicit assumption that concessional sales of vegetable oils will continue in line with those that prevailed during the historical period. As indicated on pages 10-11, U.S. PL 480 shipments of vegetable oil appear to have had a buoying effect on world vegetable oil prices. If concessional sales of vegetable oil, on a world basis, are greater by 1980 than they were during the 1960's, one could conclude that world prices would decline at a lesser rate than the projected rate of 20 percent under set I. This would require that the increase in concessional sales would not displace commercial trade.

Highlights of projected changes in regional net trade levels from 1963-65 through 1980 under projection set I are:

(1) In the less developed regions--

(a) South America would switch from an importing to an exporting region.

(b) The export availability from the East and West Africa region and the East Asia and Pacific Islands region would increase by around 1.0 and 2.1 percent a year, respectively.

(c) Import requirements of Japan, Central America and Mexico, North Africa and West Asia, and South Asia would increase substantially. 20/

(2) In the central plan regions--

(a) East Europe would continue to be a moderate net importer.

(b) The USSR, a major exporter of vegetable oils in the 1960's, would neither be an exporter nor an importer by 1980.

(c) Communist Asia would become an importing region, compared to being an exporting region during 1963-65.

20/ For the South Asia region, the increase is especially sharp, from an average of 21,000 tons in 1963-65 to 1,247,000 tons by 1980. At first glance, such an increase seems most unrealistic. But it is noted that oil exports into this region in 1968 by the United States alone were in excess of 200,000 tons. Reports available up to early 1970 indicate that future oil imports by this region will continue to rise sharply. The projected import requirements for the South Asia region are considered to be reasonable providing that (a) there is a continued availability of oil on a concessional sales basis and (b) the countries in this region do not impose new policies to restrict oil imports.

(3) In the developed regions--

(a) Canada would be a net exporter of vegetable oils in 1980 rather than a net importer as it was during 1963-65.

(b) For South Africa, the opposite situation is projected.

(c) Although the importing developed regions would continue to provide the major home for vegetable oil traded, the increase in imports from 1963-65 through 1980 is only 1.9 percent a year.

(d) Export availabilities from the United States would increase substantially--from 1.2 million tons in 1963-65 to 3.6 million tons by 1980, or by 7.2 percent a year.

Oilcakes

Under set I, demand and prices for oilcakes are projected to 1980 to be at the same levels as in chapter 9. As indicated in the beginning of the present chapter, projected world demand for oilcakes at the 1963-65 price level was in balance with projected production levels in chapter 11. Thus, neither strong upward pressures nor strong downward pressures on world oilcake prices would be anticipated through 1980.

In world trade of oilcakes, the developed regions will account for 97 percent of imports in 1980 (table 36). The remaining 3 percent is accounted for by the Eastern Europe region. 21/

The EC alone would purchase some 41 percent of the 1980 world trade in oilcakes. Rising EC imports are partly due to the substitution of oilcakes for relatively high-priced grain in feed rations. Japan would import 21 percent of the world market, Other Western Europe 20 percent, and the United Kingdom 13 percent.

The developed countries are also projected to dominate the world market on the export side, with the United States providing some 71 percent of the world export supply, or 16.6 million tons. The projected increase in LDC oilcake production is substantially above their estimated increase in demand, and the resulting increased export availability is expected to find a market, primarily in the West European countries. The LDC's together are projected to provide 27 percent of the world's oilcake exports, or 6.3 million tons.

Projection Set II.--World Trade With a Higher Level of Agricultural Production and Economic Growth in the Less Developed Countries

Alternative II assumes a higher level of agricultural production and economic development in the LDC's. The projected growth rates of oilseed production in the LDC's are assumed to be 40 percent above those projected under alternative I. This level is similar to that used for other commodities of the overall study (see preface).

In the LDC's, agriculture accounts for a very large proportion of total economic activity; thus, the rates of growth in agricultural output affect rates of growth in the overall economy. Demand for vegetable oils and oilcakes under alternative II would reflect these effects.

21/ These are regional net trade estimates. Some of the net exporting regions, of course, contain importing countries.

A special study was made of the relationship between growth in the agricultural sector and growth in the total economy in each of 17 less developed countries. 22/ On the basis of the results, a set of income growth rates appropriate for alternative II was developed (app. table D-2).

Oilseed production in the LDC's in 1980 was estimated by multiplying the annual rates of growth presented in chapter 10 by 1.4. The oil and meal equivalents of the estimates were then computed to obtain the indicated vegetable oil and oilcake production.

The assumed increase in oilseed production in the LDC's is expected to result in lower world prices of oilcakes and vegetable oils than projected under set I.

Vegetable Oil

If income levels in the LDC's were to remain the same as in projection set I, a 56-percent decrease in vegetable oil prices from the 1963-65 base would be required to bring increased production into balance with demand. However, because incomes in the LDC's are assumed under set II to increase at a faster rate than under set I, the higher incomes would increase the demand for vegetable oils. Under projection set II, with the income effect included, vegetable oil prices would need to drop 31 percent below the 1963-65 level (compared with 20 percent under set I) to bring world supply and demand into balance. Consumption would be expected to increase only slightly in the developed area because of the very low price response. But consumption would increase substantially in the LDC's because of the greater response to price changes and the added income effect. The effect on trade under projection set II would be that imports would increase in all importing regions. From the export side, exports would decline slightly for the developed exporters and increase for the LDC exporters.

Oilcakes

The increase in LDC oilseed production under projection set II is equivalent to an addition of 4.2 million tons of oilcakes to world supplies. To bring this new supply into balance by increasing consumption at the world level, prices for oilcake would have to drop 13 percent from the 1963-65 level. 23/ Practically all of this increase would come from the developed area, which accounts for the bulk of the market.

22/ See ch. 7 of Rojko and Mackie (50) for a detailed explanation of this study. App. table D-2 in the present report contains the projected rates of increase in income on a total and per capita basis.

23/ The estimating equations for the United States and Canada had the wrong sign for the oilcake price coefficient but oilcake price in these instances was found to be influenced directly by the price movements of grains. Therefore, the prices of both oilcakes and grains were dropped 10 percent in these two regions. The estimating equations for the Australia-New Zealand and South Africa region and for the East Europe region did not include price variables. For these regions, implicit price elasticities based on the historical oilcake prices and demand levels were computed. The resulting elasticities were greater than 1.0 for both regions. An elasticity of 1.0 was deemed more reasonable and was adopted for determining the effect of a price drop in both of these two regions. Since the USSR and Communist Asia regions are centrally planned, and neither is a net importer, it was assumed that there would be no significant increase in oilcake consumption with a price drop in world oilcake prices.

Projection Set III.--World Trade With a Lower Level of Agricultural Production and Economic Growth in the Less Developed Countries

Projection set III assumes a lower level of agricultural production and economic development in the LDC's. The agricultural sectors of the LDC's would grow at annual rates about 30 percent lower than under set I. 24/

Vegetable Oil

World vegetable oil production under projection set III is relatively close to world consumption levels developed under set I. However, with lower incomes in the LDC's, due to their lower agricultural growth rates, the LDC demand for vegetable oils would be lower. With the price effect from the reduced production of vegetable oils being offset somewhat by reduced incomes in the LDC's, world vegetable oil prices would have to be higher than they were under projection set I; but they would still be 13 percent below the 1963-65 level to bring import requirements into balance with exportable supplies. The regional trade levels under set III do not vary greatly from those of set I (tables 36 and 40 provide the comparison).

Oilcake

With declining oilseed production in the LDC's, the 1980 world supplies of oilcakes would be 3 million tons lower than under set I. It was projected that an 8-percent increase in world prices would be required to bring supply and demand into equilibrium again. The adjustment in consumption resulting from the price increase would be mainly in the developed regions (tables 37 and 41 illustrate the difference).

Production Changes by Commodity

As shown in tables 42 and 43, production trends for individual commodities differ under each of the alternatives discussed above. The differences are greatest among the major oilseeds produced in the less developed countries: palm oil, peanut oil, cottonseed oil, and coconut oil. The bulk of the differences in oilcake production are found in peanut meal and cottonseed meal.

The percentage of increase, or decrease, in each commodity relative to projected world production of each commodity is also presented in tables 42 and 43. Under set II--the assumption of a 40-percent growth rate in production in the LDC's--world supplies of palm oil would be 36 percent higher than those of alternative I; peanut oil, 19 percent higher; and cottonseed oil, coconut oil, and palm kernel oil, all 14 percent higher. Olive oil and soybean oil would be higher by around 2 percent. Among oilcakes, the higher rates of production growth in the LDC's result in projected world supplies of peanut meal 19 percent above those of alternative I; copra meal, 15 percent; and cottonseed meal and palm kernel meal, some 12 percent. Soybean meal supplies would be only 2 percent higher, and rapeseed and linseed meal supplies, 4 percent higher.

Because the production levels of both meals and oils vary substantially by commodity, the price pressures would also vary among commodities. As discussed in chapter 2, the various vegetable oils and oilcakes are substantially substitutable, one for another, yet there remain some important distinguishing characteristics. Thus, the estimated

24/ Estimated income growth rates associated with lower growth rates in the total agricultural sector of these regions are shown as alternative III in app. table D-2.

price changes required to bring about world trade equilibrium would not be absorbed equally by all vegetable oils and oilcakes. The lauric oils--coconut oil and palm kernel oil--have demand schedules quite different from those of the other vegetable oils. This study did not try to estimate the effect that diverging production trends would have on the prices for individual oilseed commodities; this would require a separate study. The projected changes in world prices developed for oilcakes and vegetable oil under the different production alternatives should be considered "weighted average price" changes, and individual commodity price changes should be expected to vary from the estimates.

The price changes among the oilseeds, as such, would also be expected to differ because of variations in prices of the oils and meals derived from them, and because some oilseeds have a high yield of oil and a low yield of meal, while others have the reverse. Since future price ranges are projected to be greater for oils than for meals, the price of a high oil-yielding oilseed would range more widely than would the price of a low oil-yielding oilseed. Soybean prices are the least dependent on the fats and oils market, while the prices of oil palm kernels are the most dependent (table 44).

Structure of the Oilseed Crushing Industry 25/

The preceding regional projections, made on a meal and oil equivalent basis, do not specify whether future trade by the less developed countries will be primarily in the form of oil and meal, or in the form of oilseeds as such. The value added in crushing is estimated to be generally less than 10 percent. Thus, the increase in export earnings from the export of oil and cake rather than seed would average less than U.S. $15 per ton of seed. Nonetheless, this represents a valuable increment in LDC's, where alternative investment opportunities may be limited.

This report does not attempt to estimate the growth of the oilseed crushing industry in the LDC's through 1980. However, the possible effect such growth may have on an LDC's trade earnings, or cost, warrants a review of the structure of the world oilseed crushing industry.

Practically all of the major producers of oilseeds among the LDC's are anxious to expand their oilseed processing industries. The industrialized countries, both importers and exporters, are also willing to expand their "crush" capacity. Since a further expansion of the crushing industry will be required by 1980, the question is whether this increase will take place in the developed or the less developed regions. Location of economic activitiy is commonly determined by some geographic advantage in production efficiency, or by economics of transportation.

Modern oil milling is a rather capital intensive operation, whether conducted in a developed or less developed country since it is generally profitable to use mechanical handling equipment even where unskilled labor is plentiful. Thus, there is relatively little difference between the plant and machinery required in a developed and a less developed country.

There is no technical reason why the same equipment should be more or less efficient in one location than in another. Also, the processing costs, based on different studies, do not appear to vary sharply from one region to another. Freight rates differ from country to country, by the type of oils and seeds involved and according to the arrangements crushers have with shippers. In general, the shipping of oil and cake rather than seed appears neither to offer any substantial freight advantage nor to add significantly to freight costs.

25/ This section is drawn from (23).

Since neither processing nor transporation efficiency appear to offer dominant economic reasons for future expansion of the oilseed industry in one region or another, future expansion of the industry in the LDC's will probably be determined by small differences in these and a number of other factors. Other determining factors include:

(1) Access to markets. It may be difficult for seed crushers in the LDC's to find markets for greatly expanded output.

(2) Tariffs. Since the value added by processing is generally less than 10 percent of the value of the raw materials, relatively small differences between the tariffs on oilseeds and on equivalent quantities of vegetable oils and oilcakes can be a major deterrent to the expansion of seed crushing in the LDC's.

(3) Productivity of capital. The returns on capital invested in seed crushing are generally small. Thus, more profitable alternative uses of capital are likely to be numerous, especially in the capital-scarce LDC's.

(4) Speculation. Perhaps as important as efficiency in processing is the timing and direction of sales. Processors in the exporting countries, being further from the final market, are at some disadvantage. However, processing does permit the exporting countries to send their oil to one market and their meal to another. The projections in this report indicate that the future vegetable oil market lies primarily within the LDC's, while meal exports will continue to flow primarily to the developed countries.

(5) Industrialization. Other considerations may prompt governments of LDC's to encourage seed crushing. Advantages include the training of industrial labor and the stimulus to the development of auxilliary trades which may affect taxation and other policies.

Table 36.--Vegetable oil: World supply, demand, and trade, by region, average 1963-65, and projected to 1980 under projection set I 1/

Region	Average 1963-65				1980				Share of 1980 trade		Rates of change 1963-65 - 1980		
	Supply	Demand	Export	Import	Supply	Demand	Export	Import	Import	Export	Supply	Demand	Trade
	1,000 metric tons								Percent		Percent		
United States	4,267	3,094	1,173	--	7,999	4,434	3,565	--	--	52.2	4.0	2.3	7.2
Canada	95	171	--	76	336	285	51	--	--	7.8	8.2	3.2	--
EC	511	2,327	--	1,816	992	3,239	--	2,247	32.9	--	4.2	2.1	2.3
United Kingdom	2	497	--	495	--	644	--	644	9.4	--	--	1.7	1.7
O.W.E.	710	1,134	--	424	869	1,450	--	581	8.5	--	1.3	1.6	2.0
Japan	39	443	--	404	--	824	--	824	12.1	--	--	4.0	4.6
Australia-New Zealand	21	54	--	33	13	127	--	114	1.7	--	-3.0	5.5	8.1
South Africa	76	57	19	--	115	134	--	19	.3	--	2.6	5.5	--
Total	5,721	7,777	1,192	3,248	10,324	11,137	3,616	4,429	64.9	53.0	3.8	2.3	-5.6
Eastern Europe	561	758	--	197	1,250	1,306	--	56	.8	--	5.1	3.5	-7.6
USSR	2,159	1,960	199	--	3,866	3,866	--	--	--	--	3.7	4.3	1.5
Communist Asia	1,121	1,033	88	--	1,411	1,568	--	157	2.3	--	1.5	2.6	--
Total	3,841	3,751	287	197	6,527	6,740	--	213	3.1	--	3.4	3.7	6.8
Central America and Mexico	365	397	--	32	521	846	--	325	4.8	--	2.3	4.8	15.5
South America	800	858	--	58	1,776	1,753	23	--	--	.3	5.1	4.6	--
East and West Africa	2,348	1,067	1,281	--	3,489	1,979	1,510	--	--	22.1	2.5	3.9	1.0
North Africa and West Asia	642	845	--	204	1,257	1,743	--	486	7.1	--	4.3	4.6	5.6
South Asia	2,176	2,197	--	21	3,522	4,779	--	1,257	18.4	--	3.1	5.0	--
Southeast Asia	149	160	--	11	179	298	--	119	1.7	--	1.1	4.0	16.0
East Asia and Pacific Islands	2,382	1,185	1,198	--	4,055	2,375	1,680	--	--	24.6	3.4	4.4	2.1
Total	8,862	6,709	2,479	326	14,799	13,773	3,213	2,187	32.0	47.0	3.3	4.6	-4.5
World total	18,424	18,237	3,958	3,771	31,650	31,650	6,829	6,829	100.0	100.0	3.4	3.5	--

1/ Set I assumes a continuation of present production and trade (with some modification) and allows for moderate gain in productivity in the LDC's.

Table 37.--Oilcakes: World supply, demand, and trade, by region, average 1963-65, and projected to 1980 under projection set I 1/

Region	Average, 1963-65				1980				Share of 1980 trade		Annual rate of change, 1963-65 - 1980		
	Supply	Demand 2/	Export	Import	Supply	Demand	Export	Import	Import	Export	Supply	Demand	Trade
	1,000 metric tons				1,000 metric tons				Percent		Percent per year		
United States	18,198	3/11,812	5,904	--	31,820	15,180	16,640	--	--	70.9	3.6	1.6	6.7
Canada	500	880	--	380	949	1,314	--	365	1.6	--	4.1	2.5	- .3
EC	262	5,269	--	5,007	742	10,429	--	9,687	41.2	--	6.7	4.4	4.2
United Kingdom	--	1,619	--	1,619	--	3,190	--	3,190	13.6	--	--	4.3	4.3
O.W.E.	289	2,479	--	2,190	454	5,074	--	4,620	19.7	--	2.9	4.6	4.8
Japan	70	1,915	--	1,845	--	4,866	--	4,866	21.7	--	--	6.0	6.2
Australia-New Zealand and South Africa	139	119	20	--	245	215	30	--	--	.1	3.6	3.8	2.6
Total	19,458	4/24,575	5,924	11,041	34,210	40,268	16,670	22,728	96.8	71.0	3.6	3.1	1.1
Eastern Europe	1,045	1,623	--	578	2,269	3,024	--	755	3.2	--	5.0	4.0	1.7
USSR	3,897	3,768	129	--	6,398	6,348	50	--	--	.2	3.1	3.3	-5.8
Communist Asia	3,415	3,333	82	--	4,957	4,507	450	--	--	1.9	2.4	1.9	11.2
Total	8,357	8,724	211	578	13,624	13,879	500	755	3.2	2.1	3.1	3.0	-3.2
Latin America	2,574	1,136	1,438	--	4,366	1,870	2,496	--	--	10.6	3.4	3.2	3.5
Africa and West Asia	2,801	833	1,968	--	4,805	1,335	3,470	--	--	14.8	3.4	3.0	3.6
Other Asia	5,416	4,254	1,162	--	9,080	8,733	347	--	--	1.5	3.3	4.6	-7.3
Total	10,791	6,223	4,568	--	18,251	11,938	6,313	--	--	26.9	3.3	4.2	2.0
World total	38,606	39,522	10,703	11,619	66,085	66,086	23,483	23,483	100.0	100.0	3.4	3.3	--

1/ Set I assumes a continuation of present production and trade policies (with some modification) and allows for moderate gain in productivity in the LDC's.
2/ All regions except U.S. are availabilities.
3/ Does not include stocks.
4/ Includes an allowance for U.S. stocks.

Table 38.--Vegetable oil: World supply, demand, and trade, by region, average 1963-65, and projected to 1980 under projection set II 1/

Region	Average 1963-65				1980				Share of 1980 trade		Annual rate of change, 1963-65 - 1980		
	Supply	Demand	Export	Import	Supply	Demand	Export	Import	Import	Export	Supply	Demand	Trade
	1,000 metric tons								Percent		Percent		
United States	4,267	3,094	1,173	--	7,999	4,463	3,536	--	--	44.4	4.0	2.3	7.1
Canada	95	171	--	76	336	296	40	--	--	.5	8.2	3.5	--
EC	511	2,327	--	1,816	992	3,300	--	2,308	29.0	--	4.2	2.2	1.5
United Kingdom	2	497	--	495	--	675	--	675	8.5	--	--	1.9	2.0
O.W.E.	710	1,134	--	424	869	1,486	--	617	7.8	--	1.3	1.7	2.4
Japan	39	443	--	404	--	851	--	851	10.7	--	--	4.2	4.8
Australia-New Zealand	21	54	--	33	13	128	--	115	1.4	--	-3.0	5.5	8.1
South Africa	76	57	19	--	115	142	--	27	.3	--	2.6	5.9	--
Total	5,721	7,777	1,192	3,248	10,324	11,341	3,576	4,593	57.7	44.9	3.8	2.4	-4.3
Eastern Europe	561	758	--	197	1,250	1,360	--	110	1.4	--	5.1	3.7	-3.6
USSR	2,159	1,960	199	--	3,866	4,021	--	155	1.9	--	3.7	4.6	2/
Communist Asia	1,121	1,033	88	--	1,411	1,635	--	224	2.8	--	1.5	2.9	2/
Total	3,841	3,751	287	197	6,527	7,016	--	489	6.1	--	3.4	4.0	2/
Central America and Mexico	365	397	--	32	620	1,003	--	383	4.8	--	3.4	6.0	16.5
South America	809	858	--	58	2,498	2,106	392	--	--	4.9	7.4	5.8	--
East and West Africa	2,348	1,067	1,281	--	4,117	2,305	1,812	--	--	22.6	3.6	4.9	2.2
North Africa and West Asia	642	846	--	204	1,658	2,106	--	448	5.6	--	6.1	5.9	5.0
South Asia	2,176	2,197	--	21	4,296	6,194	--	1,898	23.9	--	4.3	6.7	3/
South East Asia	149	160	--	11	198	345	--	147	1.8	--	1.8	4.9	17.5
East Asia and Pacific Islands	2,382	1,184	1,198	--	5,051	2,873	2,178	--	--	27.4	4.8	5.7	3.8
Total	8,862	6,709	2,479	326	18,438	16,932	4,382	2,876	36.1	55.1	4.7	6.0	-2.2
World total	18,424	18,237	3,958	3,771	35,289	35,289	7,958	7,958	100.0	100.0	4.2	4.2	--

1/ Set II assumes that agricultural productivity and economic growth in the LDC's would be higher than projected in set I.
2/ Changed from a net exporter to a net importer.
3/ Computed percent not relevant because of small base in 1963-65.

Table 39.--Oilcakes: World supply, demand, and trade, by region, average 1963-65, and projected to 1980 under projection set II 1/

Region	Average, 1963-65				1980				Share of 1980 trade		Annual rate of change, 1963-65 - 1980		
	Supply	Demand 2/	Export	Import	Supply	Demand	Export	Import	Import	Export	Supply	Demand	Trade
	1,000 metric tons								Percent		Percent per year		
United States	18,198	3/11,812	5,904	--	31,820	15,633	16,187	--	--	42.8	3.5	1.7	6.5
Canada	500	880	--	380	949	1,547	--	598	2.2	--	4.1	3.6	2.8
EC	262	5,269	--	5,007	742	11,941	--	11,199	41.5	--	6.7	5.3	5.2
United Kingdom	--	1,619	--	1,619	--	3,652	--	3,652	13.5	--	--	5.2	5.2
O.W.E.	289	2,479	--	2,190	454	5,884	--	5,430	20.1	--	2.7	5.5	5.2
Japan	70	1,915	--	1,845	--	5,014	--	5,014	18.6	--	--	6.2	6.4
Australia-New Zealand & South Africa	139	119	20	--	245	245	--	--	--	--	3.6	4.6	--
Total	19,458	4/24,575	5,924	11,041	34,210	43,916	16,187	25,893	96.0	42.8	3.6	3.7	4.1
Eastern Europe	1,045	1,623	--	578	2,269	3,356	--	1,087	4.0	--	5.0	4.7	4.0
USSR	3,897	3,768	129	--	6,398	6,348	50	--	--	16.9	3.1	3.3	-5.8
Communist Asia	3,415	3,333	82	--	4,957	4,507	450	--	--	13.1	2.3	1.9	11.2
Total	8,357	8,724	211	578	13,624	14,211	500	1,087	4.0	30.0	3.1	3.1	3.0
Latin America	2,574	1,136	1,438	--	5,432	2,042	3,390	--	--	9.0	4.8	3.7	5.5
Africa and West Asia	2,801	833	1,968	--	6,065	1,336	4,729	--	--	12.5	5.0	3.0	5.7
Other Asia	5,416	4,254	1,162	--	11,013	8,839	2,174	--	--	5.7	4.5	4.7	4.0
Total	10,791	6,223	4,568	--	22,509	12,217	10,292	--	--	27.2	4.7	4.3	5.2
World total	38,606	39,522	10,705	11,619	70,344	70,344	26,980	26,980	100.0	100.0	3.8	3.4	--

1/ Set II assumes that agricultural productivity and economic growth in the LDC's would be higher than projected in set I.
2/ All regions except U.S. are availabilities.
3/ Does not include stocks.
4/ Includes an allowance for U.S. stocks.

Table 40.--Vegetable oil: World supply, demand, and trade, by region, average 1963-65, and projected to 1980 under projection set III 1/

Region	Average, 1963-65				1980				Share of 1980 trade		Annual rate of change, 1963-65 - 1980		
	Supply	Demand	Export	Import	Supply	Demand	Export	Import	Import	Export	Supply	Demand	Trade
	1,000 metric tons								Percent		Percent		
United States	4,267	3,094	1,173		7,999	4,420	3,579			55.9	4.0	2.2	7.2
Canada	95	171	--	76	336	279	57			.9	8.2	3.1	--
EC	511	2,327	--	1,816	992	3,206	--	2,214	34.6	--	4.2	2.0	1.2
United Kingdom	2	497	--	495	--	629	--	629	9.8	--	--	1.5	1.5
O.W.E.	710	1,134	--	424	869	1,435	--	566	8.8	--	1.3	1.5	1.8
Japan	39	443	--	404	--	812	--	812	12.7	--	--	3.8	4.4
Australia-New Zealand	21	54	--	33	32	127	--	95	1.5	--	2.8	5.5	6.8
South Africa	76	57	19	--	115	130	--	15	.2	--	2.6	5.3	—
Total	5,721	7,777	1,192	3,248	10,343	11,038	3,636	4,331	67.6	56.8	3.8	2.2	6.6
Eastern Europe	561	758	--	197	1,250	1,281	--	31	.5	--	5.1	3.4	-10.9
USSR	2,159	1,960	199	--	3,866	3,791	75	--	--	1.2	3.7	4.2	-5.9
Communist Asia	1,121	1,033	88	--	1,411	1,536	--	125	2.0	--	1.5	2.5	2/
Total	3,841	3,751	287	197	6,527	6,608	75	156	2.5	1.2	3.4	3.6	2/
Central America and Mexico	365	397	--	32	462	752	--	290	4.5	--	1.5	4.0	14.8
South America	800	858	--	58	1,409	1,544	--	135	2.1	--	3.6	3.7	5.4
North and West Africa	2,348	1,067	1,281	--	3,115	1,785	1,330	--	--	20.8	1.8	3.3	0.2
North Africa and West Asia	642	846	--	204	1,030	1,537	--	507	7.9	--	3.0	3.8	5.9
South Asia	2,176	2,197	--	21	3,072	3,952	--	880	13.7	--	2.2	3.8	28.5
South East Asia	149	160	--	11	170	272	--	102	1.6	--	.8	3.4	14.9
East Asia and Pacific Islands	2,382	1,184	1,198	--	3,459	2,099	1,360	--	--	21.2	2.4	3.6	.8
Total	8,862	6,709	2,479	326	12,717	11,941	2,690	1,914	29.9	42.0	2.3	3.7	-6.2
World total	18,424	18,237	3,958	3,771	29,587	29,587	6,401	6,401	100.0	100.0	3.0	3.1	--

1/ Set III assumes that agricultural productivity and economic growth in the LDC's would be lower than projected in set I.
2/ Changed from a net exporter to a net importer.

