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Palm Oil Prospects for 2005

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Abstract

In the last two decades, palm oil has emerged as the most traded edible oil and a major component of global oil consumption and production. The increase in palm oil's importance is due primarily to changes in the economics underlying the highly complex edible oil market. In the coming decade, palm oil production, centered in Southeast Asia, will continue to expand rapidly, driven on the demand side by cost advantages over alternative oils and on the supply side by relative profitability over competing estate and other crops. The growth in palm oil production will not, however, decrease demand for U.S.-produced edible oils because of 1) the expected rapid income growth will boost edible oil demand, especially in the developing world and 2) the increased use of palm oil in oleochemical production.

Keywords: palm oil, baseline, projections, trade, oleochemicals.

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PALM OIL PROSPECTS FOR 2005

Jaime Castaneda and Mark Giordano

Introduction

Palm oil[1], produced from the fruit of the oil palm tree, ranks second only to soybean oil in terms of global edible oil production and consumption and first in terms of world edible oil trade. Palm oil is produced in Central and South America, Africa, and Asia--in particular Malaysia and Indonesia--and is traded on a global basis in competition with other edible oils.

Palm oil's importance within the edible oil industry has intensified over the last two decades due to its low production costs as well as developments in the global markets for edible oil and oilseed. In fact, global production, consumption, and trade of palm oil have grown at a faster rate than that of any other oil (fig. 1). With the potential for significant additional growth in the overall demand for fats and oils coupled with palm oil's unique properties compared with other vegetable and marine oil sources, palm oil's role in edible oils trade and consumption is likely to continue rising in the future.

This report provides an overview of the current palm oil market and an examination of likely future developments. After reviewing the edible oil market in general, the report gives longrun projections through 2005 for the consumption, production, and trade of palm oil in the major consuming, producing, and trading nations.

These projections are a component of the **Long-term Agricultural Baseline Projections** of the U.S. Department of Agriculture. Baseline projections are a Departmental consensus on a

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[1] In contrast to palm oil (mesocarp), palm kernel oil and meal are extracted from the kernels. The kernel's oil is lauric with high levels of saturated fat (solid at room temperature), while palm oil is palmitic and is semi-solid at room temperature.

representative longrun scenario for the agricultural sector. Compared with the World Commodity Baseline Projections, this report gives specific analysis to palm oil which was not included in the previous baseline projections.

This report was prepared in conjunction with USDA's analysis for the fiscal 1996 President's Budget, using May 1995 supply/use data. The baseline scenario presented in this report is not a USDA forecast about the future. Instead, it is a conditional, longrun scenario about what would be expected to happen under current agricultural law and specific assumptions about external conditions that are discussed throughout the document. Critical assumptions include:

- Declining population growth rates over the projection period, mostly because of population growth slowing down in the developing countries.

- A major recovery and expansion in the world economy from the sluggish performance of the 1980s and early 1990s. Gradual debt relief for developing countries.

- Slow real growth in petroleum and edible oil prices at the end of the projection period. But declining real prices for other major commodities.

- A slow-down in production growth of other oils from the rapid growth in the 1980s. Implementation of the Uruguay Round Agreement, the agricultural reform in the European Community (EU-12), and a continuation of the existing trade and agricultural environment and policies. A continuation of current U.S. agricultural programs.