Table 41.--Oilcakes: World supply, demand, and trade, by region, average 1963-65, and projected to 1980 under projection set III 1/

Region	Average, 1963-65				1980				Share of 1980 trade		Annual rate of change, 1963-65 - 1980		
	Supply	Demand 2/	Export	Import	Supply	Demand	Export	Import	Import	Export	Supply	Demand	Trade
	1,000 metric tons								Percent		Percent per year		
United States	18,198	3/11,812	5,904	--	31,820	14,890	16,930	--	--	76.7	3.6	1.4	6.8
Canada	500	880	--	380	949	1,166	--	217	1.0	--	4.1	1.8	-3.5
EC	262	5,269	--	5,007	742	9,464	--	8,722	39.5	--	6.7	3.7	3.6
United Kingdom	--	1,619	--	1,619	--	2,897	--	2,897	13.1	--	--	3.7	3.7
O.W.E.	289	2,479	--	2,190	454	4,557	--	4,103	18.6	--	2.9	3.9	4.0
Japan	70	1,915	--	1,845	--	4,771	--	4,771	21.6	--	--	5.9	6.1
Australia-New Zealand & South Africa	139	119	20		245	196	49	--	--	.2	3.6	3.2	5.8
Total	19,458	4/24,575	5,924	11,041	34,210	37,941	16,979	20,710	93.8	76.9	3.6	2.8	-2.9
Eastern Europe	1,045	1,623	--	578	2,269	2,812	--	543	2.5	--	5.0	3.5	-.4
USSR	3,897	3,768	129	--	6,398	6,348	50	--	--	.2	3.1	3.3	-5.8
Communist Asia	3,415	3,333	82	--	4,957	4,507	450	--	--	2.1	2.4	1.9	11.2
Total	8,357	8,724	211	578	13,624	13,667	500	543	2.5	2.3	3.1	2.8	5/
Latin America	2,574	1,136	1,438	--	3,563	1,761	1,802	--	--	8.2	2.1	2.8	1.5
Africa and West Asia	2,801	833	1,968	--	4,122	1,334	2,788	--	--	12.6	2.4	3.0	2.2
Other Asia	5,416	4,254	1,162	--	7,849	8,665	--	816	3.7	--	2.3	4.6	--
Total	10,791	6,223	4,569	--	15,534	11,760	4,590	816	3.7	20.8	2.3	4.1	-.5
World total	38,606	39,522	10,703	11,619	63,368	63,368	22,069	22,069	100.0	100.0	3.1	3.0	--

1/ Set III assumes that agricultural productivity and economic growth in the LDC's would be lower than projected under set I.
2/ All regions except U.S. are availabilities.
3/ Does not include stocks.
4/ Includes an allowance for U.S. stocks.
5/ Net trade declines by more than 15 percent.

Table 42.--Alternative 1980 projections of oilcake production, by commodity

Commodity	Set I	Set II			Set III		
	1980 production	1980 production	Quantity change from I	Percentage change from I	1980 production	Quantity change from I	Percentage change from I
	1,000 metric tons	1,000 metric tons		Percent	1,000 metric tons		Percent
Copra meal	2,556	2,947	391	15.3	2,310	-246	-9.6
Palm kernel meal	556	620	64	11.5	520	-36	-6.5
Cottonseed meal	10,075	11,225	1,150	11.4	9,382	-693	-6.9
Peanut meal	6,529	7,753	1,224	18.7	5,785	-744	-11.4
Linseed meal	1,740	1,813	73	4.2	1,654	-86	-4.9
Rapeseed meal	4,555	4,909	354	7.7	4,320	-235	-5.2
Soybean meal	33,363	[illegible]	670	2.0	33,104	-259	-.8
Sunflowerseed meal	6,711	7,044	333	5.0	6,293	-418	-6.2
Total	66,085	70,344	4,259	6.4	63,368	-2,717	-4.1

Table 43.--Alternative 1980 projections of vegetable oil production, by commodity

Commodity	Set I	Set II			Set III		
	1980 production	1980 production	Quantity change from I	Percentage change from I	1980 production	Quantity change from I	Percentage change from I
	1,000 metric tons	1,000 metric tons		Percent	1,000 metric tons		Percent
Cottonseed oil	3,858	4,417	559	14.5	3,531	-327	-8.5
Peanut oil	4,670	5,557	887	19.0	4,167	-503	-10.8
Rapeseed oil	2,185	2,311	126	5.8	2,108	-77	-3.5
Soybean oil	7,470	7,590	120	1.6	7,414	-56	-.8
Sunflowerseed oil	4,710	5,080	370	7.9	4,527	-183	-3.9
Palm kernel oil	620	706	86	13.9	570	-50	-8.1
Coconut oil	4,078	4,656	578	14.2	3,694	-384	-9.4
Palm oil	2,480	3,362	882	35.6	2,018	-462	-18.6
Olive oil	1,579	1,610	31	2.0	1,558	-21	-1.3
Total	31,650	35,289	3,639	11.5	29,587	-2,063	-6.5

Table 44.--Value of the oil and cake components of selected oilseeds and fish products, 1967

Commodity	Value of components 1/			Share of total value	
	Cake	Oil	Total	Cake	Oil
	U.S. dollars per metric ton			Percent	
Fish products 2/	107	24	131	82	18
Soybeans	78	39	117	67	33
Cottonseed	47	44	91	52	48
Linseed	57	71	128	45	55
Sunflowerseed 3/	35	64	99	35	64
Rapeseed	38	79	117	32	68
Peanuts	53	127	180	29	71
Copra	28	204	232	12	88
Palm products 4/	8	207	215	4	96

1/ Calculated on the basis of prices c.i.f. European ports in 1967.
2/ Values based on average yields of fishmeal and fish oil calculated on a world basis.
3/ Values based on yields of Argentine seed.
4/ Values based on estimated composition of palm fruits from Malayan palms (deli dura).

Source: (21).

13.--IMPLICATIONS FOR THE LESS DEVELOPED COUNTRIES

Given the trade projections developed in chapter 12 for oilcakes and vegetable oil, this chapter discusses the potential export earnings of and import costs to the less developed countries.

Vegetable Oil Export Earnings and Import Costs

For the LDC's as a group, total net export earnings for vegetable oils by 1980 are projected to decline considerably compared with the 1963-65 net trade earnings. This occurs not because of a sharp drop in earnings from the net exporting regions, but because of a large increase in the cost to the net importing regions.

Total vegetable oil earnings of the exporting regions during 1963-65 averaged $669 million while total costs to the importing regions totaled $92 million (table 45).

Under projection set I, total export earnings are projected to reach $694 million and import costs are forecast to rise to $607 million. Export earnings by the East Asia and Pacific Islands region are estimated to increase slightly over the average for 1963-65. For the East and West Africa region, earnings are projected to decline somewhat. The South America region, a net importer during 1963-65, is placed as a moderate exporter by 1980. Projected import costs are substantially greater for all regions than during 1963-65. The major change is for the South Asia region: for import costs to approach the projected level of $332 million, vegetable oil would probably have to continue to be available under concessional terms, and restrictions on imports avoided.

Under projection set II (higher production and income levels in the LDC's), earnings of the exporting regions are only a little higher than under set I, because the projected increase in domestic demand due to higher incomes nearly offsets the projected increase in production. The projected increase in demand in LDC importing regions, however, is substantially greater than the projected production increase. As a result, import costs rise sharply and total import costs of the LDC's for vegetable oil exceed earnings.

The situation is reversed under set III. As a result of the assumed decline in incomes, demand drops faster than production. Compared with the export earning levels under set I, the earnings for the exporting regions are lower by only $92 million, while the import costs drop by $173 million.

Oilcake Export Earnings and Import Costs

The LDC's export earnings from oilcakes by 1980 are projected to be substantially greater than during 1963-65, when they averaged $236 million. Under projection set I, such earnings are placed at $364 million, and under set II, at $592 million. Under set III, even though the Other Asia region becomes a net importer of oilcakes, the net earnings for all LDC's are $262 million, which is still above the 1963-65 level (table 46).

Total Export Earnings and Import Costs

Total LDC export earnings from oilseeds and oilseed products are projected to be higher under all three alternatives than they were during 1963-65. Total earnings averaged $905 million in 1963-65, and are projected to reach $1,058 million under projection set I; $1,269 million under set II; and $952 million under set III (table 47).

Import costs to the LDC's for oilseed products are projected to rise most sharply through 1980. Averaging $92 million during 1963-65, they are projected to reach $607 million, $697 million, and $522 million under sets I, II, and III, respectively. The bulk of this increase is accounted for by the projected rising import demand for vegetable oil by the South Asia region.

As a result of the projected increase in import costs, the net earnings from oilseed products for the LDC's as a whole are projected to be lower under all three sets than during 1963-65.

Per capita consumption of oilseed products is projected to rise through 1980, even though LDC net export earnings from oilseed products are not; and regardless of the fact that the populations in LDC's are expected to continue to increase at very high rates. LDC's may find it difficult to achieve a consensus on trade policy, since the less developed area includes both importers and exporters. Lower world prices benefiting importers would adversely affect exporters, and higher world prices benefiting exporters would adversely affect importers.

Methodology Used To Determine Values

While the trade projections were developed on an oil and meal equivalent basis of the seeds, trade occurs in the form of meal, oil, and oilseeds. Primarily because of crushing and margin costs, the value of meal and oil traded in the form of unprocessed oilseeds varies from the value of processed meal and oil. In view of these value differences, one cannot simply take a price for meal and a price for oil and apply that to the projected volume of trade to arrive at a region's export earnings or costs. To determine the value of the combined meal and oil trade and to allow for some trade in unprocessed form, the following procedure was used. The example is for a region projected to be a net oilseed exporter; similar steps were followed for net importers.

(1) The average value of each of the region's 1963-65 oilseed exports was obtained (app. A tables). The composition of the region's oilseed exports was computed by determining the value of each oilseed as a percentage of the total gross oilseed export value.

(2) This percentage value for each oilseed was then multiplied by the total value of the region's net oilseed export earnings to allocate the value of each oilseed with respect to net export earnings. (The net export earning values which were used are given in app. A tables).

(3) The value of oil and meal in each oilseed was computed by multiplying the net value of each oilseed by the percentage share of total value of oil and meal derived from each oilseed (table 44).

(4) These computed values of oil and meal (exported as oilseeds) were then added to the region's net actual values of oil and meal exported as such (1963-65 average). The resulting totals give a 1963-65 average value for the region's net exports of oilseeds, oil, and meal on an oil and meal basis only.

(5) The region's 1980 net export earning values from vegetable oil were estimated by multiplying the 1963-65 net values by the change in net quantity exported between 1963-65 and 1980 projected. This was done for each alternative. The values obtained were adjusted by the difference in estimated price levels that would bring world demand and supply into equilibrium. A similar procedure was used to determine meal values.

This procedure assumes that the composition of a region's trade in oilseeds, oils, and meals would not change significantly between 1963-65 and 1980. Should a region change from an exporter of oilseeds to an exporter of oils and meals, the increased value received would be approximately 10 percent of the value of the oilseeds.

Table 45.--Vegetable oils: Net export earnings and net import costs for the less developed regions, average 1963-65, and alternative projections to 1980

Region	1963-65 Average		1980 projected					
			Set I 1/		Set II 2/		Set III 3/	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
	Million dollars							
Mexico & Central America	--	21.4	--	175.7	--	185.6	--	139.6
South America	--	20.6	3.7	--	54.1	--	--	42.1
East and West Africa	371.2	--	353.3	--	250.7	--	309.3	--
North Africa & West Asia	--	44.4	--	85.4	--	67.1	--	95.5
South Asia	--	3.8	--	332.3	--	430.2	--	144.3
Southeast Asia	--	1.6	--	13.7	--	14.4	--	12.6
East Asia & Pacific Is	297.5	--	337.2	--	372.3	--	292.5	--
Total	668.7	91.8	694.2	607.1	677.1	697.3	601.8	434.0
Total net earnings	576.9		87.1		-20.2		167.8	

1/ Continuation of present trends.
2/ Higher agricultural production and income.
3/ Lower agricultural production and income.

Table 46.--Oilcakes: Net export earnings and net import costs for the less developed regions, average 1963-65, and alternative projections to 1980

Region	1963-65 Average		1980 projected					
			Set I 1/		Set II 2/		Set III 3/	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
	Million dollars							
Latin America	90.5	--	157.2	--	185.3	--	204.2	--
Africa & West Asia	95.2	--	167.8	--	198.5	--	145.6	--
Other Asia	50.6	--	38.5	--	208.3	--	--	88.1
Total	236.6	--	363.5	--	592.1	--	349.8	88.1
Total net earnings	236.3		363.5		592.1		261.7	

1/ Continuation of present trends.
2/ Higher agricultural production and income.
3/ Lower agricultural production and income.

Table 47.--Vegetable oils and oilcakes: Export earnings and import costs for the less developed regions, average 1963-65, and alternative projections to 1980 1/

Region	1963-65 Average			1980 projected								
				Set I 2/			Set II 3/			Set III 4/		
	Exports	Imports	Net	Exports	Imports	Net	Exports	Imports	Net	Exports	Imports	Net
	Million dollars											
Latin America	90.5	42.0	48.4	160.9	175.7	-14.8	239.3	185.6	53.7	204.2	181.7	22.6
Africa & West Asia	466.4	44.4	422.0	521.2	85.4	435.8	449.2	67.1	382.1	454.9	95.6	359.5
Other Asia	348.1	5.4	342.7	375.7	346.0	29.7	580.7	444.6	136.0	292.5	245.0	47.5
Total	905.0	91.8	813.2	1,057.7	607.1	450.6	1,269.2	697.3	571.9	951.6	522.1	429.5

1/ The regional classifications for vegetable oil were collapsed to correspond to the regional classification for oilcakes.
2/ Continuation of present trends.
3/ Higher agricultural production and income.
4/ Lower agricultural production and income.

Table 48.--Vegetable oils: Total and per capita availability, by region, average 1963-65, and alternative projections to 1980

Region	Average 1963-65		1980 projected					
			Set I 1/		Set II 2/		Set III 3/	
	Total	Per capita	Total	Per capita	Total	Per capita	Total	Per Capita
	1,000 m.t.	Kilos	1,000 m.t.	Kilos	1,000 m.t.	Kilos	1,000 m.t.	Kilos
United States	3,098	16.73	4,434	18.39	4,463	18.51	4,420	18.33
Canada	171	8.88	285	10.95	296	11.37	279	10.72
EC	2,327	12.96	3,239	16.33	3,300	16.63	3,206	16.16
United Kingdom	497	9.17	644	10.61	675	11.12	629	10.36
Other Western Europe	1,134	13.03	1,450	14.87	1,486	15.25	1,435	14.72
Japan	443	4.57	824	7.39	851	7.63	812	7.28
Australia & New Zealand	54	3.96	127	6.97	128	7.03	127	6.97
South Africa, Republic	57	4.25	134	5.02	142	5.32	130	4.87
Total	7,781	11.78	11,137	14.28	11,341	14.54	11,038	14.15
Eastern Europe	750	6.29	1,306	9.41	1,360	9.80	1,281	9.24
USSR	1,960	8.61	3,866	13.94	4,021	14.50	3,791	13.67
Communist Asia	1,032	1.31	1,568	1.46	1,635	1.52	1,536	1.43
Total	3,750	3.30	6,740	4.51	7,016	4.70	6,608	4.43
Central America, Mexico	397	5.12	846	6.58	1,003	7.80	752	5.85
South America	858	5.31	1,753	7.09	2,106	8.52	1,544	6.25
East & West Africa	1,067	5.03	1,979	6.27	2,305	7.30	1,785	5.66
North Africa & West Asia	846	5.34	1,743	7.07	2,106	8.54	1,537	6.23
South Asia	2,197	3.53	4,779	5.23	6,194	6.78	3,952	4.33
Southeast Asia	161	2.03	298	2.53	345	2.92	272	2.31
East Asia & Pacific Is	1,186	6.12	2,375	7.95	2,873	9.61	2,099	7.02
Total	6,710	4.46	13,773	6.07	16,932	7.46	11,941	5.26
World total	18,241	5.53	31,650	6.97	35,289	7.77	29,587	6.51

1/ Continuation of present trends.
2/ Higher agricultural production and income.
3/ Lower agricultural production and income.

LITERATURE CITED

(1) Abbas, S. A.
1967. Supply and Demand of Selected Agricultural Products in Pakistan, 1961-1975. Oxford Univ. Press, Lahore, Pakistan. *

(2) Alzand, Osama Adhim
1969. Olive Oil Trade and Trade Policies in the Mediterranean Region. Ph.D. Dissertation, Department of Agr. Economics, Univ. of Minn., Minneapolis, Minn.

(3) Berg, Eric R.
1967. Nigeria, Senegal, and the Congo (Kinshasa)--Projected Level of Demand, Supply and Exports of Oilseed Products to 1975 with Implications for U.S. Exports to the European Economic Community. Univ. of Alberta, Edmonton, Canada. *

(4) _____
1961. Structure of Soybean Oil Export Market. University of Illinois, Agricultural Exp. Sta. Bull. 674.

(5) Centre de Recherches et de Documentation sur la Consummation
1967. Production and Uses of Selected Farm Products in France, Projections to 1970 and 1975. Paris, France. *

(6) Committee on the Economy of China Monographs
1968. Economic Trends in Communist China. Aldine, New York, New York.

(7) Consejo De Bienestarr Rural
1965. Long Term Forecasts of Supply and Demand of Agricultural and Livestock Products in Venezuela. Caracas, Venezuela. *

(8) Crosson, Pierre R.
1966. Economic Growth in Malaysia. Center for Development Planning, National Planning Association, Wash., D. C. *

(9) Department of Economics, Monash University, Australia
1968. Australia, Long-Term Projections of Agricultural Supply and Demand 1965 through 1980. *

(10) Department of Economics, University of Bombay and Operations Research Group, Baroda
1969. Survey of India's Export Potential of Oilcakes. Vols. I-V. April.

(11) Eckey, E. W.
1954. Vegetable Fats and Oils. Reinhold Co., New York, New York.

(12) Elz, Dieter
1967. Oilseed Product Needs of the European Economic Community, 1970.

(13) Food and Agriculture Organization of the United Nations
1968. A Buffer Stock Scheme for Vegetable Oils. CCP, 68/5/5.

---

* See note at end of list.

(14) _____
1966. Agricultural Commodities--Projections for 1975 and 1985. Vols. 1 and 2, CCP, 67/3. Aug.

(15) _____
1965. FAO Group on Coconut and Coconut Products. CCP/ Coconut, 65/12. Jan.

(16) _____
1968. Indicative World Plan for Agricultural Development. Provisional Regional Study No. 1 (Near East - 1966); No. 2 (Latin America - 1968); No. 3 (Africa, South of the Sahara - 1968); and No. 4 (Asia and the Far East - 1968).

(17) _____
1955-1968 Trade Yearbooks. Vols. 9 - 22.

(18) _____
1955-1968 Production Yearbooks. Vols. 9-22.

(19) _____
1968. Internationally Financed Food Aid. CCP, 68/5/4. Oct.

(20) _____
1965. Substitution Between Coconut and Other Oils. CCP/Coconut, 65/2. Apr.

(21) _____
1969. Commodity Review and Outlook 1968-1969. Chapter III - World Market for Oilcakes.

(22) _____
1956. World Production Estimates for Fats and Oils. Monthly Bulletin of Agricultural Economics and Statistics. Feb.

(23) _____
1967. Structure of the Oilseed Crushing Industry and Factors Affecting its Location. Monthly Bulletin of Agricultural Economics and Statistics. Apr. and May.

(24) Foote, R. J.
1958. Analytical Tools for Studying Demand and Structures. U. S. Dept. Agr., Agricultural Handbook No. 164, Aug.

(25) Fox, Karl A. and Ezekiel, Mordecai
1959. Methods of Correlation and Regression Analysis. John Wiley and Sons, Inc., New York.

(26) General Agreement on Tariffs and Trade (GATT), International Trade Center
1966. International Trade, 1965. Geneva.

(27) _____
1966. Western European Market for Oilcake. Geneva.

(28) _____
1967. The Market for Cottonseed Oil in Five European Countries and Japan. Geneva.

(29) Goreux, L.
1957. Long-range Projection of Food Consumption, FAO Monthly Bull. of Agr. Econ. and Statis. 6:1-18 illus. June, 1957.

(30) Houck, J. P.
1966. A Look at Flexibilities and Elasticities. Journal of Farm Economics, Vol. 48, No. 2. May

(31) Houck, J. P. and Subatnik, A.
1969. United States Supply of Soybeans; Regional Acreage Functions. Agricultural Economics Research, Oct.

(32) Houck, J. P. and Mann, J. S.
1968. An Analysis of Demand and Foreign Demand for U. S. Soybean and Soybean Products. Tech. Bull. 256, Agr. Exp. Sta., Univ. of Minn.

(33) IFO - Institut fur Wirtschaftsforschung
1967. Long-Term Development of Demand and Supply for Agricultural Products in the Federal Republic of Germany. Munich. *

(34) Institute for Agricultural Economic Research, The University of Tokyo
1964. Japanese Import Requirements: Projections of Agricultural Supply and Demand for 1965, 1970, and 1975. *

(35) Institute for Research in Agricultural Economics, Oxford, England
1969. United Kingdom: Projected Level of Demand, Supply and Imports of Agricultural Products, 1970, 1975, and 1980. Dec. *

(36) International Monetary Fund
1968. International Financial Statistics. Vol. XXI, No. 7. July.

(37) Johnson, Glenn K. and others
1969. Strategies and Recommendations for Nigerian Rural Development, 1969/85. Mich. State Univ., East Lansing, Mich., CSNRD 33. July.

(38) Johnston, J.
1963. Econometric Methods. McGraw-Hill Book Co., Inc., New York, San Francisco, Toronto and London.

(39) Landbouw - Economisch Instituut
1967. Supply and Demand, Imports and Exports of Selected Agricultural Products in the Netherlands. Forecast for 1970 and 1975. The Hague. *

(40) Little, Arthur D., Inc.
1966. Projected Exports and Imports of Selected Agricultural Commodities in South Africa. Cambridge. Dec.

(41) _____
1964. World Market Opportunities for Nigerian Vegetable Oil Products. Cambridge. May.

* See note at end of list.

(42) Mackie, A. B., Full, T. E., and Falck, J. E.
1968. World Trade in Selected Agricultural Commodities 1951-65. Vol. V Oilseeds, Oil Nuts, and Animal and Vegetable Oils. U. S. Dept. Agr ., Econ. Res. Serv., Foreign Agr. Rpt. 47.

(43) Magleby, R. S. and Missiaen, E. L.
1970. World Demand Prospects for Cotton in 1980. U. S. Dept. Agr., Econ. Res. Serv., Foreign Agr., Rpt. 000. Jan.

(44) Moe, Lyle E.
1968. World Population and Income by Countries, 1950-65 and Projections to 1980. Working paper prepared as part of the research project, "Demand Prospects for Agricultural Products of Less Developed Countries," U. S. Dept. Agr., Econ. Res. Serv. Oct.

(45) Morrison, F. B.
1959. Feeds and Feeding. The Morrison Publishing Co., Ithaca, N. Y.

(46) Mundlak, Yair
1964. Long-Term Projections of Supply and Demand for Agricultural Products in Israel. Hebrew Univ., Jerusalem. May.

(47) Organization for Economic Cooperation and Development (OECD)
1968. Agricultural Projections for 1975 and 1985. Europe, North America, Japan, Oceania -- Production and Consumption of Major Foodstuffs. Paris.

(48) _____
1968. Food Consumption Statistics 1954-1966. Paris.

(49) Potter, Neal
1969. Natural Resources Potentials of the Antartic, adapted from RFF study, American Geographical Society.

(50) Rojko, Anthony S. and Mackie, Arthur B.
1970. World Demand Prospects for Agricultural Exports of Less Developed Countries in 1980. U. S. Dept. Agr., Econ. Res. Serv., Foreign Agr. Econ. Rpt. 60. June.

(51) Secretaria De Agricultura y Ganaderia, Secretary de Hacienda y Credito Publico Banco de Mexico, S.A.
1966. Projections of Supply and Demand for Agricultural Products in Mexico to 1965, 1970, and 1975.*

(52) Shepherd, Robert E.
1969. Summary of--United Kingdom: Projected Level of Demand, Supply, and Imports of Agricultural Products, 1970, 1975, 1980. U.S. Dept. Agr., Econ. Res. Serv., ERS-Foreign 248.*

(53) Studiecentrum Voor Economisch en Sociall Onderzoek
1967. Long-Term Development of Supply and Demand for Agricultural Products in Belgium 1970-1975. Universitaire Faculterten St. Ignatius, Antwerpen.

(54) Thiel, H.
1957. Specification Errors and the Estimation of Economic Relationships. Review of the International Statistics Institute, Vol. 25.

* See note at end of list.

(55) Unilever House Annual Statistics.
1955-1967 Oil, Fats and Oilseed...London.

(56) U. S. Department of Agriculture.
1968. Agricultural Statistics, 1955-1968. Annual Publication.

(57) _____
1969. Agricultural Statistics of Eastern Europe and the Soviet Union, 1950-66. ERS-Foreign 252.

(58) _____
1969. Indices of Agricultural Production for Western Europe, 1950-1968. ERS-Foreign 266.

(59) _____
1969. Indices of Agricultural Production in 1959-68 in Africa and the Near East. ERS-Foreign 265. Published annually.

(60) _____
1969. Indices of Agricultural Production in Eastern Europe and the Soviet Union 1950-68. ERS-Foreign 273.

(61) _____
1969. Indices of Agricultural Production for East Asia, South Asia and Oceania, Average 1957-59 and Annual 1959-68. Published annually.

(62) _____
1961. Foreign Agriculture Circular, FFO 17-61. Nov.

(63) _____
1966. Foreign Agriculture Circular FFO 1-66. Jan.

(64) _____
1968. Foreign Agriculture Circular, FFO 1-68. Feb.

(65) _____
1969. Foreign Agriculture Circular, FFO 10-68. July.

(66) _____
1970. Foreign Agriculture Circular, FFO 1-70. Feb.

(67) _____
1969. World Agricultural Production and Trade. Foreign Agriculture Circular. Sept.

(68) Vandenborre, R. J.
1967. An Econometric Analysis of the Markets for Soybean Oil and Soybean Meal. Univ. of Illinois, College of Agriculture, Exp. Sta., Bull. 723. March.

* Part of a study conducted under contract with the USDA as part of a series to evaluate long-term supply and demand prospects for agricultural products throughout the world. The complete study may be obtained on request from the Division of Information, Office of Management Services, U. S. Department of Agriculture, Washington, D. C. 20250.

APPENDIX A.--REGIONAL TRADE IN OILSEEDS AND OILSEED PRODUCTS, BY VALUE, 1963-66

Table		Page
A- 1	United States	140
A- 2	Canada	141
A- 3	EC	142
A- 4	United Kingdom	143
A- 5	Other Western Europe	144
A- 6	Japan	145
A- 7	Australia and New Zealand	146
A- 8	South Africa, Republic of	147
A- 9	Eastern Europe	148
A-10	USSR	149
A-11	Communist Asia	150
A-12	Central America and Mexico	151
A-13	South America	152
A-14	East and West Africa	153
A-15	North Africa and West Asia	154
A-16	South Asia	155
A-17	Southeast Asia	156
A-18	Other East Asia and Pacific Islands	157

Table A-1.--United States: World trade in oilseeds and oilseed products by value, 1963-66

Item	1963			1964			1965			1966		
	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade
	1,000 dollars											
Soybeans	472,374	4	472,370	566,892	--	566,892	650,066	--	650,066	759,905	--	579,905
Peanuts	4,115	433	3,682	9,138	359	8,779	19,699	106	19,593	15,338	332	15,006
Cottonseed	1,395	18	1,377	1,991	--	1,991	1,137	--	1,137	2,114	--	2,114
Sunflowerseed	--	1,132	-1,132	--	530	-530	--	579	-579	--	1,333	-1,333
Rapeseed	7	1,792	-1,785	2	1,285	-1,283	--	1,952	-1,952	--	3,365	-3,365
Copra	8	38,093	-38,085	3	43,133	-43,130	--	54,987	-54,987	--	41,569	-41,569
Palm kernels												
Total	477,899	41,472	436,427	578,026	45,307	532,719	670,902	57,624	613,278	777,357	46,599	730,758
Soybean oil	120,245	--	120,245	140,130	--	140,130	161,880	--	161,880	125,515	--	125,515
Peanut oil	1,121	--	1,121	10,018	--	10,018	9,621	1	9,620	2,755	1	2,754
Cottonseed oil	44,572	--	44,572	68,931	--	68,931	75,701	--	75,701	24,489	--	24,489
Sunflowerseed oil	--	58	-58	--	44	-44	--	12	-12	--	--	--
Rapeseed oil 1/	--	324	-324	--	818	-818	--	546	-546	--	905	-905
Coconut oil	1,154	38,926	-37,772	349	47,526	-47,177	1,736	51,811	-50,075	1,130	60,152	-59,022
Palm kernel oil	--	10,065	-10,065	--	10,500	-10,500	--	12,381	-12,381	--	14,750	-14,750
Palm oil	--	2,108	-2,108	--	628	-628	--	720	-720	--	7,775	-7,775
Olive oil	--	12,650	-12,650	--	17,889	-17,889	--	13,684	-13,684	--	15,173	-15,173
Total	167,092	64,131	102,961	219,428	77,405	142,023	248,938	79,155	169,783	153,889	98,756	55,133
Soybean meal	116,513	--	116,513	133,631	--	133,631	169,007	--	169,007	216,773	--	216,773
Peanut meal	--	--	--	--	--	--	--	--	--	--	--	--
Cottonseed meal	5,008	2,551	2,457	6,169	1,303	4,866	9,415	1,541	7,874	2,847	2,948	-101
Sunflowerseed meal	--	--	--	--	--	--	--	--	--	--	--	--
Rapeseed meal	--	--	--	--	--	--	--	--	--	--	--	--
Copra meal	--	423	-423	--	--	--	--	--	--	--	--	--
Palm kernel meal	--	--	--	--	--	--	--	--	--	--	--	--
Linseed meal	2,817	42	2,775	4,336	--	4,336	6,567	--	6,567	10,158	--	10,158
Fish meal	--	38,550	-38,550	--	44,154	-44,154	--	28,300	-28,300	--	59,292	-59,292
Total	124,338	41,566	82,772	144,136	45,457	98,679	184,989	29,841	155,148	229,778	62,240	167,538
GRAND TOTAL	769,329	147,169	622,160	941,590	168,169	773,421	1,104,829	166,620	938,209	1,161,024	207,595	953,429

1/ Includes colza and mustard oils.

Table A-2.--Canada: World trade in oilseeds and oilseed products by value, 1963-66

Item	1963			1964			1965			1966		
	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade
	1,000 dollars											
Soybeans	4,616	38,094	-33,478	5,346	49,037	-43,691	9,237	42,991	-33,754	10,121	48,662	-38,541
Peanuts	--	8,125	-8,125	--	9,357	-9,357	--	13,016	-13,016	--	11,605	-11,605
Cottonseed	--	--	--	--	--	--	--	--	--	--	--	--
Sunflowerseed	1,111	--	1,111	733	--	733	878	--	878	1,445	--	1,445
Rapeseed	17,519	--	17,519	12,123	--	12,123	32,996	--	32,996	41,441	--	41,441
Copra	--	--	--	--	--	--	--	--	--	--	--	--
Palm kernels	--	--	--	--	--	--	--	--	--	--	--	--
Total	23,246	46,219	-22,973	18,202	58,394	-40,192	43,111	56,007	-12,896	53,007	60,267	-7,260
Soybean oil	4,607	3,184	1,423	2,824	3,543	-719	4,365	3,809	556	3,460	3,153	307
Peanut oil	--	2,227	-2,227	--	1,124	-1,124	--	1,319	-1,319	--	4,175	-4,175
Cottonseed oil	--	4,166	-4,166	--	3,937	-3,937	--	5,663	-5,663	--	4,311	-4,311
Sunflowerseed oil	--	--	--	--	--	--	--	--	--	--	--	--
Rapeseed oil	10	--	10	42	--	42	1	--	1	--	--	--
Coconut oil	--	--	--	--	--	--	--	--	--	--	--	--
Palm kernel oil	--	1,012	-1,012	--	976	-976	--	1,537	-1,537	--	1,223	-1,223
Palm oil	--	2,296	-2,296	--	1,292	-1,292	--	2,023	-2,023	--	2,598	-2,598
Olive oil	--	691	-691	--	1,104	-1,104	--	935	-935	--	1,160	-1,160
Total	4,617	13,576	-8,959	2,866	11,976	-9,110	4,366	15,286	-10,920	3,460	16,620	-13,160
Soybean meal	20,322	19,104	1,218	19,537	16,169	3,368	22,523	19,224	3,299	18,808	19,024	-216
Peanut meal	--	--	--	--	--	--	--	--	--	--	--	--
Cottonseed meal	--	72	-72	--	212	-212	--	323	-323	--	143	-143
Sunflowerseed meal	--	--	--	--	--	--	--	--	--	--	--	--
Rapeseed meal	--	--	--	--	--	--	--	--	--	--	--	--
Copra meal	--	--	--	--	--	--	--	--	--	--	--	--
Palm kernel meal	--	--	--	--	--	--	--	--	--	--	--	--
Linseed meal	1,036	--	1,036	1,163	--	1,168	1,760	--	1,760	1,250	--	1,250
Fish meal	7,278	303	6,975	8,672	511	8,161	8,795	9	8,786	8,888	--	8,888
Total	28,636	19,479	9,157	29,377	16,892	12,485	33,078	19,556	13,522	28,946	19,167	9,779
GRAND TOTAL	56,499	79,274	-22,775	50,445	87,262	-36,817	80,555	90,849	-10,294	85,413	96,054	-10,641

Table A-3.--EC: World trade in oilseeds and oilseed products by value, 1963-66

Item	1963			1964			1965			1966		
	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade
	1,000 dollars											
Soybeans	149	208,246	-208,097	654	271,050	-270,396	239	272,384	-272,145	63	341,304	-341,241
Peanuts	2,937	162,144	-159,207	3,105	146,835	-143,730	6,046	157,931	-151,885	3,996	178,837	-174,841
Cottonseed	--	2,447	-2,447	--	239	-239	--	1,184	-1,184	--	432	-432
Sunflowerseed	826	13,134	-12,308	1,885	12,893	-11,008	375	13,640	-13,265	826	21,862	-21,036
Rapeseed	14,039	18,975	-4,936	20,752	16,604	4,148	19,583	34,396	-14,813	20,610	42,804	-22,194
Copra	663	90,293	-89,630	87	108,533	-108,446	285	114,284	-113,999	171	120,805	-120,634
Palm kernels	55	52,195	-52,140	11	56,584	-56,573	124	58,695	-58,571	22	53,693	-53,601
Total	18,669	547,434	-528,765	26,494	612,738	-586,244	26,652	652,514	-625,862	25,758	759,737	-733,979
Soybean oil	10,560	9,334	1,252	11,330	11,368	-38	13,303	10,851	2,452	13,362	7,449	5,913
Peanut oil	9,809	68,775	-58,966	13,421	78,842	-65,421	10,158	80,422	-70,264	10,490	80,020	-69,530
Cottonseed oil	145	16,245	-16,099	183	18,808	-18,625	113	25,776	-25,663	278	7,735	-7,457
Sunflowerseed oil	1,128	15,628	-14,518	1,441	17,799	-16,358	2,172	24,372	-22,200	2,886	36,038	-33,152
Rapeseed oil	5,275	3,840	1,439	6,659	2,479	4,210	15,222	5,282	9,940	19,262	10,218	9,044
Coconut oil	11,139	19,222	-8,083	10,781	21,059	-10,278	13,339	27,779	-14,440	12,127	21,546	-9,419
Palm kernel oil	5,719	7,179	-1,460	7,061	6,951	110	9,633	10,753	-1,120	6,225	10,318	-4,093
Palm oil	4,175	56,745	-52,570	5,252	68,734	-63,482	4,870	69,886	-65,016	5,092	67,518	-62,426
Olive oil	11,984	116,080	-104,096	12,610	44,754	-32,144	11,645	35,260	-23,615	13,586	71,867	-58,281
Total	59,955	313,048	-253,093	65,766	270,794	-202,026	80,455	290,381	-209,926	83,308	312,709	-229,401
Soybean meal	28,969	80,684	-51,715	36,092	96,568	-60,476	35,774	128,394	-92,620	36,040	188,435	-152,395
Peanut meal	6,867	34,735	-27,841	6,267	30,486	-24,219	4,400	34,476	-30,076	7,261	45,164	-37,903
Cottonseed meal	270	21,746	-21,476	172	19,426	-19,254	71	26,265	-26,194	260	29,616	-29,356
Sunflowerseed meal	687	16,093	-15,406	2,127	10,797	-8,670	1,126	14,098	-12,972	854	27,904	-27,050
Rapeseed meal	3,036	4,386	-1,350	4,016	5,888	-1,872	8,210	6,821	1,389	10,489	8,723	1,766
Copra meal	4,064	24,377	-20,313	3,704	26,649	-22,945	4,508	30,428	-25,920	5,840	39,901	-34,061
Palm kernel meal	6,126	15,208	-9,082	6,388	17,065	-8,999	7,500	19,120	-11,620	7,614	24,619	-17,005
Linseed meal	4,734	55,312	-50,578	7,171	57,634	-50,463	8,362	62,861	-54,599	8,200	58,888	-50,688
Fish meal	1,387	85,662	-84,275	1,875	112,933	-111,058	3,228	136,110	-132,882	2,497	136,857	-134,360
Total	58,140	339,906	-281,766	69,456	377,406	-307,950	73,179	458,573	-385,395	79,055	560,107	-481,052
GRAND TOTAL	136,764	1,200,388	-1,063,624	164,712	1,260,938	-1,096,226	180,286	1,401,468	-1,221,183	188,121	1,632,553	-1,444,432

Table A-4.--United Kingdom: World trade in oilseeds and oilseed products by value, 1963-66

Item	1963			1964			1965			1966		
	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade
	1,000 dollars											
Soybeans	--	29,452	-29,452	--	33,067	-33,067	--	33,835	-33,835	--	35,078	-35,078
Peanuts	469	36,010	-35,541	427	29,640	-29,213	842	21,910	-21,068	736	20,835	-20,099
Cottonseed	--	14,473	-14,473	--	9,269	-9,269	--	9,229	-9,229	--	4,290	-4,290
Sunflowerseed	--	--	--	--	--	--	--	--	--	--	--	--
Rapeseed	1	967	-966	1	1,550	-1,549	--	4,178	-4,178	1	5,673	-5,672
Copra	--	14,039	-14,039	--	10,884	-10,884	16	12,835	-12,819	--	11,105	-11,105
Palm kernels	1	31,485	-31,484	11	29,757	-29,746	--	35,865	-35,865	--	27,846	-27,846
Total	471	126,426	-125,955	439	114,167	-113,728	858	117,852	-116,994	737	104,827	-104,090
Soybean oil	432	5,726	-5,295	145	4,250	-4,107	428	6,118	-5,690	232	4,936	-4,704
Peanut oil	3,636	11,598	-7,962	2,017	15,575	-13,558	812	22,226	-21,414	1,145	30,800	-29,655
Cottonseed oil	1,458	1,564	-106	29	3,017	-2,995	132	9,262	-9,130	67	9,456	-9,389
Sunflowerseed oil	--	857	-857	--	1,185	-1,185	--	686	-686	--	1,383	-1,383
Rapeseed oil	1	791	-790	17	66	-49	42	92	-50	73	14	-59
Coconut oil	455	11,516	-11,061	290	13,547	-13,257	604	14,619	-14,015	756	10,542	-9,786
Palm kernel oil	3,366	4	3,362	1,303	15	1,288	1,562	288	1,274	216	4,508	-4,292
Palm oil	129	24,353	-24,224	133	26,649	-26,516	260	30,033	-29,773	109	34,650	-34,541
Olive oil	12	1,987	-1,975	103	2,002	-1,899	100	1,982	-1,882	112	1,887	-1,775
Total	9,488	58,396	-48,908	4,027	66,306	-62,279	3,940	85,306	-81,366	2,710	98,176	-95,466
Soybean meal	--	24,281	-24,281	19	21,494	-21,475	4	27,838	-27,834	27	25,035	-25,008
Peanut meal	3	56,251	-56,248	5	49,937	-49,932	17	52,808	-52,791	3	40,734	-40,731
Cottonseed meal	46	15,647	-15,601	--	14,885	-14,885	6	21,832	-21,826	6	20,051	-20,045
Sunflowerseed meal	--	5,491	-5,491	--	5,301	-5,301	--	5,970	-5,970	--	9,442	-9,442
Rapeseed meal	--	2,069	-2,069	--	2,624	-2,624	--	4,127	-4,127	--	5,970	-5,970
Copra meal	--	--	--	--	--	--	--	--	--	--	--	--
Palm kernel meal	--	--	--	--	--	--	--	--	--	--	--	--
Linseed meal	14	2,737	-2,723	1	2,934	-1,933	6	2,584	-2,578	34	1,168	-1,134
Fish meal	53	40,853	-40,800	21	55,021	-55,000	24	63,132	-63,108	64	58,610	-58,546
Total	116	147,329	-147,213	46	151,196	-151,150	57	178,291	-178,234	134	161,010	-142,876
GRAND TOTAL	10,075	332,151	-322,076	4,512	331,669	-327,157	4,855	381,449	-376,594	3,581	346,013	-342,432

Table A-5.--Other Western Europe: World trade in oilseeds and oilseed products by value, 1963-66

Item	1963			1964			1965			1966		
	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade
	1,000 dollars											
Soybeans	--	55,214	-55,214	--	65,735	-65,735	--	105,332	-105,332	--	139,662	-139,662
Peanuts	158	31,063	-30,905	131	32,624	-32,493	164	46,252	-46,088	95	46,116	-46,021
Cottonseed	--	2,178	-2,178	--	1,381	-1,381	13	3,503	-3,490	27	4,506	-4,479
Sunflowerseed	428	1,182	-754	122	990	-868	171	1,015	-844	574	1,134	-560
Rapeseed	9,364	1,036	8,348	13,237	1,419	11,818	15,149	1,608	13,541	8,939	2,211	6,728
Copra	--	31,375	-31,375	--	32,595	-32,595	--	38,131	-38,131	1	39,175	-39,174
Palm kernels	--	5,956	-5,956	--	7,125	-7,125	--	7,196	-7,196	--	6,951	-6,951
Total	9,970	128,004	-118,034	13,490	141,869	-128,379	15,497	203,037	-187,540	9,636	239,755	-230,119
Soybean oil	11,110	36,942	-25,832	12,537	28,081	-15,544	12,900	45,334	-32,434	10,238	21,389	-11,151
Peanut oil	445	36,012	-35,567	1,137	11,202	-10,065	422	18,941	-18,519	432	10,752	-10,320
Cottonseed oil	38	2,068	-2,030	83	3,203	-3,120	131	4,708	-4,577	4	3,315	-3,311
Sunflowerseed oil	231	19,388	-19,157	--	10,337	-10,337	2	19,810	-19,808	3	15,644	-15,641
Rapeseed oil	3,977	1,457	2,520	2,224	1,647	577	4,351	2,929	1,422	3,669	4,827	-1,158
Coconut oil	697	6,359	-5,662	647	6,547	-5,900	466	7,104	-6,638	463	7,332	-6,869
Palm kernel oil	942	853	89	781	1,048	-267	1,036	2,136	-100	720	1,172	-452
Palm oil	121	5,560	-5,449	23	6,657	-6,634	141	5,741	-5,600	87	6,829	-6,742
Olive oil	55,349	3,810	51,539	61,527	8,371	53,156	24,403	14,273	10,130	57,302	3,773	53,529
Total	72,900	112,449	-39,549	78,959	77,093	1,866	43,852	120,976	-77,124	72,918	75,033	-2,115
Soybean meal	8,910	36,175	-27,265	10,058	45,587	-35,529	11,204	48,024	-36,820	10,456	57,575	-47,119
Peanut meal	66	20,303	-20,237	178	24,316	-24,138	247	23,483	-23,236	156	23,784	-23,628
Cottonseed meal	692	45,623	-44,931	1,030	46,993	-45,963	1,383	53,244	-51,861	1,542	55,892	-54,350
Sunflowerseed meal	2	8,339	-8,337	--	4,958	-4,958	14	7,508	-7,494	--	13,563	-13,563
Rapeseed meal	78	924	-846	--	1,245	-1,245	--	1,233	-1,233	115	2,158	-2,043
Copra meal	1,469	6,740	-5,271	1,830	9,231	-7,401	1,797	9,842	-8,045	1,355	7,945	-6,590
Palm kernel meal	457	72	385	896	32	864	679	2	677	723	20	703
Linseed meal	35	6,438	-6,403	67	6,402	-6,335	72	7,269	-7,197	147	7,093	-6,946
Fish meal	36,929	23,028	13,901	54,973	24,776	30,197	87,252	40,365	46,887	92,271	50,056	42,215
Total	48,638	147,642	-99,004	69,032	163,540	-94,508	102,648	190,970	-88,322	106,765	218,086	-111,321
GRAND TOTAL	131,508	388,095	-256,587	161,481	382,502	-221,021	161,997	514,983	-352,986	189,319	532,874	-343,555

Table A-6.--Japan: World trade in oilseeds and oilseed products by value, 1963-66

Item	1963			1964			1965			1966		
	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade
	1,000 dollars											
Soybeans	0	167,946	-167,940	73	184,524	-184,451	9	225,774	-225,765	624	272,007	-271,383
Peanuts	--	2,136	-2,136	1	4,201	-4,200	--	7,057	-7,057	8	9,807	-9,799
Cottonseed	--	12,483	-12,483	--	15,108	-15,108	--	17,148	-17,148	--	23,599	-23,599
Sunflowerseed	--	1,230	-1,230	--	77	-77	--	412	-412	--	334	-334
Rapeseed	--	10,513	-10,513	--	10,074	-10,074	--	14,173	-14,173	--	26,030	-26,030
Copra	--	18,752	-18,752	--	15,600	-15,600	--	18,965	-18,965	--	19,391	-19,391
Palm kernels	--	3,571	-3,571	--	3,536	-3,536	--	3,535	-3,535	--	3,416	-3,416
Total	6	216,631	-216,625	74	233,120	-233,046	9	287,064	-287,055	632	354,584	-353,952
Soybean oil	827	344	483	1,270	97	1,173	1,646	143	1,503	1,344	41	1,303
Peanut oil	--	--	--	273	--	273	199	--	199	81	--	81
Cottonseed oil	8	2,385	-2,377	5	3,680	-3,675	16	729	-713	12	1,428	-1,416
Sunflowerseed oil	--	--	--	--	--	--	--	--	--	--	--	--
Rapeseed oil	863	--	863	667	--	667	1,044	--	1,044	2,958	--	2,958
Coconut oil	6	--	6	78	--	78	446	--	446	15	--	15
Palm kernel oil	371	36	335	427	92	335	979	424	555	746	591	155
Palm oil	70	3,662	-3,592	148	4,209	-4,061	8	4,322	-4,314	50	4,853	-4,803
Olive oil	1	326	-325	9	294	-285	3	280	-277	--	369	-369
Total	2,146	6,753	-4,607	2,877	8,372	-5,495	4,341	5,898	-1,557	5,206	7,282	-2,076
Soybean meal	49	177	-128	5	1,464	-1,459	57	4,872	-4,815	318	792	-474
Peanut meal	--	3,205	-3,205	--	6,025	-6,025	--	3,861	-3,861	--	7,193	-7,193
Cottonseed meal	--	1,117	-1,117	--	431	-431	--	259	-259	--	850	-850
Sunflowerseed meal	--	--	--	--	--	--	--	--	--	--	--	--
Rapeseed meal	--	--	--	--	--	--	--	--	--	--	--	--
Copra meal	296	74	222	79	100	-21	8	159	-151	64	17	47
Palm kernel meal	--	--	--	--	--	--	--	--	--	--	--	--
Linseed meal	190	--	190	381	10	371	--	48	-48	--	176	-176
Fish meal	464	11,062	-10,598	834	13,665	-12,831	2,066	16,383	-14,317	2,624	18,493	-15,869
Total	1,005	15,635	-14,630	1,299	21,695	-20,396	2,131	25,582	-23,451	3,006	27,521	-24,515
GRAND TOTAL	3,157	239,019	-235,862	4,250	263,187	-258,937	6,481	318,544	-312,063	8,844	389,387	-380,543

Table A-7.--Australia & New Zealand: World trade in oilseeds and oilseed products by value, 1963-66

Item	1963			1964			1965			1966		
	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade
						1,000 dollars						
Soybeans	--	184	-184	--	266	-266	--	756	-756	--	159	-159
Peanuts	--	1,616	-1,616	5	1,578	-1,573	1	1,362	-1,361	1	3,872	-3,871
Cottonseed	--	55	-55	--	46	-46	--	83	-83	--	--	--
Sunflowerseed												
Rapeseed	--	106	-106	--	67	-67	--	95	-95	--	119	-119
Copra	--	5,359	-5,359	--	5,947	-5,947	--	6,627	-6,627	--	6,776	-6,776
Palm kernels												
Total	--	7,325	-7,325	5	7,904	-7,899	1	8,923	-8,922	1	10,926	-10,925
Soybean oil	--	1,603	-1,603	--	1,621	-1,621	--	1,838	-1,838	--	1,699	-1,699
Peanut oil	--	3,502	-3,502	--	4,399	-4,399	--	3,082	-3,082	--	3,390	-3,390
Cottonseed oil	--	2	-2	--	142	-142	--	674	-874	--	476	-476
Sunflowerseed oil	--	8	-8	--	23	-23	--	18	-18	--	69	-69
Rapeseed oil	--	128	-128	--	552	-552	--	1,181	-1,181	--	1,656	-1,656
Coconut oil	2	150	-148	4	209	-205	3	261	-258	1	335	-334
Palm kernel oil	--	204	-204	--	368	-368	--	338	-338	--	337	-337
Palm oil	--	579	-579	--	915	-915	--	579	-579	--	826	-826
Olive oil	--	3,596	-3,596	--	2,676	-2,676	--	3,096	-3,096	--	3,023	-3,023
Total	2	9,812	-9,810	4	10,905	-10,901	3	11,267	-11,264	1	11,810	-11,810
Soybean meal	--	177	-177	--	721	-721	--	1,346	-1,346	--	2,689	-2,689
Peanut meal												
Cottonseed meal												
Sunflowerseed meal												
Rapeseed meal												
Copra meal												
Palm kernel meal												
Linseed meal												
Fish meal	142	679	-537	146	972	-824	85	1,398	-1,313	16	1,673	-1,657
Total	142	856	-714	148	1,682	-1,535	85	2,744	-2,659	16	4,362	-4,346
GRAND TOTAL	144	17,993	-17,839	157	20,492	-20,335	89	22,934	-22,845	18	27,098	-27,081

Table A-8.--South Africa, Republic of: World trade in oilseeds and oilseed products by value, 1963-66

Item	1963			1964			1965			1966		
	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade
	1,000 dollars											
Soybeans	--	16	-16	--	3	-3	--	27	-27	--	33	-33
Peanuts	13,812	7	13,805	13,609	27	13,582	4,121	4	4,117	3,575	--	3,575
Cottonseed	--	5	-5	--	6	-6	--	30	-30	--	36	-36
Sunflowerseed	476	--	476	459	--	459	284	--	284	660	--	660
Rapeseed												
Copra												
Palm kernels												
Total	14,288	28	14,260	14,068	36	14,032	4,405	61	4,344	4,235	69	4,166
Soybean oil	--	77	-77	--	174	-174	--	438	-438	--	1,149	-1,149
Peanut oil	2,876	6	2,870	3,534	20	3,514	2,439	--	2,439	1,732	39	1,693
Cottonseed oil	--	--	--	--	--	--	--	171	-171	--	2	-2
Sunflowerseed oil	366	--	366	150	--	150	232	--	232	241	1,170	-929
Rapeseed oil	--	--	--	9	9	--	14	5	9	9	3	6
Coconut oil	--	2,146	-2,076	--	2,076	-2,076	--	2,297	-2,297	--	2,533	-2,533
Palm kernel oil	--	300	-300	--	561	-561	--	928	-928	--	478	-478
Palm oil	--	--	--	--	12	-12	--	--	--	--	81	-81
Olive oil	--	77	-77	2	85	-83	4	80	-76	4	97	-93
Total	3,242	2,606	636	3,695	2,937	758	2,689	3,919	-1,230	1,986	5,552	-3,566
Soybean meal												
Peanut meal	--	6	-6	--	--	--	--	--	--	--	39	-39
Cottonseed meal												
Sunflowerseed meal												
Rapeseed meal												
Copra meal												
Palm kernel meal												
Linseed meal												
Fish meal	21,124	--	21,124	23,949	--	23,949	22,410	--	22,410	17,573	--	17,573
Total	21,124	6	21,118	23,949	--	23,949	22,410	--	22,410	17,573	39	17,534
GRAND TOTAL	38,654	2,640	36,014	41,712	2,973	38,739	29,504	3,980	25,524	23,794	5,660	18,134

Table A-9.--Eastern Europe: World trade in oilseeds and oilseed products by value, 1963-66

Item	1963			1964			1965			1966		
	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade
					1,000 dollars							
Soybeans	--	6,353	-6,353	--	7,241	-7,241	--	13,832	-13,832	65	8,983	-8,918
Peanuts	1,300	19,379	-17,379	1,408	19,877	-18,469	189	18,389	-18,200	227	20,689	-20,462
Cottonseed	--	2,302	-2,302	--	2,434	-2,434	--	2,834	-2,834	--	2,634	-2,634
Sunflowerseed	9,417	21,321	-11,904	14,248	8,158	6,090	16,533	14,584	1,949	33,001	23,618	9,383
Rapeseed	1,317	5,099	-3,782	177	5,227	-5,050	7,217	10,359	-3,142	13,038	3,435	9,603
Copra	--	2,435	-2,435	--	2,943	-2,943	--	1,567	-1,567	--	501	-501
Palm kernels	--	3,847	-3,847	--	3,932	-3,932	--	5,516	-5,516	--	1,379	-1,379
Total	11,834	60,636	-48,802	15,833	69,810	-53,977	23,939	67,081	-43,142	46,331	61,239	-14,908
Soybean oil	61	7,867	-7,806	109	10,791	-10,682	--	9,897	-9,897	6	7,093	-7,087
Peanut oil	474	114	360	940	674	266	337	69	268	654	43	611
Cottonseed oil	268	18	250	--	4,443	-4,443	--	1,409	-1,409	--	65	-65
Sunflowerseed oil	14,977	36,599	-21,622	17,738	38,734	-19,996	15,572	36,789	-21,217	33,519	56,241	-22,722
Rapeseed oil	179	321	142	464	689	-225	1,734	913	881	6,568	160	-6,408
Olive oil	--	8,471	-8,471	417	7,903	-7,486	--	8,106	-8,106	--	8,890	-8,890
Palm kernel oil	--	277	-277	--	288	-288	266	266	19	--	178	-178
Palm oil	--	903	-903	--	1,979	-1,979	--	2,515	-2,515	--	904	-904
Fibre oil	226	6,734	-6,508	1,214	4,572	-3,358	1,128	3,784	-2,662	500	5,775	-5,275
Total	16,187	61,304	-45,117	20,882	70,870	-49,988	19,037	63,688	-44,638	41,247	79,349	-38,102
Soybean meal	--	6,438	-6,438	--	9,114	-9,114	--	6,320	-6,320	--	9,469	-9,469
Peanut meal	438	21,110	-20,672	14	21,965	-21,951	--	21,672	-21,672	500	23,731	-23,231
Cottonseed meal	2,482	8,824	-6,342	1,274	7,030	-5,756	2,056	8,404	-6,348	1,778	7,804	-6,026
Sunflowerseed meal	--	2,292	-2,292	--	3,709	-3,709	--	2,292	-2,292	--	1,339	-1,339
Rapeseed meal	--	--	--	--	--	--	--	72	-72	--	1	-1
Copra meal												
Palm kernel meal												
Linseed meal	--	928	-928	--	1,985	-1,985	--	652	-652	--	618	-618
Fish meal	--	2,284	-2,284	23	68,152	-68,129	19	41,479	-41,460	111	51,254	-51,143
Total	2,920	42,076	-39,156	1,311	111,955	-110,644	2,075	80,891	-78,816	2,389	94,432	-92,043
GRAND TOTAL	30,941	163,016	-132,075	38,026	249,635	-211,609	45,051	211,840	-166,789	89,967	235,020	-145,053

Table A-10.--USSR: World trade in oilseeds and oilseed products by value, 1963-66

Item	1963			1964			1965			1966		
	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade
	1,000 dollars											
Soybeans	--	--	--	--	--	--	--	10,911	-10,911	--	--	--
Peanuts	--	4,902	-4,902	--	6,249	-6,249	--	4,429	-4,429	--	6,230	-6,230
Cottonseed												
Sunflowerseed	11,536	--	11,536	12,844	--	12,844	10,980	--	10,980	20,299	--	20,299
Rapeseed												
Copra	--	1,981	-1,981	--	1,453	-1,453	--	1,904	-1,904	--	1,351	-1,351
Palm kernels	--	363	-363	--	569	-569	--	683	-683	--	1,178	-1,178
Total	11,536	6,883	4,653	12,844	8,271	4,573	10,980	17,927	-6,947	20,299	8,759	11,540
Soybean oil												
Peanut oil												
Cottonseed oil												
Sunflowerseed oil	64,904	716	64,188	46,692	742	45,950	65,490	743	64,747	118,432	126	118,306
Rapeseed oil												
Coconut oil	--	2,637	-2,637	--	3,340	-3,340	--	3,538	-3,538	--	4,933	-4,933
Palm kernel oil												
Palm oil	--	402	-402	--	469	-469	--	831	-831	--	768	-768
Olive oil	--	2,323	-2,323	--	2,823	-2,823	--	5,747	-5,747	--	4,074	-4,074
Total	64,904	6,078	58,826	46,692	7,374	39,318	65,490	10,859	54,631	118,432	9,901	108,531
Soybean meal												
Peanut meal												
Cottonseed meal												
Sunflowerseed meal												
Rapeseed meal												
Copra meal												
Palm kernel meal												
Linseed meal												
Fish meal	456	--	456	550	--	550	1,103	--	1,103	1,717	--	1,717
Total	456	--	456	550	--	550	1,103	--	1,103	1,717	--	1,717
GRAND TOTAL	76,896	12,961	63,935	60,086	15,645	44,441	77,573	28,786	48,787	140,448	18,660	121,788

Table A-11.--Communist Asia: World trade in oilseeds and oilseed products by value, 1963-66

Item	1963			1964			1965			1966		
	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade
	1,000 dollars											
Soybeans	43,763	54	43,709	61,774	--	61,774	76,745	--	76,745	71,625	--	71,625
Peanuts	2,100	--	2,100	10,088	22	10,066	13,077	--	13,077	16,270	159	16,111
Cottonseed												
Sunflowerseed	347	--	347	102	--	102	615	--	615	600	--	600
Rapeseed	37	--	37	--	--	--	1,010	--	1,010	3,560	--	3,560
Copra	--	870	-870	--	1,380	-1,380	--	1,010	-1,010	--	--	--
Palm kernels	79	--	79	4	22	-17	--	130	-130	--	--	--
Total	46,327	924	45,403	71,964	1,424	70,540	91,447	1,140	90,307	92,055	159	91,896
Soybean oil	726	--	726	710	--	710	615	--	615	1,220	--	1,220
Peanut oil	898	--	898	2,200	--	2,200	2,698	--	2,698	9,030	--	9,030
Cottonseed oil	--	--	--	--	--	--	6,800	--	6,800	11,400	--	11,400
Sunflowerseed oil	--	90	-90	--	198	-198	--	210	-210	--	1,176	-1,176
Rapeseed oil	--	--	--	--	--	--	1,081	--	1,081	9,400	--	9,400
Coconut oil	--	3,176	3,176	--	5,045	-5,045	360	4,762	-4,402	610	2,770	-2,160
Palm kernel oil												
Palm oil	--	--	--	--	--	--	--	125	-125	--	30	-30
Olive oil	2	--	2	--	321	-321	--	224	-224	20	3	17
Total	1,626	3,866	-2,240	2,910	5,564	-2,654	11,554	5,321	6,233	31,680	3,979	27,701
Soybean meal												
Peanut meal												
Cottonseed meal												
Sunflowerseed meal												
Rapeseed meal												
Copra meal												
Palm kernel meal												
Linseed meal												
Fish meal	333	--	333	605	--	605	1,590	--	1,590	1,936	--	1,936
Total	333	--	333	605	--	605	1,590	--	1,590	1,936	--	1,936
GRAND TOTAL	48,286	4,790	43,496	75,479	6,988	68,491	104,591	6,461	97,613	125,671	4,138	121,533

Table A-12.--Central America and Mexico: World trade in oilseeds and oilseed products by value, 1963-66

Item	1963			1964			1965			1966		
	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade
	-1,000 dollars											
Soybeans	--	2,933	-2,933	--	3,203	-3,203	--	2,798	-2,798	--	3,154	-3,154
Peanuts	2,883	727	1,956	2,810	6,073	-4,056	2,060	896	1,164	1,791	841	950
Cottonseed	7,999	864	7,135	8,299	1,033	7,166	10,776	763	10,013	10,361	1,236	9,125
Sunflowerseed												
Rapeseed	--	28	-28	--	35	-35	--	28	-28	--	22	-22
Copra	6,113	2,290	3,827	3,956	2,790	1,166	2,510	2,233	277	1,759	2,260	-501
Palm kernels	--	--	--	--	--	--	25	--	25	--	--	--
Total	16,775	6,528	9,947	14,265	13,134	1,031	15,371	6,718	8,653	13,911	7,513	6,398
Soybean oil	--	2,969	-2,969	--	4,439	-4,439	--	5,216	-5,216	--	4,778	-4,778
Peanut oil	--	349	-349	--	503	-503	--	1,050	-1,050	--	1,039	-1,039
Cottonseed oil	1,485	1,273	232	1,572	1,396	176	2,011	8,216	-6,205	3,987	5,713	-1,726
Sunflowerseed oil	--	10,940	-10,940	--	7,080	-7,080	--	12,080	-12,080	--	13,650	-13,650
Rapeseed oil	--	13	-13	--	277	-277	--	1,451	-1,451	--	1,863	-1,863
Coconut oil	1,212	2,205	-1,093	847	2,303	-1,456	2,229	1,572	657	1,361	1,151	210
Palm kernel oil	1	--	1	2	--	2	--	--	--	--	--	--
Palm oil	247	404	-157	126	556	-430	207	367	-160	183	931	-748
Olive oil	2	5,477	-5,475	3	4,390	-4,387	--	1,880	-1,880	--	1,794	-1,794
Total	2,747	23,186	-20,439	2,550	20,944	-18,394	4,447	31,832	-27,385	5,531	30,919	-25,388
Soybean meal	--	996	-996	--	3,851	-3,851	--	1,785	-1,785	--	1,843	-1,843
Peanut meal	972	--	972	1,475	--	1,475	430	--	430	--	--	--
Cottonseed meal	7,909	--	7,909	9,066	--	9,066	10,894	--	10,894	10,865	--	10,865
Sunflowerseed meal												
Rapeseed meal												
Copra meal	24	--	24	26	--	26	115	--	115	118	--	118
Palm kernel meal												
Linseed meal	--	120	-120	--	116	-116	--	102	-102	--	92	-92
Fish meal	155	3,739	-3,584	312	4,830	-4,518	721	5,739	-5,028	1,525	10,915	-9,390
Total	9,060	4,855	4,205	10,879	8,797	2,082	12,160	7,626	4,534	12,508	12,850	-342
GRAND TOTAL	28,582	34,757	-6,175	28,188	39,875	-11,687	31,968	46,176	-14,208	31,950	51,282	-19,332

Table A-13.--South America: World trade in oilseeds and oilseed products by value, 1963-66

Item	1963			1964			1965			1966		
	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade
						1,000 dollars						
Soybeans	3,107	610	2,497	13	2,876	-2,863	7,427	3,002	4,425	13,067	4,491	8,576
Peanuts	2,508	201	2,307	47	140	-93	4,207	315	3,892	3,515	250	3,265
Cottonseed	--	28	-28	--	1	-1	--	29	-29	--	177	-177
Sunflowerseed	12	14	-2	--	16	-16	--	14	-14	--	28	-28
Rapeseed	--	23	-23	475	27	448	--	25	-25	--	30	-30
Copra	--	11,015	-11,015	--	13,201	-13,201	--	11,898	-11,898	--	11,730	-11,730
Palm kernels	611	8	603	--	356	-356	457	--	457	--	--	--
Total	6,238	11,899	-5,661	535	16,617	-16,082	12,091	15,283	-3,192	16,582	16,706	-124
Soybean oil	--	8,880	-8,880	--	14,195	-14,195	--	20,884	-20,884	--	16,904	-16,904
Peanut oil	11,027	2,571	8,456	212	819	-607	16,998	3,493	13,505	19,697	2,265	17,432
Cottonseed oil	1,331	3,948	-2,617	38	8,208	-8,170	292	9,091	-8,799	354	6,106	-5,752
Sunflowerseed oil	1,462	79	1,383	97	--	97	9,036	2,224	6,812	19,384	11,486	7,898
Rapeseed oil	--	3	-3	--	6	-6	--	69	-69	--	83	-83
Coconut oil	--	2,146	-2,146	--	2,083	-2,083	--	1,838	-1,838	--	1,583	-1,583
Palm kernel oil	1,190	470	720	758	28	730	1,056	257	799	1,336	92	1,244
Palm oil	469	831	-362	432	1,289	-857	305	457	-152	376	412	-36
Olive oil	6,534	5,595	939	5,412	8,605	-3,193	3,746	7,749	-4,003	5,180	8,397	-3,217
Total	22,013	24,523	-2,510	6,949	35,233	-28,284	31,433	46,062	-14,629	46,327	47,328	-1,001
Soybean meal	4,334	1,490	2,844	3,118	679	2,439	7,863	69	7,794	14,653	10	14,643
Peanut meal	16,481	--	16,481	11,823	--	11,823	19,713	--	19,713	25,854	--	25,854
Cottonseed meal	8,555	--	8,555	7,912	--	7,912	8,154	--	8,154	7,456	--	7,456
Sunflowerseed meal	16,585	--	16,585	13,760	--	13,760	18,216	--	18,216	23,808	--	23,808
Rapeseed meal	147	--	147	326	--	326	222	--	222	--	--	--
Copra meal												
Palm kernel meal	115	--	115	68	--	68	86	--	86	110	--	110
Linseed meal	44,217	13	44,204	37,936	19	37,917	43,879	17	43,862	27,993	14	27,979
Fish meal	115,724	2,324	113,400	163,016	2,506	160,510	165,589	1,873	163,716	208,599	2,722	205,877
Total	206,158	3,827	202,331	237,959	3,204	234,755	263,722	1,959	261,763	308,473	2,746	305,727
GRAND TOTAL	234,409	40,249	194,160	245,443	55,054	190,389	307,246	63,304	243,942	371,382	66,780	304,602

Table A-14.--East and West Africa: World trade in oilseeds and oilseed products by value, 1963-66

Item	1963			1964			1965			1966		
	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade
	1,000 dollars											
Soybeans	5,469	--	5,469	969	--	969	1,811	--	1,811	1,358	--	1,358
Peanuts	186,390	944	185,446	178,988	2,221	176,839	186,965	990	184,975	187,189	564	186,625
Cottonseed	6,967	18	6,949	5,591	21	5,549	6,979	99	6,880	7,978	97	7,881
Sunflowerseed	727	1	726	1,433	21	1,412	1,376	12	1,064	994	--	994
Rapeseed	456	--	456	132	--	132	132	--	132	--	--	--
Copra	43,246	673	43,573	24,998	749	24,249	12,824	640	11,984	11,426	864	10,562
Palm kernels	78,452	62	78,390	86,073	76	86,297	101,930	73	101,857	84,791	73	84,718
Total	322,307	1,697	320,610	298,184	3,188	295,996	314,017	1,814	308,703	293,736	1,598	292,138
Soybean oil	--	5,186	-5,186	--	2,489	-2,489	--	5,518	-5,518	--	5,187	-5,187
Peanut oil	81,377	3,503	77,874	77,979	3,747	77,232	92,190	3,279	88,911	92,750	2,887	89,863
Cottonseed oil	1,183	183	1,000	1,445	1,376	69	1,358	2,029	-679	483	1,124	-641
Sunflowerseed oil	--	--	--	3	5	-2	25	162	-137	45	633	-588
Rapeseed oil	--	83	-83	267	142	125	595	673	-75	--	824	-824
Coconut oil	2,487	1,525	962	2,462	1,314	1,148	2,133	2,580	-447	1,571	2,662	-1,091
Palm kernel oil	7,478	310	7,168	10,990	402	9,684	13,636	523	13,113	19,005	297	18,708
Palm oil	98,649	1,830	96,823	58,733	1,849	57,884	66,825	3,518	63,307	53,346	3,938	49,408
Olive oil	--	4,331	-4,331	--	4,576	-4,576	--	4,603	-4,603	--	5,109	-5,109
Total	190,782	16,965	173,817	152,998	14,320	138,918	176,757	22,885	153,872	167,200	22,661	144,539
Soybean meal												
Peanut meal	16,763	328	16,435	25,697	779	24,828	28,468	1,004	27,464	31,155	1,254	29,901
Cottonseed meal	8,413	443	7,970	9,017	753	8,264	11,877	766	11,111	11,039	783	10,256
Sunflowerseed meal												
Rapeseed meal	421	--	421	--	--	--	--	--	--	--	--	--
Copra meal	864	--	864	837	--	837	902	--	902	685	--	685
Palm kernel meal	2,278	--	2,278	2,682	--	2,682	2,128	--	2,128	2,296	--	2,296
Linseed meal												
Fish meal	3,111	849	2,261	6,231	844	5,387	6,218	1,210	5,008	7,805	1,310	6,495
Total	31,850	1,621	30,229	44,374	2,376	41,998	49,593	2,980	46,613	52,980	3,347	49,633
GRAND TOTAL	461,658	15,063	446,595	406,381	18,648	467,733	536,867	27,679	509,188	513,916	27,606	486,310

Table A-15.--North Africa and West Asia: World trade in oilseeds and oilseed products by value, 1963-66

Item	1963			1964			1965			1966		
	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade
	1,000 dollars											
Soybeans	--	19,803	-19,803	349	26,681	-26,332	97	28,320	-28,223	--	30,856	-30,856
Peanuts	25,381	9,663	15,718	33,172	8,498	24,674	30,768	5,877	24,891	56,072	4,443	51,929
Cottonseed	14,865	7,287	7,576	6,314	3,721	2,596	11,027	5,022	6,005	6,728	3,114	3,614
Sunflowerseed	231	557	-326	20	143	-123	170	80	90	19	13	6
Rapeseed	256	13,876	-13,620	132	11,158	-11,026	10	9,000	-8,990	17	10,188	-10,171
Copra	--	1,487	-1,487	--	1,843	-1,843	--	1,612	-1,612	--	3,327	-3,327
Palm kernels	--	191	-191	--	--	--	--	117	-117	--	369	-369
Total	40,733	52,864	-12,131	39,987	52,044	-12,057	42,072	50,028	-7,956	62,836	52,310	10,526
Soybean oil	4,806	47,086	-42,280	5,270	39,285	-34,015	6,200	43,056	-36,856	4,494	34,850	-30,356
Peanut oil	53	5,898	-5,845	512	3,729	-3,217	269	2,891	-2,622	--	3,148	-3,148
Cottonseed oil	3,075	33,239	-30,164	3,688	25,464	-21,776	7,466	24,586	-17,120	7,313	15,804	-8,491
Sunflowerseed oil	2	4,243	-4,241	3	5,922	-5,919	3	6,094	-6,091	1	20,897	-20,896
Rapeseed oil	12	430	-418	--	240	-240	--	645	-645	--	861	-861
Coconut oil	27	806	-779	87	632	-545	37	926	-889	27	962	-934
Palm kernel oil	--	229	-229	--	231	-231	--	612	-612	--	343	-343
Palm oil	--	6,826	-6,826	--	7,881	-7,881	--	14,475	-14,475	--	9,662	-9,662
Olive oil	55,512	996	54,516	34,560	5,131	29,429	41,740	1,078	40,662	41,868	4,988	36,880
Total	63,487	99,753	-36,266	44,120	88,515	-44,395	55,715	94,363	-38,648	53,703	91,515	-37,812
Soybean meal	575	69	506	610	46	564	870	116	754	--	190	-190
Peanut meal	168	28	140	436	60	376	115	111	4	--	15	-15
Cottonseed meal	16,569	--	16,569	16,912	--	16,912	20,216	--	20,216	22,954	--	22,954
Sunflowerseed meal	--	16	-16	--	25	-25	--	46	-46	--	--	--
Rapeseed meal	2,030	--	2,030	2,128	--	2,128	2,070	--	2,070	1,710	--	1,710
Copra meal	40	--	40	--	--	--	--	--	--	--	--	--
Palm kernel meal												
Linseed meal	193	--	193	228	--	228	182	--	182	137	--	137
Fish meal	2,316	1,556	760	2,694	1,480	1,214	1,186	1,528	-214	5,795	2,637	3,158
Total	21,891	1,669	20,222	23,008	1,611	21,397	24,639	1,801	22,838	30,596	2,842	27,754
GRAND TOTAL	126,111	154,286	-28,175	107,115	142,170	-35,055	122,426	146,192	-23,766	147,135	146,667	468

Table A-1.--South Asia: World trade in oilseeds and oilseed products by value, 1963-66

Item	1963			1964			1965			1966		
	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade
	1,000 dollars											
Soybeans	--	25	-25	--	76	-76	--	3,254	-3,254	--	2,540	-2,540
Peanuts	7,547	6	7,541	7,737	5	7,732	82	783	-701	34	--	34
Cottonseed	237	13	224	423	5	418	3,310	413	+2,897	3,356	2	3,354
Sunflowerseed												
Rapeseed	522	592	-70	556	2,033	-1,477	559	4,453	-3,894	742	3,786	-3,044
Copra	8,240	19,114	-10,874	11,571	16,639	-5,068	10,190	13,514	-3,324	5,165	7,298	-2,133
Palm kernels												
Total	16,546	19,750	-3,204	20,287	18,758	1,529	14,141	22,417	-8,276	9,297	13,626	-4,329
Soybean oil	--	29,341	-29,341	--	21,537	-21,537	--	42,618	-42,618	--	19,031	-19,031
Peanut oil	23,071	43	23,028	15,908	114	15,794	6	8	-2	394	18	376
Cottonseed oil	--	3,669	-3,669	--	3,987	-3,987	--	5,120	-5,120	--	3,006	-3,006
Sunflowerseed oil												
Rapeseed oil	102	--	102	135	201	-66	340	216	124	252	199	53
Coconut oil	20,783	4,406	16,377	32,367	5,312	27,055	30,433	4,968	25,465	22,790	5,922	16,868
Palm kernel oil	--	85	-85	--	98	-98	--	46	-46	--	25	-25
Palm oil	--	8,121	-8,121	--	8,017	-8,017	--	2,064	-2,064	--	2,659	-2,659
Olive oil	--	47	-47	--	73	-73	--	74	-74	--	20	-20
Total	43,956	45,712	-1,756	48,410	39,339	9,071	39,779	55,114	-24,335	23,436	30,880	-7,444
Soybean meal												
Peanut meal	63,151	11	63,140	69,848	11	69,837	69,678	12	69,666	59,103	--	59,103
Cottonseed meal	5,726	--	5,726	6,989	--	6,989	8,982	--	8,982	11,354	--	11,354
Sunflowerseed meal												
Rapeseed meal	939	--	939	537	--	537	852	--	852	814	--	814
Copra meal	1,392	--	1,392	1,599	--	1,599	2,166	--	2,166	1,483	--	1,483
Palm kernel meal												
Linseed meal	1,483	--	1,483	1,032	--	1,032	84	--	84	1,212	--	1,212
Fish meal	265	--	265	462	--	462	907	--	907	889	--	889
Total	72,956	11	72,945	80,467	11	80,456	82,669	12	82,657	74,855	--	74,855
GRAND TOTAL	133,458	65,473	67,985	149,164	58,108	91,056	127,589	77,543	50,046	107,588	44,506	63,082

Table A-17.--Southeast Asia: World trade in oilseeds and oilseed products by value, 1963-66

Item	1963			1964			1965			1966		
	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade
	1,000 dollars											
Soybeans	987	111	876	812	--	812	1,172	198	974	803	--	803
Peanuts	2,853	--	2,853	3,269	9,650	-6,381	4,888	--	4,888	3,581	--	3,581
Cottonseed	496	3	493	660	--	660	513	--	513	1,126	--	1,126
Sunflowerseed												
Rapeseed	55	--	55	47	--	47	24	--	24	--	--	--
Copra	20	610	-590	3	95	-92	41	314	-273	76	19	57
Palm kernels												
Total	4,411	724	3,687	4,791	9,745	-4,954	6,638	512	6,126	5,586	19	5,567
Soybean oil	11	753	-742	12	7,887	-7,875	8	988	-980	3	4,599	-4,596
Peanut oil	257	433	-176	384	27,995	-27,611	739	792	-53	554	419	135
Cottonseed oil												
Sunflowerseed oil												
Rapeseed oil												
Coconut oil	24	1,151	-1,127	140	3,648	-3,508	302	3,299	-2,997	--	344	-344
Palm kernel oil												
Palm oil	--	14	-14	--	20	-20	--	13	-13	--	18	-18
Olive oil	--	28	-28	--	54	-54	--	26	-26	--	23	-23
Total	292	2,379	-2,087	536	39,604	-39,068	1,049	5,118	-4,069	557	5,403	-4,846
Soybean meal	363	--	363	648	--	648	332	--	332	249	--	249
Peanut meal	14,147	--	14,147	8,942	--	8,942	4,883	--	4,883	5,238	--	5,238
Cottonseed meal	724	--	724	647	--	647	634	--	634	634	--	634
Sunflowerseed meal												
Rapeseed meal												
Copra meal	421	--	421	376	--	376	515	--	515	732	--	732
Palm kernel meal												
Linseed meal												
Fish meal	7	--	7	21	--	21	173	--	173	586	--	586
Total	15,662	--	15,662	10,634	--	10,634	6,537	--	6,537	7,439	--	7,439
GRAND TOTAL	20,365	3,103	17,262	15,961	49,349	-33,388	14,224	5,630	8,594	13,582	5,422	8,160

Table A-18.--Other East Asia and Pacific Islands: World trade in oilseeds and oilseed products by value, 1963-66

Item	1963			1964			1965			1966		
	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade	Exports	Imports	Net trade
	1,000 dollars											
Soybeans	1,552	27,042	-25,490	1,230	21,996	-20,766	1,860	29,175	-27,315	1,852	30,739	-28,887
Peanuts	1,360	6,572	-5,212	2,133	9,363	-7,230	2,758	7,325	-4,567	2,043	7,979	-5,936
Cottonseed	247	207	40	9	21	-12	10	7	3	53	104	-51
Sunflowerseed												
Rapeseed	18	--	18	4	648	-644	4	--	4	--	--	--
Copra	246,830	11,779	235,051	235,091	6,962	228,109	236,580	7,547	229,033	226,387	9,772	216,609
Palm kernels	6,855	1,241	5,614	6,807	1,495	5,312	7,349	1,782	5,567	7,971	1,892	6,079
Total	256,862	46,841	210,021	245,270	40,505	204,765	248,561	45,836	202,725	238,300	50,486	187,814
Soybean oil	273	5,047	-4,774	848	9,746	-8,898	1,086	5,848	-4,762	339	2,726	-2,387
Peanut oil	2,845	9,903	-7,058	2,851	9,454	-6,603	3,392	11,419	-8,027	4,275	10,186	-5,911
Cottonseed oil	2	102	-100	9	268	-259	8	734	-726	200	780	-580
Sunflowerseed oil												
Rapeseed oil	11	1,323	-1,312	9	969	-960	74	1,958	-1,884	1,024	7,512	-6,488
Coconut oil	78,061	3,325	74,736	86,410	3,126	83,284	91,005	3,937	87,068	101,493	6,777	94,716
Palm kernel oil	81	86	-5	--	141	-141	--	218	-218	106	--	106
Palm oil	49,874	11,106	38,768	61,384	10,280	51,104	74,035	15,071	58,964	83,464	15,270	68,194
Olive oil	12	160	-148	10	167	-157	6	194	-188	5	477	-472
Total	131,159	31,052	100,107	151,521	34,151	117,370	169,606	39,379	130,227	190,906	43,728	147,178
Soybean meal	--	515	-515	--	621	-621	--	848	-848	--	1,012	-1,012
Peanut meal												
Cottonseed meal	--	--	--	--	--	--	--	26	-26	--	143	-143
Sunflowerseed meal												
Rapeseed meal												
Copra meal	18,241	3,594	14,647	17,392	1,617	15,775	17,567	1,766	15,801	22,311	1,419	20,892
Palm kernel meal												
Linseed meal												
Fish meal	638	5,234	-4,596	454	6,199	-5,745	498	6,567	-6,069	742	7,500	-6,758
Total	18,879	9,343	9,536	17,846	8,437	9,409	18,065	9,207	8,858	23,053	10,074	12,979
GRAND TOTAL	406,900	87,236	319,664	414,637	83,093	331,544	436,232	94,422	341,810	452,259	104,288	347,971

APPENDIX B.--WORLD PRODUCTION OF OILSEEDS AND OILSEED PRODUCTS

World Production of Oilseed Products by Region Averages for 1954-56, 1960-62, and 1965-67

Table		Page
B- 1	Cottonseed	159
B- 2	Peanuts	160
B- 3	Soybeans	161
B- 4	Sunflowerseed	162
B- 5	Rapeseed	163
B- 6	Olive Oil	164
B- 7	Palm Oil	165
B- 8	Palm kernels	166
B- 9	Copra	167

World Production of Oilseeds, Vegetable Oil (Oil Equivalent), and Oilcakes (Meal Equivalent), by Region, 1955-68

B-10	United States	168
B-11	Canada	169
B-12	EC	170
B-13	Other Western Europe	171
B-14	Japan	172
B-15	Australia and New Zealand	173
B-16	South Africa, Republic of	174
B-17	Eastern Europe	175
B-18	USSR	176
B-19	Communist Asia	177
B-20	Central America and Mexico	178
B-21	South America	179
B-22	East and West Africa	181
B-23	North Africa and West Asia	183
B-24	South Asia	184
B-25	Southeast Asia	185
B-26	East Asia and Pacific Islands	186

Factors used in Converting Oilseeds into Oil and Meal Equivalents

B-27	Assignment of oilseed production to processing year, either year of harvest or year following harvest year	187
B-28	Percentage of oilseed crops assumed crushed for oil and meal production, by country	188
B-29	Conversion rates for oilseeds to oil equivalent	189
B-30	Conversion rates for oilseeds to meal equivalent	190

Table B-1.--Cottonseed: World production by regions, averages for 1954-56, 1960-62, 1965-67, and annual percentage rates of change

Region	Average			Share of	Rates of change	
	1954-56	1960-62	1965-67	1965-67 total	1954-56 : 1965-67	1960-62 : 1965-67
	1,000 metric tons			Percent	Percent per year	
United States	5,189	5,444	4,044	19.4	-2.2	-5.8
Canada	--	--	--	--	--	--
EC	17	8	7	--	-7.7	-2.6
United Kingdom	--	--	--	--	--	--
O.W.E.	180	371	306	1.5	5.0	-3.8
Japan	--	--	--	--	--	--
Australia-New Zealand	1	4	14	.1	1/	2/
South Africa, Republic of	11	11	30	.2	9.6	22.2
Total Developed Countries	5,398	5,838	4,401	21.2	-1.8	-5.5
Eastern Europe	67	33	40	.2	-4.6	2.3
USSR	2,565	2,910	3,733	17.9	3.5	5.1
Communist Asia	2,847	2,462	2,971	14.3	.4	3.8
Total Communist Countries	5,479	5,405	6,744	32.4	1.9	4.5
Central America and Mexico	1,010	973	1,296	6.2	2.3	5.9
South America	1,324	1,659	1,707	8.2	2.3	.6
East and West Africa	548	638	958	4.6	5.2	8.5
North Africa and West Asia	1,544	2,088	2,537	12.2	4.6	4.0
South Asia	2,782	3,062	3,059	14.7	.9	-.1
South East Asia	64	75	84	.4	2.5	2.3
East Asia and Pacific Islands	36	19	11	.1	-10.2	-10.4
Total Less Developed Countries	7,308	8,514	9,652	46.4	2.6	2.5
WORLD TOTAL	18,185	19,757	20,797	100.0	1.2	1.0

1/ More than 15 percent.
2/ More than 24 percent.

Sources: USDA bulletins on world oilseed production and FAO Production Yearbooks.

Table B-2.--Peanuts: World production by regions, averages for 1954-56, 1960-62, 1965-67, and annual percentage rates of change

Region	Average			Share of	Rates of change	
	1954-56	1960-62	1965-67	1965-67 total	1954-56 : 1965-67	1960-62 : 1965-67
	-1,000 metric tons			Percent	Percent per year	
United States	629	807	1,099	6.7	5.2	2.6
Canada	--	--	--	--	--	--
EC	10	12	7	--	-3.2	-6.9
United Kingdom	--	--	--	--	--	--
O.W.E.	17	13	14	.1	-1.8	-3.8
Japan	45	137	237	.8	10.6	--
Australia-New Zealand	11	18	33	.2	10.5	12.9
South Africa, Republic of	203	208	270	1.7	2.6	5.4
Total Developed Countries	915	1,195	1,560	9.5	4.9	5.5
Eastern Europe	4	3	3	--	-2.6	0.0
USSR	--	--	--	--	--	--
Communist Asia	3,009	1,724	2,370	14.4	-2.2	6.6
Total Communist Countries	3,013	1,727	2,373	14.4	-2.2	6.6
Central America and Mexico	136	167	167	1.0	1.9	--
South America	378	899	1,252	7.6	11.5	6.8
East and West Africa	2,898	3,926	4,676	28.5	4.4	3.6
North Africa and West Asia	151	289	419	2.6	9.7	7.7
South Asia	4,107	4,896	4,893	29.8	1.6	.1
South East Asia	266	559	530	3.2	6.5	1.1
East Asia and Pacific Islands	431	501	556	3.4	2.4	2.1
Total Less-Developed Countries	8,367	11,237	12,493	76.1	3.7	2.1
WORLD TOTAL	12,295	14,159	16,426	100.0	2.7	3.0

Sources: USDA bulletins on world oilseed production and FAO Production Yearbooks.

Table B-3.--Soybeans: World production by regions, averages for 1954-56, 1960-62, 1965-67, and annual percentage rates of change

Region	Average			Share of 1965-67 total	Rates of change	
	1954-56	1960-62	1965-67	1965-67 total	1954-56 : 1965-67	1960-62 : 1965-67
	1,000 metric tons			Percent	Percent per year	
United States	10,560	17,263	24,950	72.3	8.1	7.6
Canada	144	165	228	.7	4.3	6.7
EC	--	--	--	--	--	--
United Kingdom	--	--	--	--	--	--
O.W.E.	--	--	--	--	--	--
Japan	446	380	206	.6	-6.8	-11.5
Australia-New Zealand	--	--	--	--	--	--
South Africa, Republic of	--	2	2			
Total Developed Countries	11,150	17,810	25,386	73.6	7.8	7.3
Eastern Europe	14	24	16	--	1.2	-7.8
USSR	107	310	519	1.6	1/	10.9
Communist Asia	9,157	8,158	7,073	20.5	-2.3	-2.8
Total Communist Countries	9,278	8,492	7,608	22.1	-1.8	-2.2
Central America and Mexico	--	12	94	.3	--	2/
South America	115	301	697	2.0	1/	2/
East and West Africa	27	31	28	.1	.3	-2.0
North Africa and West Asia	4	5	5	--	2.1	0.0
South Asia	--	--	--	--	--	--
South East Asia	30	41	38	.1	2.1	-1.5
East Asia and Pacific Islands	550	627	647	1.8	1.5	.6
Total Less-Developed Countries	726	1,017	1,509	4.3	6.9	2.8
WORLD TOTAL	21,154	27,319	34,503	100.0	4.5	4.8

1/ More than 15 percent.
2/ More than 24 percent.

Sources: USDA bulletins on world oilseed production and FAO Production Yearbooks.

Table B-4.--Sunflowerseed: World production by regions, averages for 1954-56, 1960-62, 1965-67, and annual percentage rates of change

Region	Average			Share of	Rates of change	
	1954-56	1960-62	1965-67	1965-67 total	1954-56 to 1965-67	1960-62 to 1965-67
	1,000 metric tons			Percent	Percent per year	
United States						
Canada	8	11	16	.2	6.5	7.8
EC	9	20	22	.3	7.6	2.0
United Kingdom	--	--	--	--	--	--
O.W.E.	--	1	4	--	--	--
Japan	--	--	--	--	--	--
Australia-New Zealand	--	--	--	--	--	--
South Africa, Republic of	55	100	91	1.1	4.7	-1.9
Total Developed Countries	72	132	133	1.6	5.7	.2
Eastern Europe	765	1,083	1,424	16.8	5.8	5.6
USSR	2,960	4,144	5,583	66.0	5.9	6.2
Communist Asia	53	61	66	.8	2.0	1.6
Total Communist Countries	3,778	5,288	7,073	83.6	5.9	6.0
Central America and Mexico	--	--	--	--	--	--
South America	593	857	1,002	11.8	4.9	3.2
East and West Africa	26	35	47	.6	5.5	6.1
North Africa and West Asia	122	90	205	2.4	4.8	17.9
South Asia	--	--	--	--	--	--
South East Asia	--	--	--	--	--	--
East Asia and Pacific Islands	--	--	--	--	--	--
Total Less-Developed Countries	741	982	1,254	14.8	4.9	5.0
WORLD TOTAL	4,591	6,402	8,460	100.0	5.7	5.7

Sources: USDA bulletins on world oilseed production and FAO Production Yearbooks.

Table B-5.--Rapeseed: World production by regions, averages for 1954-56, 1960-62, 1965-67, and annual percentage rates of changes

Region	Average			Share of 1965-67 total	Rates of change	
	1954-56	1960-62	1965-67		1954-56 : 1960-62 to 1965-67	1960-62 to 1965-67
	1,000 metric tons			Percent	Percent per year	
United States	1	--	1	--	--	--
Canada	61	213	553	11.8	1/	21.0
EC	141	213	487	10.3	11.6	18.0
United Kingdom	--	--	10	.2	--	--
O.W.E.	142	163	240	5.1	4.9	8.0
Japan	270	262	100	2.1	-8.6	-16.0
Australia-New Zealand	--	--	--	--	--	--
South Africa, Republic of	--	--	--	--	--	--
Total Developed Countries	615	851	1,391	29.5	7.7	10.3
Eastern Europe	324	517	858	18.2	9.3	10.7
USSR	31	18	8	.2	-11.0	-15.0
Communist Asia	897	540	745	15.7	-1.7	6.6
Total Communist Countries	1,252	1,075	1,611	34.1	2.3	8.4
Central America and Mexico	7	7	6	.1	-1.4	-3.0
South America	--	36	64	1.4	--	12.2
East and West Africa	20	5	6	.1	-10.4	3.7
North Africa and West Asia	2	4	8	.2	13.4	14.9
South Asia	1,231	1,567	1,621	34.4	2.6	.7
South East Asia	--	--	--	--	--	--
East Asia and Pacific Islands	1	7	12	.2	1/	11.4
Total Less-Developed Countries	1,261	1,626	1,717	36.4	2.1	1.1
WORLD TOTAL	3,128	3,552	4,719	100.0	3.8	5.8

1/ More than 15 percent.

Sources: USDA bulletins on world oilseed production and FAO Production Yearbooks.

Table B-6,--Olive oil: World production by regions, averages for 1954-56, 1960-62 1965-67, and annual percentage rates of changes

Region	Average			Share of 1965-67 total	Rates of change	
	1954-56	1960-62	1965-67		1954-56 : 1960-62 1965-67 : 1965-67	
	1,000 metric tons			Percent	Percent per year	
United States	1	1	1	.1	--	--
Canada	--	--	--	--	--	--
EC	231	362	427	34.1	5.8	3.4
United Kingdom	--	--	--	--	--	--
O.W.E.	534	586	599	47.8	1.0	.4
Japan	--	--	--	--	--	--
Australia-New Zealand	--	--	--	--	--	--
South Africa, Republic of	--	--	--	--	--	--
Total Developed Countries	766	949	1,027	82.0	2.7	1.6
Eastern Europe	4	3	5	.4	2.1	10.8
USSR	--	--	--	--	--	--
Communist Asia	--	--	--	--	--	--
Total Communist Countries	4	3	5	.4	2.1	10.8
Central America and Mexico	--	--	--	--	--	--
South America	4	6	10	.8	8.7	10.8
East and West Africa	--	--	--	--	--	--
North Africa and West Asia	180	222	210	16.8	1.4	-1.1
South Asia	--	--	--	--	--	--
South East Asia	--	--	--	--	--	--
East Asia and Pacific Islands	--	--	--	--	--	--
Total Less-Developed Countries	184	228	220	17.6	1.6	-.7
WORLD TOTAL	954	1,180	1,252	100.0	2.5	1.2

Sources: USDA bulletins on world oilseed production and FAO Production Yearbooks.

Table B-7.--Palm oil: World production by regions, averages for 1954-56, 1960-62, 1965-67, and annual percentage rates of changes

Region	Average			Share of 1965-67 total	Rates of change	
	1954-56	1960-62	1965-67		1954-56 : 1960-62 to 1965-67	1960-62 to 1965-67
	1,000 metric tons			Percent	Percent per year	
United States						
Canada						
EC						
United Kingdom						
O.W.E.						
Japan						
Australia-New Zealand						
South Africa, Republic of						
Total Developed Countries						
Eastern Europe						
USSR						
Communist Asia						
Total Communist Countries						
Central America and Mexico	--	--	--	--	--	--
South America	2	3	6	.5	10.5	14.9
East and West Africa	984	999	843	70.8	-1.4	-3.3
North Africa and West Asia	--	--	--	--	--	--
South Asia	--	--	--	--	--	--
South East Asia	--	--	--	--	--	--
East Asia and Pacific Islands	223	241	341	28.7	3.9	7.2
Total Less-Developed Countries	1,209	1,243	1,190	100.0	-.1	-.9
WORLD TOTAL	1,209	1,243	1,190	100.0	-.1	-.9

Sources: USDA bulletins on world oilseed production and FAO Production Yearbooks.

Table B-8.--Palm kernels: World production by regions, averages for 1954-56, 1960-62, 1965-67, and annual percentage rates of changes

Region	Average			Share of 1965-67 total	Rates of change	
	1954-56	1960-62	1965-67		1954-67 : 1960-62	
					1965-67 : 1965-67	
	1,000 metric tons			Percent	Percent per year	
United States						
Canada						
EC						
United Kingdom						
O.W.E.						
Japan						
Australia-New Zealand						
South Africa, Republic of						
Total Developed Countries						
Eastern Europe						
USSR						
Communist Asia						
Total Communist Countries						
Central America and Mexico	17	25	27	2.7	4.3	1.6
South America	82	125	167	16.9	66.7	6.0
East and West Africa	836	797	719	72.8	-1.4	-2.0
North Africa and West Asia	--	--	--	--	--	--
South Asia	--	--	--	--	--	--
South East Asia	--	--	--	--	--	--
East Asia and Pacific Islands	57	59	75	7.6	2.5	4.9
Total Less-Developed Countries	992	1,006	988	100.0	-.1	-.4
WORLD TOTAL	992	1,006	988	100.0	-.1	-.4

Sources: USDA bulletins on world oilseed production and FAO Production Yearbooks.

Table B-9.--Copra: World production by regions, averages for 1954-56, 1960-62, 1965-67, and annual percentage rates of change

Region	Average			Share of 1965-67 total	Rates of change	
	1954-56	1960-62	1965-67		1954-56 to 1965-67	1960-62 to 1965-67
	1,000 metric tons			Percent	Percent per year	
United States						
Canada						
EC						
United Kingdom						
O.W.E.						
Japan						
Australia-New Zealand						
South Africa, Republic of						
Total Developed Countries						
Eastern Europe						
USSR						
Communist Asia						
Total Communist Countries						
Central America and Mexico	143	219	209	4.4	3.5	-.9
South America	17	12	18	.3	.5	8.4
East and West Africa	125	135	143	3.0	1.2	1.2
North Africa and West Asia	--	--	--	--	--	--
South Asia	724	781	808	17.1	1.0	.7
South East Asia	242	235	238	5.1	-.2	.2
East Asia and Pacific Islands	2,626	2,848	3,315	70.1	2.1	3.1
Total Less-Developed Countries	3,877	4,230	4,731	100.0	1.8	2.3
WORLD TOTAL	3,877	4,230	4,731	100.0	1.8	2.3

Sources: USDA bulletins on world oilseed production and FAO Production Yearbooks.

Table B-10.--United States: Production of selected oilseeds, plus their oil and meal equivalent, 1955-68

Item	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
	1,000 metric tons													
Actual														
Cottonseed	5,482	4,905	4,181	4,353	5,435	5,340	5,423	5,569	5,617	5,649	5,522	3,592	3,017	4,140
Peanut	702	729	651	823	720	810	789	821	917	1,000	1,081	1,093	1,122	1,146
Soybean	10,170	12,227	13,157	15,792	14,503	15,113	18,495	18,213	19,034	19,078	23,016	25,270	26,564	29,385
Olive oil	1	--	2	--	4	--	1	1	1	1	1	1	1	1
Flaxseed	1,027	1,195	638	950	539	772	563	819	791	620	899	594	509	693
Oil equivalent basis														
Cottonseed	821	829	712	651	765	824	814	882	870	877	895	760	503	506
Peanut	37	39	55	31	48	43	46	29	46	63	83	88	106	106
Soybean	1,620	1,797	2,014	2,208	2,581	2,730	2,681	3,020	3,164	3,288	3,511	3,373	4,104	4,258
Olive oil	1	--	2	--	4	--	1	1	1	1	1	1	1	1
Total oil	2,479	2,665	2,783	2,890	3,398	3,597	3,542	3,932	4,081	4,229	4,490	4,722	4,714	4,871
Meal equivalent basis														
Cottonseed	2,396	2,175	1,781	1,872	2,312	2,275	2,276	2,485	2,534	2,517	2,447	1,638	1,317	1,680
Peanut	50	67	54	75	69	84	56	57	87	117	137	146	157	142
Soybean	7,382	8,392	9,343	10,963	11,326	11,356	12,637	13,951	13,712	14,643	17,062	17,825	18,091	19,359
Linseed	792	490	639	491	552	482	355	438	398	476	466	478	367	390
Total meal	10,620	11,124	11,817	13,401	14,259	14,197	15,344	16,941	16,731	17,751	20,112	20,087	19,932	21,571

Sources: USDA bulletins on world oilseed production and FAO Production Yearbooks.

Table B-11.--Canada: Production of selected oilseeds, plus their oil and meal equivalent, 1955-68

Item	1955	1956	1956	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
	1,000 metric tons													
Actual														
Soybean	15	144	177	181	186	136	180	180	136	190	219	245	220	249
Rapeseed	35	136	196	176	81	252	254	133	190	300	513	586	561	424
Sunflowerseed	7	9	5	10	15	13	11	8	18	14	13	18	18	18
Flaxseed	482	889	488	567	437	571	364	407	536	516	743	559	238	461
Oil equivalent basis														
Soybean	21	24	22	28	29	29	21	29	29	21	29	34	39	34
Rapeseed	4	11	43	62	56	25	79	80	42	59	94	162	184	176
Sunflowerseed	2	2	2	1	2	3	3	2	2	6	4	4	6	6
Total oil	27	37	67	91	87	57	103	111	73	86	127	200	229	216
Meal equivalent basis														
Soybean	99	114	104	133	137	137	99	137	137	99	137	161	185	161
Rapeseed	7	19	76	110	99	71	140	139	74	105	167	287	326	312
Sunflowerseed	6	6	6	3	6	9	9	4	4	11	7	7	11	11
Linseed	146	252	464	255	296	229	298	190	212	280	270	388	292	231
Total meal	258	391	650	501	538	446	546	470	427	495	581	843	814	715

Source: USDA bulletins.

B-12.--EC. Production of selected oilseeds, plus their oil and meal equivalent, 1955 -68

Item	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
Actual	1,000 metric tons													
Cottonseed	22	13	14	12	18	9	9	7	9	11	10	5	6	5
Peanuts	10	10	10	11	12	12	13	12	12	11	7	7	6	4
Rapeseed	150	150	247	268	200	162	190	288	243	368	460	431	571	629
France	(107)	(81	(160)	(196)	(131)	(83)	(107)	(160)	(135)	(247)	(338)	(317)	(429)	(449)
Germany	(21)	(39)	(67)	(58)	(58)	(68)	(72)	(115)	(96)	(109)	(107)	(99)	(125)	(160)
Sunflowerseed	8	13	9	9	7	12	18	30	48	26	20	23	23	23
Olive oil	185	174	353	315	291	381	393	312	540	306	422	322	538	371
Italy	(181)	(173)	(352)	(313)	(291)	(380)	(393)	(310)	(538)	(304)	(420)	(320)	(537)	(355)
Flaxseed	63	73	76	53	47	70	71	83	81	91	70	74	62	43
Oil equivalent basis														
Cottonseed	3	4	2	2	2	3	2	2	1	1	2	2	1	1
Peanut	1	1	1	1	1	1	1	1	1	1	1	--	--	--
Rapeseed	47	47	77	85	63	51	59	91	76	116	145	136	180	198
Sunflowerseed	2	2	3	2	2	2	3	4	9	15	8	6	7	7
Olive oil	335	185	174	353	315	291	381	393	312	540	306	422	32]	538
Total	388	239	257	443	383	348	446	491	399	673	462	566	510	744
Meal equivalent basis														
Cottonseed	8	11	5	5	5	8	5	5	3	3	5	5	3	3
Peanut	1	1	1	1	1	1	1	1	1	1	1	--	--	--
Rapeseed	83	83	136	151	112	90	105	161	135	205	257	241	319	351
Sunflowerseed	6	6	9	6	6	6	9	7	16	27	14	11	12	12
Linseed	27	30	34	36	25	22	32	33	39	37	42	32	35	29
Total meal	125	131	185	199	149	127	152	207	194	273	319	289	369	395

Sources: USDA bulletins on world oilseed production and FAO Production Yearbooks.

Table B-13.— Other Western Europe: Production of selected oilseeds, plus their oil and meal equivalent, 1955-68

Item	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
							1,000 metric tons							
Actual														
Cottonseed	201	207	205	213	248	278	419	415	392	298	291	329	297	324
Peanuts	18	15	10	13	14	13	13	14	15	11	13	13	15	12
Rapeseed	168	53	216	172	233	94	167	227	152	268	296	168	257	331
Sunflowerseed	--	--	--	--	--	1	1	1	3	3	3	4	4	4
Olive oil	485	465	652	600	465	692	628	704	425	945	370	587	661	548
Spain	(309)	(273)	(396)	(311)	(314)	(440)	(464)	(361)	(316)	(638)	(200)	(324)	(437)	(273)
Flaxseed	8	9	9	15	9	8	8	7	6	5	4	1	--	--
Oil equivalent basis														
Cottonseed	18	27	28	28	29	33	38	57	56	53	40	40	44	40
Peanut	4	4	4	2	3	3	3	3	3	4	2	3	3	4
Rapeseed	53	17	68	54	74	30	52	71	48	85	94	53	81	104
Sunflowerseed	--	--	--	--	--	--	--	--	--	1	1	1	1	1
Olive oil	485	465	652	600	465	692	628	704	425	945	370	587	661	548
Total oil	560	513	752	684	571	758	720	835	532	1,088	507	684	790	697
Meal equivalent basis														
Cottonseed	53	80	83	83	86	98	113	169	166	157	119	119	131	119
Peanut	5	5	5	2	4	4	4	4	4	5	2	4	4	5
Rapeseed	94	30	120	96	131	53	92	126	85	151	167	94	143	184
Sunflowerseed	--	--	--	--	--	--	--	--	--	2	2	2	2	2
Linseed	5	4	5	5	8	5	4	4	3	3	3	2	1	--
Total meal	157	119	213	186	229	160	213	303	258	318	293	221	281	310

Sources: USDA bulletins on world oilseed production and FAO Production Yearbooks.

Table B-14.--Japan: Production of selected oilseeds, plus their oil and meal equivalent, 1955-68

Item	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
	1,000 metric tons													
Actual														
Peanuts	47	50	72	83	94	126	142	142	144	131	137	139	136	122
Rapeseed	270	320	286	267	262	264	274	247	109	135	126	95	79	68
Soybean	507	455	458	391	426	418	387	336	318	240	230	199	190	168
Flaxseed	4	3	4	4	4	4	3	3	3	2	2	1	--	--
Oil equivalent basis														
Rapeseed	85	101	90	84	83	83	86	77	34	42	40	30	25	22
Total oil	85	101	90	84	83	83	86	77	34	42	40	30	25	22
Meal equivalent basis														
Rapeseed	151	179	159	149	147	147	152	136	60	74	71	53	44	39
Linseed	2	2	2	2	2	2	2	2	2	2	1	1	1	--
Total meal	153	181	161	151	149	149	154	138	62	76	72	54	45	39

Sources: USDA bulletins on world oilseed production and FAO Production Yearbooks.

Table B-15.--Australia and New Zealand: Production of selected oilseeds, plus their oil and meal equivalent, 1955-68

Item	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
	1,000 metric tons													
Actual														
Cottonseed	1	1	1	3	5	4	4	5	7	7	12	10	20	26
Peanuts	9	9	19	32	19	23	15	16	23	11	28	28	42	31
Flaxseed	17	20	10	11	31	20	19	34	41	58	12	23	19	30
Oil equivalent basis														
Cottonseed	--	--	--	--		.8	.8	.8	.8	.8	.8	.8	1.5	1.5	3.0
Peanut	.6	.4	.4	.9	1.4	.9	1.0	.6	.8	1.0	.4	1.2	1.2	1.8
Total oil	.6	.4	.4	.9	2.2	1.7	1.8	1.4	1.6	1.8	1.2	2.7	2.7	4.8
Meal equivalent basis														
Cottonseed	--	--	--	--	2	2	2	2	2	2	2	4	4	9
Peanut	1	--	--	1	2	1	1	1	1	1	--	1	1	2
Linseed	4	9	11	5	5	16	11	10	18	22	30	6	10	9
Total meal	5	9	11	6	9	19	14	13	21	25	32	11	15	20

Sources: USDA bulletins on world oilseed production and FAO Production Yearbooks.

Table B-16.--South Africa, Republic of: Production of selected oilseeds, plus their oil and meal equivalent, 1955-68

Item	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
	1,000 metric tons													
Actual														
Cottonseed	14	12	14	12	16	10	10	14	24	38	30	30	30	30
Peanuts	194	214	173	134	180	197	250	177	255	202	190	197	422	222
Soybeans	--	1	2	2	2	2	2	3	2	2	2	2	3	3
Sunflowerseed	52	64	75	69	100	91	112	98	99	78	73	100	101	78
Oil equivalent basis														
Cottonseed	2	3	2	3	2	3	2	2	3	4	6	5	5	5
Peanut	44	42	46	38	29	39	43	54	38	56	44	41	43	92
Sunflowerseed	12	12	14	17	16	22	20	25	22	31	25	23	32	32
Total oil	58	57	62	58	47	64	65	81	63	91	75	69	80	129
Meal equivalent basis														
Cottonseed	5	8	5	8	5	8	5	5	8	11	16	14	14	14
Peanut	53	50	55	46	35	47	52	65	46	67	53	49	52	110
Sunflowerseed	35	35	40	49	46	63	58	44	39	55	44	41	57	57
Total meal	93	93	100	103	86	118	115	114	93	133	113	104	123	181

Sources: USDA bulletins on world oilseed production and FAO Production Yearbooks.

Table B-17.--Eastern Europe: Production of selected oilseeds, plus their oil and meal equivalent, 1955-68

Item	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
	1,000 metric tons.													
Actual														
Cottonseed	56	40	44	36	43	45	19	34	31	32	27	49	45	27
Peanuts	4	3	4	4	3	4	3	3	2	2	2	3	3	3
Rapeseed	419	310	329	274	410	410	554	586	404	504	804	749	1,020	1,064
Soybeans	15	13	11	14	16	29	31	13	11	9	11	19	17	17
Sunflowerseed	827	627	643	694	799	1,038	1,006	1,103	1,204	1,232	1,263	1,480	1,529	1,562
Bulgaria	(184)	(223)	(241)	(253)	(193)	(209)	(221)	(279)	(344)	(301)	(357)	(423)	(478)	(435)
Rumania	(270)	(215)	(243)	(286)	(286)	(522)	(481)	(450)	(506)	(518)	(564)	(671)	(720)	(726)
Olive oil	--	2	2	1	1	--	--	--	--	--	--	--	--	--
Flaxseed	112	118	98	77	76	96	102	105	107	106	139	134	131	104
Oil equivalent basis														
Cottonseed	15	8	6	6	5	6	7	3	5	4	4	4	7	7
Rapeseed	132	97	104	86	130	130	174	184	127	158	253	236	321	335
Soybean	1	1	1	1	1	1	2	2	1	1	1	1	2	2
Sunflowerseed	189	186	141	145	157	180	234	227	347	379	388	398	466	482
Olive oil	9	1	3	4	3	1	3	4	3	11	3	4	5	7
Total oil	346	293	255	242	296	318	420	420	483	553	649	643	801	833
Meal equivalent basis														
Cottonseed	43	23	17	17	14	17	20	9	14	11	11	11	20	20
Rapeseed	234	172	184	152	230	230	308	326	225	280	448	418	569	593
Soybean	5	5	5	5	5	5	9	9	5	5	5	5	9	9
Sunflowerseed	544	536	406	418	452	518	674	402	615	671	687	705	825	854
Linseed	19	55	58	48	38	37	47	50	52	53	52	68	66	64
Total meal	845	791	670	640	739	807	1,058	796	911	1,020	1,203	1,207	1,489	1,540

Sources: USDA bulletins on world oilseed production and FAO Production Yearbooks.

Table B-18.--USSR: Production of selected oilseeds, plus their oil and meal equivalent, 1955-68

Item	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
	1,000 metric tons													
Actual														
Cottonseed	2,406	2,686	2,611	2,691	2,902	2,659	2,802	2,668	3,230	3,274	3,509	3,710	3,980	3,980
Rapeseed	47	22	--	42	--	11	25	19	6	2	8	8	8	8
Soybeans	151	114	162	229	224	224	242	465	439	280	410	596	550	570
Sunflowerseed	3,493	3,631	2,577	4,256	2,777	3,652	4,370	4,411	3,942	5,573	5,013	5,658	6,079	6,110
Flaxseed	486	614	516	502	395	443	438	478	423	400	449	511	531	540
Oil equivalent basis														
Cottonseed	377	348	388	377	388	419	384	405	386	467	473	507	536	575
Rapeseed	14	7	--	14	--	4	8	6	2	1	3	3	3	3
Soybean	4	12	8	12	17	17	17	18	35	33	21	31	44	41
Sunflower seed	531	1,057	1,098	805	1,372	914	1,249	1,510	1,568	1,426	2,062	1,913	2,205	2,418
Total oil	926	1,424	1,494	1,208	1,777	1,354	1,658	1,939	1,991	1,927	2,559	2,454	2,788	3,037
Meal equivalent basis														
Cottonseed	1,072	989	1,103	1,072	1,103	1,192	1,092	1,152	1,098	1,328	1,345	1,442	1,524	1,635
Rapeseed	25	12	--	25	--	7	14	11	4	2	5	5	5	5
Soybean	19	57	38	57	80	80	80	85	166	156	99	147	208	194
Sunflowerseed	1,002	1,995	1,971	1,376	2,264	1,419	1,906	2,198	2,215	1,940	2,655	2,372	2,634	2,889
Linseed	157	252	320	269	261	206	230	228	249	220	208	234	266	277
Total meal	2,275	3,305	3,432	2,799	3,708	2,904	3,322	3,674	3,732	3,646	4,312	4,200	4,637	5,000

Sources: USDA bulletins on world oilseed production and FAO Production Yearbooks.

Table B-19.--Communist Asia: Production of selected oilseeds, plus their oil and meal equivalent, 1955-68

Item	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
							1,000 metric tons							
Actual														
Cottonseed	3,203	3,052	3,560	4,322	4,068	3,157	2,090	2,139	2,393	2,801	2,954	2,903	3,055	3,055
Peanuts	2,926	3,334	2,572	2,722	2,268	1,800	1,678	1,633	1,901	2,291	2,300	2,360	2,450	2,200
Rapeseed	926	887	884	1,089	953	540	540	540	540	660	700	735	800	770
Soybeans	9,125	9,263	8,937	9,809	9,538	8,426	8,125	7,924	7,263	7,163	7,028	7,028	7,163	6,753
Sunflowerseed	51	58	61	76	76	61	61	61	66	66	66	66	66	66
Oil equivalent basis														
Cottonseed	92	128	122	142	173	163	126	84	86	96	112	118	116	122
Peanut	429	454	517	398	422	352	288	260	253	294	355	356	366	380
Rapeseed	292	279	278	343	301	170	170	170	170	208	220	231	252	243
Soybean	613	616	625	607	662	644	569	549	535	490	483	474	474	483
Sunflowerseed	12	12	13	14	17	17	14	14	19	21	21	21	21	21
Total oil	1,438	1,489	1,555	1,504	1,575	1,346	1,167	1,077	1,063	1,109	1,191	1,200	1,229	1,249
Meal equivalent basis														
Cottonseed	267	372	355	413	503	474	366	244	250	279	326	343	337	355
Peanut	515	545	620	478	506	422	346	312	304	353	426	427	439	456
Rapeseed	517	494	492	608	533	301	301	301	301	368	390	409	446	430
Soybean	2,903	2,917	2,960	2,874	3,135	3,050	2,694	2,600	2,533	2,320	2,287	2,245	2,245	2,287
Sunflowerseed	35	35	37	40	49	49	40	25	34	37	37	37	37	37
Total meal	4,237	4,363	4,464	4,413	4,726	4,296	3,747	3,482	3,422	3,357	3,466	3,461	3,504	3,565

Sources: USDA bulletins on world oilseed production and FAO Production Yearbooks.

Table B-20,--Central America & Mexico: Production of selected oilseeds, plus their oil and meal equivalent, 1955-68

Item	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
	1,000 metric tons													
Actual														
Cottonseed	1,138	957	1,125	1,038	755	807	1,024	1,088	1,299	1,255	1,332	1,351	1,206	1,350
Peanuts	142	140	135	148	164	172	160	170	164	165	154	173	175	173
Rapeseed	6	8	6	8	6	7	6	7	6	6	6	6	6	6
Soybeans	--	--	--	1	1	13	8	14	24	36	60	100	121	250
Copra	128	189	204	207	209	218	219	221	242	245	200	213	213	213
Palm kernels	17	20	22	22	24	23	23	29	31	30	26	27	27	27
Palm oil	12	12	18	17	17	19	21	20	23	24	24	26	26	26
Flaxseed	17	15	13	15	30	15	20	18	19	19	20	14	15	15
Oil equivalent basis														
Cottonseed	140	171	143	169	156	113	121	154	164	195	188	200	202	181
Peanut	5	6	6	6	6	7	7	7	7	7	7	6	7	7
Rapeseed	2	3	2	3	2	2	2	2	2	2	2	2	2	2
Soybean	--	--	--	--	.1	.1	1.1	.7	1.2	2	3	5	8	10
Coconut	76	112	120	122	123	129	129	130	143	145	118	126	126	126
Palm kernel	8	9	10	10	11	10	10	13	14	14	12	12	12	12
Palm oil	12	12	18	17	17	19	21	20	23	24	24	26	26	26
Total oil	243	313	299	327	315	280	291	327	354	389	354	377	383	364
Meal equivalent basis														
Cottonseed	372	454	380	449	414	300	321	409	436	518	499	531	537	481
Peanut	6	7	7	7	7	8	8	8	8	8	8	7	8	8
Rapeseed	4	5	4	5	4	4	4	4	4	4	4	4	4	4
Soybean	--	--	--	--	1	1	5	3	6	9	14	24	38	47
Copra meal	53	79	84	86	86	91	91	91	100	102	83	88	88	88
Palm kernel	10	11	12	12	13	12	12	16	17	17	14	14	14	14
Linseed	10	10	8	7	8	17	8	12	10	11	11	12	8	8
Total meal	455	566	495	566	533	433	449	543	581	669	633	680	697	650

Sources: USDA bulletins on world oilseed production and FAO Production Yearbooks.

Table B-21.--South America: Production of selected oilseeds, plus their oil and meal equivalent, 1955-68

Item	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
	1,000 metric tons													
Actual														
Cottonseed	1,339	1,305	1,116	1,296	1,356	1,501	1,707	1,768	1,839	1,667	1,837	1,717	1,566	1,729
Peanuts	336	431	550	639	632	658	900	1,138	969	861	1,231	1,362	1,162	785
Brazil	(186)	(181)	(192)	(308)	(357)	(408)	(584)	(648)	(604)	(470)	(743)	(895)	(751)	(450)
Rapeseed	--	--	2	9	18	41	37	29	51	51	60	71	61	41
Soybeans	107	120	128	143	169	228	294	381	379	369	601	677	814	724
Brazil	(107)	(115)	(122)	(131)	(152)	(206)	(271)	(345)	(323)	(305)	(523)	(595)	(716)	(625)
Sunflowerseed	409	870	746	940	490	924	675	972	589	568	843	935	1,229	1,229
Argentina	(283)	(754)	(625)	(759)	(387)	(802)	(585)	(860)	(462)	(460)	(759)	(782)	(1,120)	(1,120)
Copra	15	19	16	11	8	9	13	14	17	14	18	18	18	18
Olive oil	6	5	8	7	8	4	8	7	10	10	9	10	10	10
Palm kernels	82	85	93	98	91	106	124	144	151	164	164	169	169	169
Palm oil	2	2	2	2	2	2	2	4	5	6	6	6	6	6
Flaxseed	318	726	739	723	909	664	947	971	857	941	651	654	413	557
Oil Equivalent basis														
Cottonseed	159	153	132	144	167	187	209	220	224	207	222	212	197	222
Peanut	69	90	116	136	136	140	193	244	207	182	267	295	250	166
Rapeseed	--	--	1	3	5	13	12	9	16	16	19	22	19	13
Soybean	9	10	11	12	14	20	25	32	32	32	51	58	69	62
Sunflowerseed	92	196	167	212	110	208	152	306	185	179	266	294	387	387
Coconut	9	11	9	6	5	5	8	8	10	8	11	11	11	11
Olive	6	5	8	7	8	4	8	7	10	10	9	10	10	10
Palm kernel	37	38	42	44	41	48	56	65	68	74	74	76	76	76
Palm oil	2	2	2	2	2	2	2	4	5	6	6	6	6	6
Total oil	383	505	488	566	488	627	665	895	757	714	925	984	1,025	953

-- Continued.

Table B-21.--South America: Production of selected oilseeds, plus their oil and meal equivalent, 1955-68--Con.

Item	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
	1,000 metric tons													
Meal equivalent basis														
Cottonseed	422	406	351	382	444	497	555	584	595	550	590	563	523	590
Peanut	83	108	139	163	163	168	232	293	248	218	320	354	300	199
Rapeseed	--	--	2	5	9	23	21	16	28	28	34	39	34	23
Soybean	43	47	52	57	66	95	118	152	152	152	241	275	327	294
Sunflowerseed	265	564	481	611	317	599	438	542	328	317	471	521	686	686
Coconut	6	8	6	4	4	4	6	6	7	6	8	8	8	8
Palm kernel	2	2	2	2	2	2	2	5	6	7	7	7	7	7
Linseed	274	176	400	407	398	500	365	522	535	472	518	358	360	227
Total meal	1,095	1,311	1,433	1,631	1,403	1,888	1,737	2,120	1,899	1,750	2,189	2,125	2,245	2,034

Sources: USDA bulletins on world oilseed production and FAO Production Yearbooks.

Table B-22.--East & West Africa: Production of selected oilseeds, plus their oil and meal equivalent, 1955-68

Item	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
	1,000 metric tons													
Actual														
Cottonseed	544	572	550	674	692	712	541	662	800	810	890	1,032	951	888
Peanuts	3,050	3,058	3,741	3,247	3,041	3,660	3,864	4,253	4,213	4,154	4,863	4,793	4,372	4,299
Nigeria	(1,021)	(771)	(1,288)	(1,025)	(898)	(1,152)	(1,248)	(1,515)	(1,393)	(1,252)	(1,687)	(1,755)	(1,252)	(1,542)
Senegal	(608)	(752)	(896)	(803)	(830)	(907)	(993)	(894)	(953)	(1,021)	(1,170)	(870)	(1,005)	(900)
Rapeseed	20	20	19	19	20	5	5	5	5	5	5	6	6	6
Soybeans	25	30	28	16	17	27	27	39	24	33	33	29	21	33
Sunflowerseed	27	23	36	26	20	23	42	39	39	43	44	48	50	52
Copra	126	126	128	142	129	122	144	138	144	143	137	146	147	148
Palm kernels	774	871	801	871	852	831	819	742	747	796	805	770	582	599
Nigeria	(420)	(469)	(414)	(463)	(437)	(430)	(437)	(372)	(405)	(408)	(462)	(422)	(260)	(250)
Congo (K)	(120)	(140)	(145)	(144)	(162)	(148)	(136)	(130)	(97)	(110)	(75)	(80)	(95)	(105)
Palm oil	976	1,014	996	974	1,003	1,015	1,004	979	947	952	911	863	756	845
Nigeria	(564)	(570)	(538)	(534)	(542)	(552)	(541)	(509)	(510)	(515)	(530)	(508)	(325)	(375)
Congo (K)	(197)	(221)	(232)	(225)	(245)	(232)	(227)	(226)	(196)	(165)	(125)	(130)	(155)	(175)
Flaxseed	50	50	49	47	50	53	56	45	45	54	56	59	60	60
Oil equivalent basis														
Cottonseed	71	74	77	74	91	94	96	73	89	108	110	120	140	128
Peanut	524	618	620	758	658	616	741	782	861	854	842	985	970	885
Rapeseed	6	6	6	6	6	2	2	2	2	2	2	2	2	2
Soybean	2	2	2	2	1	1	2	2	3	2	2	2	2	2
Sunflowerseed	8	8	7	12	8	6	7	14	13	13	14	14	15	16
Coconut	78	78	79	88	80	76	89	86	89	89	85	91	91	92
Palm kernel	348	392	360	392	383	374	369	334	336	358	362	346	262	270
Palm oil	976	1,014	996	974	1,003	1,015	1,004	979	947	952	911	863	756	845
Total oil	2,013	2,192	2,147	2,306	2,230	2,184	2,310	2,272	2,340	2,378	2,328	2,423	2,238	2,240

-- Continued.

USDA/FAER-71

WORLD SUPPLY AND DEMAND PROSPECTS FOR OILSEEDS AND OILSEED PRODUCTS IN 1980 WITH EMPHASIS ON TRADE BY THE LESS DEVELOPED COUNTRIES. (Foreign Agricultural Economic Report). / Lyle E. Moe (and others). Washington, DC: Economic Research Service, Mar. 1971. (NAL Call No. A281.9/Ag8F)

3 OF 3
USDA
FAER-71

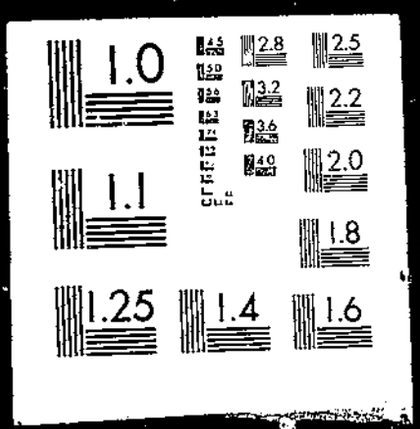


Table B-22.--East & West Africa: Production of selected oilseeds, plus their oil and meal equivalent, 1955-68--Con.

Item	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
	1,000 metric tons													
Meal equivalent basis														
Cottonseed	198	206	214	206	253	261	267	203	248	300	306	334	389	356
Peanut	629	742	744	910	790	739	889	938	1,033	1,025	1,010	1,182	1,164	1,062
Rapeseed	11	11	11	11	11	4	4	4	4	4	4	4	4	4
Soybean	9	9	9	9	5	5	9	9	14	9	9	9	9	9
Sunflowerseed	23	23	20	35	23	17	20	25	23	23	25	25	27	28
Coconut	40	40	41	45	41	39	46	44	46	46	44	47	47	47
Palm kernel	378	425	391	425	416	406	400	362	365	388	393	375	284	293
Linseed	28	28	28	27	26	28	29	31	25	25	30	31	32	32
Total meal	1,316	1,484	1,458	1,668	1,565	1,499	1,664	1,616	1,758	1,820	1,821	2,007	1,956	1,811

Sources: USDA bulletins on world oilseed production and FAO Production Yearbooks.

Table B-23.--North Africa & West Asia: Production of selected oilseeds, plus their oil and meal equivalent, 1955-68

Item	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
	1,000 metric tons													
Actual														
Cottonseed	1,534	1,608	1,531	1,832	1,918	1,991	2,050	2,223	2,163	2,471	2,652	2,489	2,457	2,568
Peanuts	127	219	212	193	234	267	269	331	398	380	423	427	413	395
Sudan	(53)	(146)	(129)	(105)	(140)	(186)	(177)	(229)	(289)	(280)	(305)	(314)	(299)	(299)
Rapeseed	2	2	1	2	3	4	5	4	5	7	8	7	8	8
Soybeans	4	5	4	4	5	6	4	4	6	5	5	5	5	5
Sunflowerseed	140	104	99	99	131	128	79	63	98	177	174	208	233	215
Turkey	(138)	(102)	(95)	(95)	(127)	(123)	(75)	(60)	(87)	(165)	(160)	(200)	(230)	(210)
Olive Oil	116	217	161	311	173	275	227	164	242	302	198	202	230	269
Tunisia	(27)	(35)	(50)	(131)	(45)	(125)	(34)	(46)	(89)	(95)	(53)	(20)	(52)	(51)
Turkey	(78)	(41)	(90)	(44)	(91)	(66)	(79)	(98)	(50)	(65)	(100)	(52)	(110)	(60)
Flaxseed	47	49	46	65	74	65	47	53	47	52	55	47	39	41
Oil equivalent basis														
Cottonseed	193	197	207	199	238	248	257	261	285	276	314	337	315	311
Peanut	22	26	44	43	39	47	54	55	67	80	77	86	86	82
Rapeseed	1	1	--	1	1	1	2	1	2	2	3	2	3	3
Soybean	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Sunflowerseed	39	44	32	32	32	41	40	25	20	31	56	55	66	74
Olive oil	208	116	217	161	311	173	275	227	164	242	302	198	202	230
Total oil	464	385	501	437	622	511	629	570	539	632	753	679	673	701
Meal equivalent basis														
Cottonseed	537	548	576	553	662	690	715	726	793	768	873	937	876	865
Peanut	26	31	53	52	47	56	65	66	80	96	92	103	103	98
Rapeseed	2	2	--	2	2	2	4	2	4	4	5	4	5	5
Soybean	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Sunflowerseed	80	91	66	66	66	84	82	44	35	55	99	97	117	131
Linseed	29	26	27	26	36	40	36	26	29	26	29	31	26	21
Total meal	679	703	727	704	818	877	907	869	946	954	1,103	1,177	1,132	1,125

Sources: USDA bulletins on world oilseed production and FAO Production Yearbooks.

Table B-24.--South Asia: Production of selected oilseeds, plus their oil and meal equivalent, 1955-68

Item	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
	1,000 metric tons													
Actual														
Cottonseed	2,646	2,812	2,914	2,742	2,361	3,041	2,811	3,333	3,629	3,032	2,910	2,960	3,307	3,183
Peanuts	3,814	4,319	4,664	5,058	4,576	4,827	5,010	4,850	5,238	5,913	4,256	4,481	5,942	5,122
India	(3,806)	(4,307)	(4,656)	(5,046)	(4,561)	(4,812)	(4,994)	(4,821)	(5,215)	(5,888)	(4,230)	(4,411)	(5,829)	(5,000)
Rapeseed	1,363	1,190	1,363	1,234	1,422	1,386	1,660	1,656	1,662	1,216	1,772	1,553	1,535	1,878
India	(1,037)	(800)	(1,043)	(933)	(1,043)	(1,063)	(1,347)	(1,346)	(1,295)	(915)	(1,466)	(1,276)	(1,228)	(1,482)
Copra	727	783	653	693	727	710	802	831	785	876	827	804	794	912
Ceylon	(488)	(541)	(425)	(451)	(484)	(458)	(544)	(571)	(524)	(610)	(545)	(502)	(492)	(610)
Flaxseed	391	419	389	256	452	461	411	477	449	394	516	348	272	411
Oil equivalent basis														
Cottonseed	159	151	159	162	151	138	169	161	189	210	179	174	178	197
Peanut	880	801	907	980	1,062	961	1,014	1,052	1,018	1,100	1,242	894	941	1,248
Rapeseed	307	268	307	277	320	311	374	373	374	274	399	350	346	423
Coconut	451	485	405	430	451	440	497	515	487	543	513	498	492	565
Total oil	1,797	1,705	1,778	1,849	1,984	1,850	2,054	2,101	2,068	2,127	2,333	1,916	1,957	2,433
Meal equivalent basis														
Cottonseed	472	448	472	481	448	410	502	478	561	623	531	517	528	585
Peanut	1,056	961	1,088	1,176	1,274	1,153	1,217	1,262	1,222	1,320	1,490	1,073	1,129	1,498
Rapeseed	884	772	884	798	922	896	1,077	1,074	1,077	789	1,149	1,008	996	1,218
Coconut	274	294	246	261	274	267	301	312	295	329	311	302	298	343
Total meal	2,686	2,475	2,690	2,716	2,918	2,726	3,097	3,126	3,155	3,061	3,481	2,900	2,951	3,644

Sources: USDA bulletins on world oilseed production and FAO production yearbooks.

Table B-25.--Southeast Asia: Production of selected oilseeds, plus their oil and meal equivalent, 1955-68

Item	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
	1,000 metric tons													
Actual														
Cottonseed	61	59	50	58	71	73	77	74	64	83	73	90	90	90
Peanuts	318	316	373	436	427	552	541	585	489	518	477	553	559	634
Soybeans	29	32	41	34	34	41	38	45	49	43	28	35	34	40
Copra	242	257	264	236	193	235	229	241	245	235	224	232	258	233
Thailand	(224)	(239)	(238)	(209)	(164)	(189)	(191)	(199)	(208)	(200)	(187)	(200)	(225)	(199)
Oil equivalent basis														
Cottonseed	8	7	7	6	7	8	8	9	8	8	9	8	10	10
Peanut	7	13	13	16	18	18	23	23	25	21	22	20	23	24
Soybean	2	2	2	2	2	2	2	2	3	3	3	2	2	2
Coconut	119	126	129	116	95	115	112	118	120	115	110	114	126	114
Total oil	136	148	151	140	122	143	145	152	156	147	144	144	161	150
Meal equivalent basis														
Cottonseed	22	20	20	17	20	22	22	25	22	22	25	22	28	28
Peanut	20	36	36	45	50	50	64	64	70	59	61	56	64	67
Soybean	9	9	9	9	9	9	9	9	14	14	14	9	9	9
Coconut	112	118	121	109	89	108	105	111	113	108	103	107	118	107
Total meal	163	183	186	180	168	189	200	209	219	203	203	194	219	211

Sources: USDA bulletins on world oilseed production and FAO Production Yearbooks.

Table B-26.--East Asia and Pacific Islands: Production of selected oilseeds, plus their oil and meal equivalent, 1955-68

Item	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
	1,000 metric tons													
Actual														
Cottonseed	41	34	19	19	19	17	22	18	14	12	12	13	8	9
Peanuts	400	431	465	468	502	507	502	495	455	529	565	577	525	496
Rapeseed	1	1	1	2	2	4	8	10	13	27	23	8	5	5
Soybeans	524	543	531	619	621	630	650	601	566	616	600	581	761	751
Copra	2,611	2,634	2,868	2,779	2,618	2,723	2,792	3,030	3,337	3,172	3,186	3,515	3,244	3,142
Philippines	(1,103)	(1,140)	(1,319)	(1,293)	(1,072)	(1,075)	(1,057)	(1,385)	(1,489)	(1,524)	(1,471)	(1,686()	1,431)	(1,382)
Palm kernels	57	56	55	54	53	57	59	61	63	64	67	75	84	97
Palm oil	223	222	219	219	210	233	241	249	274	283	313	337	372	435
Malaysia	(57)	(57)	(59)	(71)	(73)	(92)	(95)	(108)	(126)	(122)	(148)	(186)	(216)	(265)
Indonesia	(166)	(165)	(160)	(148)	(137)	(141)	(146)	(141)	(148)	(161)	(165)	(151)	(156)	(170)
Oil equivalent basis														
Cottonseed	4	4	4	2	2	2	2	2	2	2	2	2	2	1
Peanut	21	19	20	22	22	23	24	23	23	21	25	26	26	24
Rapeseed	--	--	--	1	1	1	3	4	4	8	7	3	2	2
Soybean	12	14	16	20	24	26	28	30	28	28	30	35	34	38
Coconut	1,619	1,633	1,778	1,723	1,623	1,688	1,731	1,879	2,069	1,967	1,975	2,179	2,011	1,948
Palm kernel	26	25	25	24	24	26	27	27	28	29	30	34	38	44
Palm oil	223	222	219	219	210	233	241	249	274	283	313	337	372	435
Total oil	1,905	1,917	2,062	2,011	1,906	1,999	2,056	2,214	2,424	2,338	2,382	2,616	2,485	2,492
Meal equivalent basis														
Cottonseed	12	12	12	6	6	6	6	6	6	6	6	6	6	3
Peanut	25	23	24	26	26	28	29	28	28	25	30	31	31	29
Rapeseed	--	--	--	2	2	2	5	7	7	14	12	5	4	4
Soybean	57	66	76	95	114	123	133	142	133	133	142	166	161	180
Coconut	998	1,007	1,096	1,063	1,001	1,041	1,067	1,159	1,276	1,213	1,218	1,344	1,240	1,201
Palm kernel	31	30	30	29	29	31	33	33	34	35	36	41	46	53
Total meal	1,123	1,138	1,238	1,221	1,178	1,231	1,273	1,375	1,484	1,426	1,444	1,593	1,488	1,470

Sources: USDA bulletins on world oilseed production and FAO Production Yearbooks.

Table B-27.--Assignment of oilseed production to processing year, either year of harvest or year following harvest year

Commodity	Country	Oil and meal production assigned to--	
		Year of harvest	Year following harvest
Copra	All countries	X	
Cottonseed	All countries		X
Flaxseed	India	X	
	Pakistan	X	
	New Zealand	X	
	Others		X
Palm kernels	All countries	X	
Peanuts	Argentina	X	
	Bolivia	X	
	Brazil	X	
	Columbia		X
	Ecuador	X	
	Paraguay	X	
	Peru	X	
	Surinam		X
	Uruguay	X	
	Venezuela		X
	Indonesia	X	
	South Africa	X	
	Rhodesia	X	
	Zambia	X	
	Malagasy	X	
	Tanzania	X	
	Congo (Brazzaville)	X	
	Congo (Kinshasa)	X	
	Angola	X	
	Malawi	X	
	Gabon	X	
	Mozambique	X	
	Swaziland	X	
	Liberia	X	
	Australia	X	
	Others		X
Rapeseed	Canada		X
	Mainland China		X
	Others		X
Soybeans	Argentina	X	
	Brazil	X	
	Colombia		X
	Paraguay	X	
	Peru	X	
	Surinam		X
	Congo (Kinshasa)	X	
	Rhodesia	X	
	Tanzania	X	
	Uganda	X	
	Thailand	X	
	Others		X
Sunflowerseed	Argentina	X	
	Brazil	X	
	Chile	X	
	Uruguay	X	
	South Africa	X	
	Australia	X	
	Others		X

Source: Fats and Oils Division, Foreign Agricultural Service, U. S. Department of Agriculture

Table B-28.--Percentage of oilseed crops assumed crushed for oil and meal production, by country

Type of Seed	Country	Percentage of the crop at present assumed to be crushed for oil
Copra	All countries	1/ 100
Cottonseed	India	75
	Pakistan	60
	China (Mainland)	25
	U.A.R.	80
	Brazil	65
	Argentina	90
	Europe	90
	Uganda	80
	United States	95
	U.S.S.R.	85
	All other countries	75
Flaxseed	Europe	85
	Mexico	92
	United States	93
	All other countries	90
Palm kernels	All countries	1/ 100
Peanuts (in shell)	Argentina	80
	Brazil	80
	China (Mainland)	50
	Former French West Africa	75
	Gambia	90
	Indonesia	20
	India	75
	Nigeria	75
	South Africa, Rep. of	75
	United States	28
	All other countries	15
Rapeseed	All countries	90
Soybeans	Canada	92
	China (Mainland)	45
	Indonesia	nil
	Japan	35
	Korea	nil
	United States	94
	All other countries	50
Sunflowerseed	All countries	90

1/ Applied to commercial production.

Source: Fats and Oils Division, Foreign Agricultural Service, U.S. Department of Agriculture.

Table B-29.--Conversion rates for oilseeds to oil equivalent

Region 1/	Unshelled peanuts	Shelled peanuts	Copra	Palm kernels	Soy-beans	Flaxseed	Cotton-seed	Rapeseed	Sunflower seed
					-Percent-				
United States	31	43	64	45	17	35	17	35	2/
Canada	31	43	64	45	17	35	17	35	2/
EC	31	43	64	49	17	35	20	35	2/
EFTA	31	43	64	47	15	32	17	35	2/
O.W.E.	30	42	64	47	15	28	15	35	2/
Japan	31	43	64	45	14	35	17	35	2/
Australia and New Zealand	29	40	62	45	15	36	19	35	2/
South Africa, Republic of	29	40	62	45	15	36	19	35	2/
Eastern Europe	31	43	63	45	15	32	17	35	2/
USSR	31	43	64	45	15	32	17	35	3/
Communist Asia	31	43	64	45	15	32	16	35	2/
Mexico and Central America	28	39	59	45	17	32	20	35	2/
South America	28	39	59	45	17	32	20	35	2/
West Africa	27	38	62	45	15	32	18	35	2/
East Africa	27	38	62	45	15	32	18	35	2/
North Africa	27	38	62	45	15	32	18	35	2/
West Asia	28	39	62	45	15	32	15	35	2/
South Asia	28	39	62	45	15	38	15	25	2/
South East Asia	28	39	49	45	13	32	15	35	2/
Other East Asia	28	39	60	45	13	32	15	35	2/
Far East Asia and Oceania	31	43	62	45	17	32	15	35	2/

1/ Oil equivalents were computed on the basis of these regions. The totals were then regrouped into the regions used in this study.

2/ 25 percent from 1955 through 1962; 35 percent from 1963 on.

3/ Percentage rates were: 32.9 in 1955 & 1956, 33.6 in 1957, 34.7 in 1958, 35.8 in 1959, 36.7 in 1960, 38.3 in 1961, 38.4 in 1962, 39.5 in 1962, 40.2 in 1964, 41.1 in 1965, 42.4 in 1966, 43.4 in 1967, 44.2 in 1968.

Source: Foreign Agricultural Service, USDA, Washington, D.C., and "Technical Conversion Factors for Agricultural Commodities," FAO, Rome, 1960.

Table B-30.--Conversion rates for oilseeds to meal equivalent

Region 1/	Unshelled peanuts	Shelled peanuts	Copra	Palm kernels	Soy-beans	Flaxseed	Cotton-seed	Rapeseed	Sunflower-seed
	Yield percentage								
United States	39.5	55.4	35.0	53.0	80.5	62.0	45.5	62.0	2/
Canada	39.5	55.4	35.0	53.0	80.5	62.0	45.5	62.0	2/
EC	39.5	55.4	35.0	49.0	80.5	62.0	42.5	62.0	2/
EFTA	59.5	55.4	35.0	51.0	82.5	65.0	45.5	62.0	2/
O.W.E.	40.5	56.8	35.0	51.0	82.5	69.0	47.5	62.0	2/
Japan	40.5	56.8	35.0	51.0	82.5	69.0	47.5	62.0	2/
Australia and New Zealand	41.5	58.2	37.0	53.0	82.5	61.0	43.5	62.0	2/
South Africa, Republic of	41.5	58.2	37.0	53.0	82.5	61.0	43.5	62.0	2/
Eastern Europe	39.5	55.4	36.0	53.0	82.5	65.0	45.5	62.0	3/
U.S.S.R.	39.5	55.4	35.0	53.0	82.5	65.0	45.5	62.0	3/
Communist Asia	39.5	55.4	35.0	53.0	82.5	65.0	46.5	62.0	2/
Mexico and Central America	42.5	59.6	40.0	53.0	80.5	65.0	42.5	62.0	2/
South America	42.5	59.6	40.0	53.0	80.5	65.0	42.5	62.0	2/
West Africa	43.5	61.0	37.0	53.0	82.5	65.0	44.5	62.0	2/
East Africa	43.5	61.0	37.0	53.0	82.5	65.0	44.5	62.0	2/
North Africa	43.5	61.0	37.0	53.0	82.5	65.0	44.5	62.0	2/
West Asia	42.5	59.6	37.0	53.0	82.5	65.0	47.5	62.0	2/
South Asia	42.5	59.6	37.0	53.0	82.5	59.0	47.5	62.0	2/
South East Asia	42.5	59.6	50.0	53.0	84.5	65.0	47.5	62.0	2/
Other East Asia 2/	42.5	59.6	39.0	53.0	84.5	65.0	47.5	62.0	2/
Far East Asia and Oceania	39.5	55.4	37.0	53.0	80.5	65.0	47.5	62.0	2/

1/ Meal equivalents were computed on the basis of these regions. The totals were then regrouped into the regions used in this study.

2/ 72 percent from 1955 through 1967, 62 percent from 1963 on.

3/ Percentage rates were: 64.1 in 1955 and 1956, 63.4 in 1957, 62.3 in 1958, 61.2 in 1959, 60.3 in 1960, 58.7 in 1961, 58.6 in 1962, 57.5 in 1963, 56.8 in 1964, 55.9 in 1965, 54.6 in 1966, 53.7 in 1967 and 44.2 in 1968.

Source: Table B-29. The meal yield percentages here and the oil yield percentages in table B-29 do not add to 100 because a waste factor is included.

APPENDIX C.--DESCRIPTION AND USES OF OILSEEDS AND OILSEED PRODUCTS

Oilseeds 1/

Soybeans

Hundreds of varieties of soybeans are known. In general, the cultivated soybeans are erect plants, growing in some cases to a height of over 3 feet. The hairy pods are borne in clusters of 3 to 5 and range from 1.5 to 3.5 inches long. The plant, a summer legume, has about the same climate and soil requirements as corn, but the time required to mature can vary from about 75 to 200 days, depending on the variety.

Peanuts

The peanut plant, an annual legume, yields kernels enclosed in a fibrous pod that develops from a peduncle thrust into the ground. The peanut kernel generally accounts for around 70 percent of the combined weight of the kernel and the pod (or shell). The peanut is a many-branched plant somewhat resembling clover in its foliage, but with quadri-foliate leaves. After the small single blossoms have bloomed, the flower stems bend down and force the little pods into the soil, where they develop and mature. Peanuts are variously known as arachis nuts, earth nuts, groundnuts, and by other names in different localities. The plants thrive best in light sandy soils well provided with plant foods in regions where the rainfall during the growing season does not exceed 26 inches.

Cottonseed

Cottonseed is a byproduct of the cotton plant. The oil and protein content of cottonseed vary depending on the variety of cotton and soils, locality, and seasonal and climatic conditions. The hulls vary from about 40 to 55 percent of the seed, and the kernels or meats vary from 44 to 61 percent. The hulls contain 0.3 to 1 percent oil and the kernel 28 to 40 percent. As a rule, seed from a long-staple cotton has the higher oil content.

Sunflowerseed

Sunflowers grow best in a warm summer climate and rich deep soils Sunflower varieties can be divided into the tall or giant types that reach a height of about 8 to 14 feet; dwarf types that reach 4 to 7 feet; and intermediate types. The tall varieties are the main ones grown in the United States, where the seed is grown principally for birdseed. As an oilseed crop, the dwarf varieties are preferable since their shorter and more uniform height makes mechanical harvesting more practical.

In recent years, Russia has developed new dwarf varieties that are vastly improved with respect to length of the vegetative cycle, homogeneity of the crop, and resistance to disease. The oil content has also been increased considerably. Approximately 80 percent of the world's sunflowerseed oil is now from the improved varieties.

1/ This section draws heavily from (11).

Rapeseed

Rape is very closely related to field mustard and to the rutabaga. It resembles the latter in many ways except that the tap root of rape does not thicken into a tuber. Plants grow 2 or 3 feet high and have thick, succulent leaves and stems. Varieties that are planted early and produce seeds in the same year are known as summer rape, while those that live in the winter and mature their seeds in the second year are known as winter rape. Rape production is confined almost wholly to the temperate and warm temperate zones.

Coconut

Coconut palm cultivation is restricted to a relatively narrow belt within the tropics. The trees grow best in areas with high temperatures, high rainfall, and alluvial soils. These conditions are found mainly on coastal regions or islands.

The tree usually grows 50 to about 100 feet high. The trunk terminates in a crown of about 20 pinnately compounded leaves 12 to 15 feet long. The flowers are borne in spadices that appear in the axils of the leaves. The trees begin to bear nuts in the sixth or seventh year and they bear in quantity when 10 or 12 years old. The nuts take 9 to 12 months to ripen and may be harvested several times a year. Mature trees on well-managed plantations may yield about 60 nuts. Plantations contain some 60 to 80 trees an acre. Most coconuts are produced in small groves, however, where the number of nuts per tree is well below 60. One coconut yields approximately 2 pounds of copra.

Copra is the dried kernel or "meat" of the coconut from which the coconut oil is expresssed. Fresh coconut contains 30 to 40 percent oil, while copra usually contains 60 to 65 percent.

Oil Palm

The oil palm is a perennial that yields several "palm bunches" in the crown of the tree. Each bunch may contain 200 to 2,000 individual fruits. Each individual "palm fruit" is approximately 2.0 inches in length and about 0.75 inch in diameter. The fruit contains three main parts: (1) the outer fleshy pulp, or pericarp, which contains the palm oil; (2) a hard-shelled nut called the palm nut, which is enclosed by the pericarp; (3) inside the nut is the palm kernel which yields palm kernel oil and cake. The fibrous residue remaining after the palm oil has been expressed from the pericarp is of little value and is sometimes used as fuel, as are the shells from the palm nuts. Palm oil is high in palmitic acid, while palm kernel oil is high in lauric acid.

After they are ripe, palm fruits cannot be allowed to hang long on the tree, but must be harvested within 6 to 9 days to prevent the formation of free fatty acids which make the palm oil inedible. The fruits ripen in about 6 months; two crops a year are obtained. While some fruit is harvested every month, two peaks of production usually occur.

The kernel and the shell are a large part of the whole fruit. To increase the oil palm yield, new varieties of oil palms with a smaller shell are being developed. The palm oil and palm kernel oil yields of the various varieties of oil palm vary considerably.

The best soils for oil palms are well-drained loams or light clays located in flat coastal lands or inland alluvial plains up to 1,000 feet in altitude. Rainfall of 100 inches or more, well distributed throughout the year, and a climate free from prolonged cold spells are desirable.

Olives

Despite the ability of olive trees to grow in the poorest types of soil, they flourish only in areas with a Mediterranean-type climate. This climate can be summarized as a long intensely hot summer; a relatively mild and rainy winter; and a short intermediate fall and spring. Olive trees require a minimum amount of rainfall in comparison with other crops in the Mediterranean region. A prolonged hot summer is necessary for the fruiting and the maturity of the olive crop.

It takes 6 or more years for an olive tree to mature into production. The profitable fruit-bearing period can be put at a minimum of 50 years in dry zones and much longer in areas of more favorable conditions. Many varieties of olive trees have been developed over the centuries. Olive production often follows a 2-year cycle, with a good crop being followed by a medium or poor crop.

Olives gathered for oil production are highly perishable and must be processed shortly after harvest to ensure good quality and yield. Most other oilseeds, of course, can be stored. The major component of olive oil production is labor. The general availability of cheap labor is a major reason why the olive oil industry has continued to flourish in the less developed parts of the Mediterranean region.

During 1960-65, some 96 percent of the total olives produced were utilized in oil processing; the remainder were eaten directly (2, p. 10). Olive kernels contain oil similar to that found in the pulp; therefore, in processing, the kernels are generally not separated from the rest of the fruit.

Flax

Flax grown to produce fiber for making linen and flax grown for its oilseed belong to the same species, but are of different varieties, and generally speaking, the two products are not obtained from the same crop. The varieties of flax grown for fiber have long stems with relatively few branches, while the varieties grown for oilseed have shorter stems and more branches and produce a greater quantity of seed.

Flax is an annual crop which is grown in many parts of the world, principally in temperate regions. It is grown primarily as a rainfed, cold-season crop and thrives best in heavy soils with high moisture-retaining capacity.

Vegetable Oils 2/

A frequent subclassification of fats and oils (not only vegetable oils) is "hard" and "soft" oils. In temperate climates, the soft oils are liquid and the hard oils are not. In general, a hard oil has relatively more saturated than unsaturated fatty acids, while just the opposite is true of a soft oil. Crudely speaking, fatty acids are called unsaturated if they can absorb more hydrogen atoms; they are called saturated if they are resistant to more hydrogen atoms.

2/ This section draws heavily from (41).

A breakdown of the vegetable oils in this study into the "hard" and "soft" classification follows:

Hard Oils	Soft Oils
Coconut	Olive
Palm kernel	Rapeseed
Palm	Peanut
	Cottonseed
	Sunflowerseed
	Soybean

Generally speaking, there is a direct relationship between the fatty acid composition of the oil and important qualities such as melting point, texture, and plasticity. The hard oils, because of their relatively large amount of saturated fatty acids, have a higher melting point than do the soft oils. Plasticity, the ability to retain a shape attained by pressure deformation, is enhanced when there is a broad and balanced representation of the several fatty acids.

Processing of Vegetable Oil

The following material discusses (1) the manner in which oil is taken from seeds (or kernels); (2) the oils that require further processing; and (3) the processing steps. (The hydrogenation process occurs after the initial processing and is discussed later).

Crude vegetable oils are obtained from seeds by pressing (expelling) or by chemical extraction. The chemically-extracted oils have to be processed further before they may be used; however, the pressed oils may or may not be used without further processing.

Five of the processing steps in the refinement of crude oil are: (1) saponification, (2) bleaching, (3) deodorizing, (4) degumming, and (5) winterizing. Not all of the vegetable oils have to go through these five steps. The chemically extracted oils must go through the saponification process, but the expelled oil may or may not be saponified.

Saponification involves the use of alkali neutralizers such as sodium hydroxide to isolate and remove certain impurities in the crude oil. During the process, the undesirable fatty acids (free fatty acids) are eliminated; but unfortunately, some oils also lose varying amounts of pure oil at the same time. For example, palm kernel oil has a higher loss than does coconut oil, and this increases the price differential of palm kernel oil relative to that of coconut oil.

Bleaching involves mixing the oil with a substance that has a high color-absorbtion power (such as diatomaceous earth, carbon black earth, or active earth) and then straining the mixture, leaving the color behind with the absorbing agent.

In addition to getting rid of undesirable color, odors and gum-like substances may be eliminated and oil may be winterized. Winterizing is necessary for cottonseed oil and the degumming is necessary for soybean oil.

In the winterizing step, the temperature is decreased to 35° F. and those parts of the oil that would solidify are precipitated out. This step for cottonseed oil and the degumming step for soybean oil increase the price differential of the oils relative to other vegetable oils. However, with the exception of these price differentials, vegetable oils generally have the same processing costs.

Hydrogenation of Vegetable Oils

The fact that hard oils have a relatively higher level of saturated fatty acids than do soft oils does not mean that these levels have to remain unchanged. Since hydrogen is a colorless, tasteless, odorless, and very light gas and hydrogenation is the process of exposing to or treating with hydrogen, the level of saturated fatty acids may be adjusted upward by the process of hydrogenation. If a selective process is used, all acids are affected at about the same time. Selective hydrogenation is generally used, as it gives the end product a higher resistance to oxidation and, therefore, less likelihood of becoming rancid.

Uses of Vegetable Oils

Vegetable oil uses may be broadly classified as edible and inedible. Edible uses include vegetable oils being used in (1) margarine, (2) salad oil, (3) cooking oil, (4) shortening, (5) confections, and (6) filling for baked goods. Inedible uses of vegetable oils include use in (1) soaps (as a lathering agent), (2) paints (as a drying agent), (3) lubricants, (4) cosmetics, (5) pharmaceutical preparations, (6) textile lubricants, (7) printing inks, (8) linoleums, and (9) varnishes.

Soybean oil.--Considerable quantities of soybean oil are used in salad oils and cooking fats. Blends of soybean oil with olive oil are used extensively. However, the use of the soybean oil for these purposes is limited to some extent by its tendency to develop a bad flavor or odor when stored in contact with air, or when heated to the temperatures used in deep fat frying. This problem is called "reversion."

Reversion is due mainly to the fact that the soybean oil contains linolenic acid. Hydrogenation, which saturates the linolenic fatty acids, greatly reduces the oxidization problem. Thus, the major use of soybean oil is in the manufacture of margarine fats and household shortenings. Even in these products, however, the percentage of soybean oil has to be limited since the oil continues to revert faster than do the other oils.

Peanut oil.--Peanut oil is well suited for use either unhydrogenated or hydrogenated. The unhydrogenated oil is valued as a salad and cooking oil because it remains liquid at refrigerator temperatures, is highly stable and nonfoaming at high temperatures, and is easily deodorized to be tasteless. As a salad oil, however, it has a greater tendency to cloud when held at low temperatures than do most other oils used as salad oils. Peanut oil is widely used in the manufacture of vegetable margarines; it is also used to some extent for cooking sardines prior to canning in olive oil. Inedible grades of the oil are used chiefly in soap.

Cottonseed oil.--Cottonseed oil makes an excellent salad oil provided a portion of the solid glycerides is removed by the winterizing process. The oil is easily deodorized to a bland flavor and keeps relatively well. It is well suited to shortening and margarine manufacture.

Sunflowerseed oil.--Sunflowerseed oil is well suited for use as a salad and cooking oil, and when hydrogenated, for use in margarine fats and shortening. Good grades of the oil may be refined with a low loss. The linolenic acid found in soybean oil is lacking in sunflowerseed oil, which is to the advantage of sunflowerseed oil when used as a food. The oil is also a good material for the manufacture of oil-modified alkyo resins and similar products.

Rapeseed oil.--Until recently, rapeseed oil was at a competitive disadvantage on world markets as an edible oil because of its high erucic acid content, which gives an unpleasant taste and odor, especially when heated. Recent technological improvements in rapeseed processing techniques have largely overcome this problem. Its uses for all edible oil purposes is expected to increase in the future.

Coconut oil.--Coconut oil, as palm kernel oil, differs sharply in physical characteristics and chemical composition from most other oils. The most noticeable physical characteristic is that the oil changes abruptly from a hard and brittle solid to a clear oil within a temperature range of a few degrees. About 90 percent of the fatty acids in the oil are saturated and nearly half of these consist of lauric acid.

Coconut oil is well suited to margarine formulations where a butter-like consistency is desired. Because the oil has a low degree of unsaturation, it is resistant to rancidity caused by oxidation and therefore can be used in confections and other products which may stand for some time before consumption. The oil is not well suited for shortening and cooking fat manufacture because of its narrow plastic range.

Coconut oil is used extensively in soap manufacture (its lauric oil content yields excellent lathering characteristics) and in the chemical industries, primarily for synthetic detergents. Most industrial uses of coconut oil have become vulnerable to replacement by synthetic raw materials.

Palm oil.-- Palm oil is widely used in margarine, shortening, and cooking fat because of its soft texture, long plastic range, high melting point, and stability. The refined oil is resistant to oxidation because of its moderate degree of unsaturation. It has a good flavor and keeps well. The large portion of palmitic acid in palm oil also makes it well suited for soap making.

Palm kernel oil.--Palm kernel oil has essentially the same characteristics and properties as coconut oil does, as well as most of the same drawbacks and advantages. Consequently, palm kernel oil is used more or less interchangeably with coconut oil. Refining losses, however, are higher with palm kernel oil. Palm kernel oil refining costs have been approximately 1 cent higher a pound than such costs for coconut oil, resulting in a market differential of that amount between the two oils.

Olive oil.--Olive oil is seldom hydrogenated to plastic shortening consistency since cookery methods in the Mediterranean countries, where olive oil is primarily consumed, were developed on the basis of using the oil in liquid form. Good grades of virgin olive oil have a pleasing delicate flavor, which is probably the reason for its high price relative to that of other oils. Olive oil is also used for a variety of other purposes, including the manufacture of soaps, textile lubricants, cosmetics, and pharmaceutical preparations.

Oilcakes 3/

In general, oilcakes are used as a protein concentrate in animal feeds. The main components of oilcakes are protein, oil, fiber, nitrogen-free extract, and mineral matter. The average composition of the various meals is presented in table C-1. The components other than protein are more important in compound feeds for poultry and hogs than in such feeds for cattle.

3/ This section is drawn from (45, ch. XXII) and (10, vol. II, ch. II).

Protein is the general term used for some 24 or more amino acids. 4/ Amino acids that cannot be made in the body from other substances or that cannot be made in sufficient amounts are called essential amino acids. Protein for the growth of protein tissues or for the formulation of milk cannot be made by an animal unless it has an adequate supply of each of the essential amino acids. A shortage of a single one in a feed ration will limit the use of all the others and therefore reduce the efficiency of the entire ration. The essential amino-acid pattern in protein by type of oilcake is presented in table C-2; that of fishmeal is included for comparison. In the processing procedure, variations in temperature, pressure, and retention time inside the cooker, for example, cause marked differences in the protein content of an oilcake. Thus, an oilcake from one particular oilseed from some suppliers obtains a premium price over other oilcakes from the same oilseed.

Comparison of the Nutritive Values of Different Cakes

Cakes of different oilseeds processed in different manners possess different amounts of protein, oil, and fiber. Digestibility of each of these components differs widely depending on the type of animal to which the oilcake is fed. Hence, it is most difficult to theoretically compare a nutritive value of the different cakes. The feed requirements of the animal must be considered along with the digestibility coefficient of each oilcake.

Uses of Individual Meals

Soybean meal.-- Soybean meal is one of the best protein supplements for dairy and beef cattle. For swine and poultry, it ranks ahead of all other common protein supplements of plant origin because of the higher quality of its protein. Soybean meal lacks methionine and vitamins, especially as a feed for chickens; another disadvantage is its limited phosphorous and calcium content.

During processing, soybean meal is subjected to toasting, which destroys the tripsin-inhibitor which is toxic when fed to animals.

Cottonseed meal.--This product is a good protein supplement for dairy cows, beef cows, and sheep. Cottonseed meal, however, does not furnish protein of high quality for swine or poultry, chiefly because it is rather low in lysine. Therefore, it should be used in combination with such supplements as tankage, meat scraps, fishmeal, milk byproducts, or soybean meal. Cottonseed meal is one of the richest feeds in phosphorous but it is low in calcium.

The toxic compound Gossypol in cottonseed meal (up to 1 percent of the ration) has no effect on ruminants, but care has to be taken in feeding the oilcake to pigs, poultry, and calves.

Linseed meal.--Linseed meal is a high-protein and palatable feed for dairy cattle, beef cattle, and sheep. It seems to have a conditioning effect on cattle and has a slight laxative effect which aids in keeping stock healthy. Since linseed meal is deficient in lysine and methionine, it should be used in combination with other protein supplements when fed to swine or poultry. Also, when fed in amounts larger than 5 percent of the total ration, it has a depressing effect on the growth of chicks and poults.

The toxicity due to linase in linseed meal is generally destroyed by the high temperature of operation during screwpressing.

4/ Generally speaking, extracted cakes are as good a protein concentrate as expeller cakes with a higher oil content. Expeller cakes, however, are preferred in some countries perhaps because of their better palatability or the extra energy the oil adds to the cakes.

Sunflowerseed meal.--Sunflowerseed meal is a good feed for stock and keeps well. The main disadvantage is the low-lysine content for feeding poultry and swine. Also, the quantity of hulls added to the kernels and the method of processing can limit the use of this meal in swine and poultry feeds because of its high-fiber content. Sunflower meal can be used as a supplement to soybean meal since it is rich in methionine, vitamin B12, and calcium and phosphorus.

Copra meal.--Copra meal is a good feed supplement for cattle, particularly dairy cattle, because of its protein content, the characteristic of its residual oil, its palatability, and its high capacity for absorbing molasses. It is not a good feed for swine and poultry because of its high-fiber content.

The meal's lysine content is high, and lysine is the limiting amino acid in feeding non-ruminants. Copra meal contributes significant amounts of the B complex vitamins to rations.

Peanut meal.--Peanut meal is a good and palatable supplementary protein concentrate for dairy and beef cattle. It is also a good supplement for mature hogs but it produces soft pork. For chicks and young pigs, it is primarily deficient in methionine, cystine, lysine, and trypotophan.

Many compound feed manufacturers have generally stopped using peanut meal in feed for poultry and young pigs because of the danger of aflatoxin--which can be fatal.

Rapeseed meal.-- The use of rapeseed meal has been limited in livestock feeding because of the presence of active goitrogens. Goitrogens are enzymes that cause the meal to be toxic to animals--particularly poultry and pigs, in which it causes growing problems and may lead to death. Recently, however, processing methods have been developed to improve the quality and nutritional value of the meal as an animal feed. Although rapeseed meal is not especially palatable, it has a protein content of around 35 percent with a good amino acid balance. Its use for animal feeding will probably expand in the future.

Palm kernel meal.--This meal varies considerably in composition and especially in fiber content. Palm kernel meal has been used chiefly in Europe, where it is mostly fed to dairy cows.

Palm kernel meal tends to produce hard fat when fed to stock and thus makes a firm butter and pork of good quality. It is not very palatable to pigs and should not form more than about one-fifth of a ration.

Table C-1.--Composition of various oilcakes

Oilcakes	Protein	Fat	Fiber	Nitrogen free extract	Mineral matter	Moisture
				-Percent		
Peanut expeller (decorticated)	46.6	6.3	5.5	30.2	5.4	6.0
Peanut extraction	52.3	1.6	6.9	26.3	5.9	7.0
Cottonseed expeller	42.1	6.1	10.5	28.3	5.6	7.4
Cottonseed extraction	41.6	2.0	10.7	31.1	5.6	9.0
Linseed expeller	35.2	4.6	8.9	36.7	5.7	8.9
Linseed extraction	36.6	1.0	9.3	38.3	5.8	9.0
Rapeseed expeller	33.5	8.1	10.8	30.2	6.9	10.5
Copra expeller	21.2	6.7	11.2	47.4	6.5	7.0
Copra extraction	21.4	12.4	13.3	47.4	6.6	8.9
Soybean expeller	44.0	4.9	5.9	30.0	6.2	9.0
Soybean extraction	45.7	1.3	5.9	31.4	6.1	9.6
Sunflowerseed meal (hulled)	1/ 27.7	41.4	6.3	16.3	3.8	4.5
Sunflowerseed meal extraction (unhulled)	19.6	1.1	35.9	27.0	5.6	10.8
Fish meal	60.9	8.9	0.9	5.0	18.3	8.0
Palm kernel	19.2	6.7	11.9	49.7	3.9	8.6

1/ New varieties of sunflowerseed have a somewhat higher protein content than this.

Source: Morrison, F. B. Feeds and Feedings, 22nd ed., 1959, pp. 1042-1068.

Table C-2.--Essential amino acid pattern in protein

Essential amino acid	Peanut meal	Cottonseed meal	Linseed meal	Rapeseed meal	Copra meal	Soybean meal	Sunflowerseed meal
	Grams per 16 percent nitrogen						
Arginine	10.8	11.02	8.55	5.6	10.8	7.0	7.76
Histidine	2.1	2.70	1.86	2.6	1.7	2.5	2.19
Isolencine	4.0	4.01	5.92	3.7	4.0	5.8	4.52
Leucine	6.8	6.20	5.78	5.7	6.2	7.6	5.95
Lysine	4.0	4.20	4.02	3.5	2.6	6.6	3.81
Methionine and cystine	0.85	1.49	1.00	1.1	1.6	1.1	2.19
Phenylainine	5.0	5.25	4.21	4.0	4.2	4.8	5.12
Threonine	2.8	3.47	3.58	3.8	3.3	3.9	3.43
Valine	5.2	4.98	4.92	5.7	5.4	5.2	4.90
Tryptophan	1.04	1.59	1.51	2.0	0.9	1.2	1.38
Tyrosine	3.69	--	2.21	2.3	1.8	3.2	--

Source: Altschul, Processed Plant Protein Foodstuffs - 1958.

APPENDIX D.--WORLD POPULATION AND INCOME, BY REGION, 1965 AND PROJECTED TO 1980

Population Projections

Population is the key variant in growth of demand. Thus, assumptions regarding population growth are critical in analysis of demand prospects for agricultural exports. Original research on population growth, however, was not within the intent of this study. A number of world demographic studies have been conducted. Population growth rates used for analytical purposes and projections were based, with some modifications, on population projections of the Population Division of the United Nations. However, some adjustments were made based on recent studies by FAO, OECD, and the USDA's long-term supply and demand studies.

For this study, a single population projection was selected for each region (table D-1). Considerably higher growth rates were used for the LDC's than for the rest of the world. It was not deemed necessary to develop high and low population projections, although major changes in growth rates will affect the projections.

Income Projections

Another key demand variant is income growth. With given levels of population, prices, and other factors, the rate of increase in income largely determines the pattern and level of per capita consumption. Population may be the most important demand factor in the LDC's, but income may be more important in countries with low population growth rates. In Japan, for example, population growth is less than 1 percent and income growth is over 8 percent.

Table D-2 presents the projected growth rates in national income that were used in this study and also shows the levels in dollar terms.

The income growth rate in the LDC's is as high or higher than that for the developed regions. However, the high rate of population growth in the LDC's reduces their per capita income levels and per capita income growth rates.

For the LDC's, separate income projections were generated for alternatives II and III. It was assumed that changes in income growth were associated with changes in oilseeds production in the LDC's. 1/ Therefore, the rates of income growth for the LDC's were adjusted with the shifting production functions--up for alternative II and down for alternative III.

1/ For more details concerning alternatives, see Rojko and Mackie (50, pp 16-19).

Table D-1.--World population, 1965, and projections to 1970, 1975, and 1980

Region	Population				Annual population growth rates			
	1965	1970	1975	1980	1965-1970	1970-1975	1975-1980	1965-1980
	Thousands				Percent			
Developed regions:								
United States	194,572	207,725	223,180	241,079	1.3	1.4	1.6	1.4
Canada	19,604	21,451	23,581	26,024	1.8	1.9	2.0	1.9
EC	181,594	187,591	193,182	198,385	0.6	0.6	0.6	0.6
United Kingdom	54,595	56,610	58,655	60,690	0.7	0.7	0.7	0.7
Other W. Europe	87,684	90,809	94,003	97,489	0.7	0.7	0.7	0.7
Japan	97,960	101,918	106,647	111,563	0.8	0.9	0.9	0.8
Australia and N. Zealand	14,000	15,227	16,554	18,216	1.7	1.7	1.9	1.8
South Africa, Rep.of	17,867	20,554	23,292	26,676	2.9	2.5	2.8	2.7
Total dev. countries	667,876	701,885	739,094	780,122	1.0	1.0	1.1	1.0
Central plan regions:								
Eastern Europe	121,430	127,179	133,083	138,763	0.9	0.9	0.8	0.9
USSR	230,600	245,266	260,350	277,325	1.3	1.2	1.3	1.3
Communist Asia	795,604	878,983	971,117	1,077,064	2.0	2.0	2.1	2.0
Total central plan	1,147,634	1,251,428	1,364,550	1,493,152	1.8	1.8	1.8	1.8
Less developed regions:								
Central America, Mexico	80,078	93,402	109,323	128,508	3.1	3.2	3.3	3.2
South America	166,046	189,548	216,571	247,185	2.7	2.7	2.7	2.7
East & West Africa	217,454	244,194	277,106	315,620	2.4	2.5	2.6	2.5
North Africa & W. Asia	162,483	185,613	213,783	246,656	2.7	2.9	2.9	2.8
South Asia	638,064	722,172	815,439	913,655	2.5	2.5	2.3	2.4
Southeast Asia	81,057	92,157	104,267	117,969	2.6	2.5	2.5	2.5
East Asia & Pac. Is	198,597	226,333	258,508	298,920	2.7	2.7	2.9	2.8
Total less developed	1,543,779	1,753,419	1,994,997	2,268,513	2.6	2.6	2.6	2.6
World total	3,359,289	3,706,732	4,098,641	4,541,787	2.0	2.0	2.1	2.0

Source: (44)

Table D-2.--World income, 1965, and projections to 1980

Region	1965	1980			Annual growth rates					
					Total			Per capita		
		Alternative I	Alternative II	Alternative III	Alternative I	Alternative II	Alternative III	Alternative I	Alternative II	Alternative III
	Million dollars				Percent growth per year					
Developed region: 1/										
United States	397,800	730,287	SAME AS ALT. I		4.1	SAME AS ALT. I		2.7	SAME AS ALT. I	
Canada	27,142	50,551			4.2			2.3		
EC	146,351	274,955			4.3			3.7		
United Kingdom	53,917	85,202			3.1			2.4		
Other W. Europe	48,808	92,635			4.4			3.7		
Japan	34,887	110,667			8.0			7.2		
Australia & N. Zealand	14,317	25,883			4.0			2.2		
South Africa, Rep. of	7,165	13,866			4.5			1.8		
Total dev. countries	730,387	1,384,046			4.3			3.2		
Central plan region: 2/										
E. Europe	85,300	176,649			5.0			4.1		
USSR	219,700	499,852			5.7			4.4		
Communist Asia	85,600	158,669			4.2			2.2		
Total central plan	390,600	835,170			5.2			3.4		
Less developed region: 3/										
Mexico, Central America and Caribbean	30,758	71,265	98,933	56,198	5.8	8.1	4.1	2.5	4.7	0.9
South America	63,270	123,159	160,043	102,425	4.5	6.4	3.3	1.8	3.6	0.6
East & West Africa	22,699	42,136	53,090	35,178	4.2	5.8	3.0	1.7	3.2	0.4
North Africa & W. Asia	39,785	84,644	113,496	68,635	5.2	7.2	3.7	2.1	4.3	0.9
South Asia	64,059	119,180	151,363	99,802	4.2	5.9	3.0	2.0	3.4	0.6
Southeast Asia	8,427	16,042	20,775	13,321	4.4	6.2	3.1	1.9	3.6	0.6
East Asia & Pac. Is.	28,070	54,188	70,185	45,023	4.5	6.3	3.2	1.7	3.4	0.4
Total less developed	257,068	510,614	667,885	420,582	4.7	6.6	3.4	2.1	3.9	0.7

1/ Consumer expenditures, 1958 dollars.
2/ Net material product, 1961-63 dollars.
3/ Gross national product, 1965 dollars.

Source: (44)

APPENDIX E.--A SIMULTANEOUS MODEL FOR DEVELOPING DEMAND ESTIMATES FOR OILSEEDS AND OILSEED PRODUCTS

The oilseed economy is interesting in that factors influencing demand for vegetable oil and demand for oilcakes are not the same, while supplies of the two products are tied together by the parent commodity, oilseeds. A simultaneous model was developed to help analyze the interrelationships and price behavior.

An exploratory model required 29 relations to fully explain the interdependency between one importing country and one exporting country producing one oilseed, converted into a vegetable oil product and an oilcake product.

Because of a lack of information for variables such as stocks, crushings, and crushing margins, it was not possible to determine statistically all of the relationships. Development of the exploratory model, however, yielded insights into the workings of the total system, which in turn, led to a better choice of variables in the limited relations that were used in projecting oil and meal demand.

A description of the simultaneous model follows for use of researchers who may be interested in more fully exploring this approach to analysis of demand for and supply of oilseed products.

The Simultaneous Model 1/

The simultaneous model developed was devised in terms of world trade based on the structure of the oilseed market (fig.4). Exporting regions were the suppliers and importing regions were the demanders of the oilseeds, meals, and oils. The interdependency of the two kinds of regions was worked out by a set of identities called the regional equilibrium conditions. The equations in the model are consistent with assumptions made from economic theory and empirical knowledge of oilseed markets.

The model has 29 equations containing endogenous and predetermined (exogenous plus lagged endogenous) variables. Four sets of equations for behavioral and technical relationships in world trade and a set of identities for regional conditions were established. The number of equations and variables in the model could be expanded or reduced. Descriptions and identifications of variables begin on page 206.

Behavioral Relationships

The behavioral relationships for the importing regions are given in equations (1) through (16). Equations (1) and (2) pertain to domestic demand for oils and meals. Demand for oil depends on the price of oil, price of substitutes, income, concessional shipment, quantity of feeds produced, and beginning stock of feeds. Demand for meal relates to the price of meal, number of animal units, quantity of feed produced, price of tankage, and price of other feeds. Equation (3) states that production of oilseeds depends on prices of oilseeds in the current and preceding periods, prices of substitutes, and a trend-time variable. Equation (4) relates the level of crushings to prices of oilseeds, meals, and oils and to the crushing margin. Equations (5) and (6) express the ending stock of oil and meal as depending on prices and supply of oilseeds--the level of concessional P. L. 480 trade is considered as another variable in the ending stock of oil.

1/ Anthony S. Rojko, Foreign Regional Analysis Div., Econ. Res. Serv., provided most helpful guidance in the development of this model.

The set of behavioral relationships for the exporting regions is the same as the above with the exception of an additional ending stock equation (16) because of the assumption of oilseed surplus in the exporting regions.

Technical Relationships

The technical relationships help to establish the simultaneity of the system; these are stated in equations (7) through (11) for the importing regions and in equations (19) through (23) for the exporting regions.

Equation (8) establishes the fixed relationship between quantity of oilseeds crushed and the outturn of oils and meal. Equations (9) and (10) state that the supply of and demand for oils and meals are in equilibrium. Equation (11) links the oil and meal prices to that of the parent commodity, oilseeds.

Equation (19) for the exporting regions differs from (7) for the importing regions in the kind and number of variables. The reason is that the exporting regions' production and beginning stocks are the supply of oilseed required to equal domestic consumption, export, and the ending stock of oilseeds; whereas, in the importing regions, the supply of oilseeds consists of production and import to fulfill domestic demand for this commodity.

Regional Relationships

Identities (24) through (26) simply state that the quantities of oilseed, oils, and meals exported are equal to those of imports on the world level. Identities (27) through (29) relate the prices of oilseed, oils, and meals in the importing regions to those in exporting regions, with cost of transportation considered.

Description of Endogenous Variables

1. Q_o^{di} = Quantity of oil demanded in importing regions.
2. Q_m^{di} = Quantity of meal demanded in importing regions.
3. Q_{os}^{pi} = Quantity of oilseed produced in importing regions.
4. Q_m^{esi} = Ending stock of meal in importing regions.
5. Q_o^{esi} = Ending stock of oil in importing regions.
6. Q_{os}^{ci} = Quantity of oilseeds crushed in importing regions.
7. Q_o^{de} = Quantity of oil demanded in exporting regions.
8. Q_m^{de} = Quantity of meal demanded in exporting regions.
9. Q_{os}^{pe} = Quantity of oilseed produced in exporting regions.
10. Q_{os}^{ese} = Ending stock of oilseed in the exporting regions.
11. Q_o^{ese} = Ending stock of oil in the exporting regions.
12. Q_m^{ese} = Ending stock of meal in the exporting regions.
13. Q_{os}^{ce} = Quantity of oilseed crushed in the exporting regions.
14. P_o^i = Price of oil in the importing regions.
15. P_m^i = Price of meal in the importing regions.
16. P_{os}^i = Price of oilseed in the importing regions.
17. P_o^e = Price of oil in the exporting regions.
18. P_m^e = Price of meal in the exporting regions.
19. P_{os}^e = Price of oilseed in the exporting regions.
20. Q_m^{pi} = Quantity of meal produced in importing regions.
21. Q_o^{pi} = Quantity of oil produced in importing regions.
22. Q_m^{pe} = Quantity of meal produced in exporting regions.
23. Q_o^{pe} = Quantity of oil produced in exporting regions.
24. Q_m^{ee} = Quantity of meal exported in exporting regions.
25. Q_o^{ee} = Quantity of oil exported in exporting regions.
26. Q_{os}^{ee} = Quantity of oilseed exported in exporting regions.
27. Q_m^{ii} = Quantity of meal imported in importing regions.
28. Q_o^{ii} = Quantity of oil imported in importing regions.
29. Q_{os}^{ii} = Quantity of oilseed imported in importing regions.

Description of Exogenous Variables

1. P^{i}_{sb} = Price of substitute in importing regions.
2. I^{i} = Index of personal income in importing regions.
3. PL^{i} = PL 480 shipments to importing regions.
4. Q^{ii}_{f} = Quantity of fat imported for importing regions.
5. Q^{bsi}_{f} = Beginning stock of fat in importing regions.
6. A^{i} = Number of animal units in importing regions.
7. Q^{pi}_{fd} = Quantity of feedgrain produced in importing regions.
8. $P^{i}_{os\ t-1}$ = Price lag, oilseed.
9. P^{i}_{sb} = Price of substitute for oilseeds in importing regions.
10. M^{i}_{c} = Crushing margin, importing regions.
11. P^{e}_{sb} = Price of substitute in exporting regions.
12. I^{e} = Index of personal income in exporting regions.
13. A^{e} = Number of animal units in exporting regions.
14. Q^{pe}_{fd} = Quantity of feedgrain produced in exporting regions.
15. $P^{e}_{os\ t-1}$ = Last year price of oilseed in exporting regions.
16. Q^{bsi}_{m} = Beginning stock of meal in importing regions.
17. Q^{bsi}_{o} = Beginning stock of oil in importing regions.
18. Q^{bse}_{o} = Beginning stock of oilseed in exporting regions.
19. M^{e}_{c} = Crushing margin, exporting regions.
20. T_{os} = Transfer costs for oilseeds.
21. T_{m} = Transfer costs for meal.
22. T_{o} = Transfer costs for oil.
23. T = Time (trend variables).
24. P^{i}_{t} = Price of tankage.
25. Q^{si}_{os} = Supply of commercial oilseeds.

WORLD MODEL FOR OILSEEDS, MEAL, AND OIL

Importing Regions

Behavioral Relationship

1. Demand for oil: $f(Q_o^{di}, P_o^i; P_{sb}^i, I^i, PL^i, Q_f^{ii}, Q_f^{bsi} \ldots\ldots\ldots\ldots\ldots\ldots e_1) = 0$
2. Demand for meal: $f(Q_m^{di}, P_m^i; A^i, Q_{fd}^{pi}, P_t^i, Q_{fd}^i \ldots\ldots\ldots\ldots\ldots\ldots e_2) = 0$
3. Production of oilseeds: $f(Q_{os}^{pi}; P_{os\ t-1}^i, P_{sb}^i, T \ldots\ldots\ldots\ldots\ldots\ldots e_3) = 0$
4. Crushing equation: $f(Q_{os}^{ci}, P_{os}^i, P_m^i, P_o^i; M_c^i \ldots\ldots\ldots\ldots\ldots\ldots e_4) = 0$
5. Ending stock of meal: $f(Q_m^{esi}, P_m^i; Q_{os}^{si} \ldots\ldots\ldots\ldots\ldots\ldots e_5) = 0$
6. Ending stock of oil: $f(Q_o^{esi}, P_o^i; Q_{os}^{esi}, PL_o^i \ldots\ldots\ldots\ldots\ldots\ldots e_6) = 0$

Technical Relationship

7. Production and import for oilseed: $Q_{os}^{pi} + Q_{os}^{ii} = Q_{os}^{ci}$
8. Crushing for oilseed: $Q_{os}^{ci} = bQ_m^{pi} + (1-b)\ Q_o^{pi}$
9. Market clearing for meal: $Q_m^{pi} + Q_m^{bsi} + Q_m^{ii} = Q_m^{di} + Q_m^{esi}$
10. Market clearing for oil: $Q_o^{pi} + Q_o^{bsi} + Q_o^{ii} = Q_o^{di} + Q_o^{esi}$
11. Price linkage: $P_{os}^i + M_c^i = bP_m^i + (1-b)\ P_o^i$

Exporting Regions

Behavioral Relationship

12. Demand for oil: $f(Q_o^{de}, P_o^e; P_{sb}^e, I^e, Q_f^{ii}, Q_f^{bsi} \ldots\ldots\ldots\ldots\ldots\ldots e_{14}) = 0$
13. Demand for meal: $f(Q_m^{de}, P_m^e; P_{sb}^e, A^e, Q_{fd}^{pe}, P_{fd}^e, P_t^e \ldots\ldots\ldots\ldots\ldots\ldots e_{15}) = 0$
14. Production of oilseeds: $f(Q_{os}^{pe}; P_{os\ t-1}^e; P_{sb}^e, T \ldots\ldots\ldots\ldots\ldots\ldots e_{16}) = 0$
15. Crushing equation: $f(Q_{os}^{ce}, P_{os}^e, P_o^e, P_m^e; M_c^e \ldots\ldots\ldots\ldots\ldots\ldots e_{17}) = 0$
16. Ending stock of oilseeds: $f(Q_{os}^{ese}, P_{os}^e, Q_{os}^{se} \ldots\ldots\ldots\ldots\ldots\ldots e_{18}) = 0$
17. Ending stock of oil: $f(Q_o^{ese}, P_o^e; Q_o^{se} \ldots\ldots\ldots\ldots\ldots\ldots e_{19}) = 0$
18. Ending stock of meal: $f(Q_m^{ese}, P_m^e; Q_m^{se} \ldots\ldots\ldots\ldots\ldots\ldots e_{20}) = 0$

Technical Relationship

19. Supply for oilseed: $Q_{os}^{pe} + Q_{os}^{bse} = Q_{os}^{ce} + Q_{os}^{ee} + Q_{os}^{ese}$
20. Crushing for oilseed: $Q_{os}^{ce} = aQ_m^{pe} + (1-a)\ Q_o^{pe}$
21. Market clearing for meal: $Q_m^{pe} + Q_m^{bse} = Q_m^{de} + Q_m^{ee} + Q_m^{ese}$

22. Market clearing for oil: $Q_o^{pe} + Q_o^{bse} = Q_o^{de} + Q_o^{ee} + Q_o^{ese}$

23. Price linkage: $P_{os}^{e} + M_c^e = aP_m^e + (1-a)\ P_o^e$

Regional Relationships

Equilibrium Conditions

24. $Q_{os}^{ee} = Q_{os}^{ii}$

25. $Q_m^{ee} = Q_m^{ii}$

26. $Q_o^{ee} = Q_o^{ii}$

27. $P_{os}^{i} = P_{os}^{e} + T_{os}$

28. $P_m^i = P_m^e + T_m$

29. $P_o^i = P_o^e + T_o$

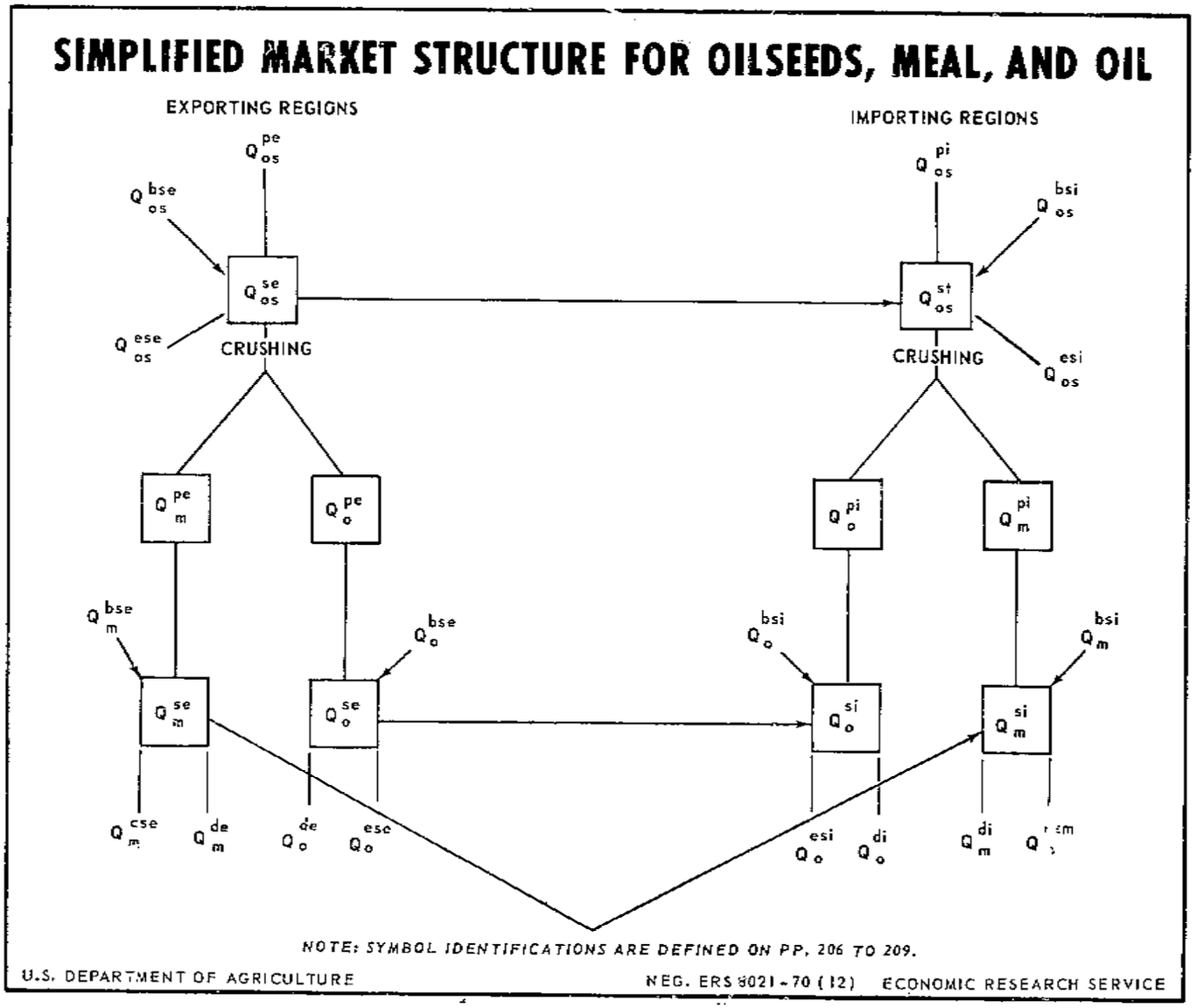

SIMPLIFIED MARKET STRUCTURE FOR OILSEEDS, MEAL, AND OIL
EXPORTING REGIONS
IMPORTING REGIONS
CRUSHING
CRUSHING
NOTE: SYMBOL IDENTIFICATIONS ARE DEFINED ON PP. 206 TO 209.
U.S. DEPARTMENT OF AGRICULTURE
NEG. ERS 6021-70 (12) ECONOMIC RESEARCH SERVICE

Figure 4

Results of the project of which this report is a part have been published as follows by the Economic Research Service:

World Trade in Selected Agricultural Commodities, 1951-65--

Vol. I.--Beverage Crops: Coffee, Cocoa, and Tea. Foreign Agr. Econ. Rpt. 40, June 1968.

Vol. II.--Food and Feed Grains: Wheat, Rice, Maize, Barley, and Other Cereals. Foreign Agr. Econ. Rpt. 45, June 1968.

Vol. III.--Textile Fibers: Cotton, Jute, and Other Vegetable Fibers. Foreign Agr. Econ. Rpt. 43, June 1968.

Vol. IV.--Sugar, Fruits, and Vegetables. Foreign Agr. Econ. Rpt. 44, June 1968.

Vol. V.--Oilseeds, Oil Nuts, and Animal and Vegetable Oils. Foreign Agr. Econ. Rpt. 47, Aug. 1968.

Japan's Food Demand and 1985 Grain Import Prospects. Foreign Agr. Econ Rpt. 53, June 1969.

World Demand Prospects for Agricultural Exports of Less Developed Countries in 1980, Foreign Agr. Econ. Rpt. 60, June 1970.

World Demand Prospects for Wheat in 1980 with Emphasis on Trade by Less Developed Countries. Foreign Agr. Econ. Rpt. 62, July 1970.

Growth in World Demand for Feed Grains: Related to Meat and Livestock Products and Human Consumption of Grains, 1980. Foreign Agr. Econ. Rpt. 63, June 1970.

World Demand Prospects for Cotton in 1980 with Emphasis on Trade by the Less Developed Countries. Foreign Agr. Econ. Rpt. 000, Jan. 1971.

World Demand Prospects in 1980 for Bananas. Foreign Agr. Econ. Rpt. 69, Feb. 1971.

Copies of these reports may be obtained upon request to the Division of Information, Office of Management Services, U. S. Department of Agriculture, Washington, D. C. 20250.

Additional reports are being developed on the following as part of the overall research project: World demand prospects in 1980 for rice; total grains; citrus fruits; and coffee, tea, and cocoa; the Japanese grain-livestock economy; and world agricultural import barriers. Publication of these reports will be announced.

END

DATE

FILMED

7-24-79

NTIS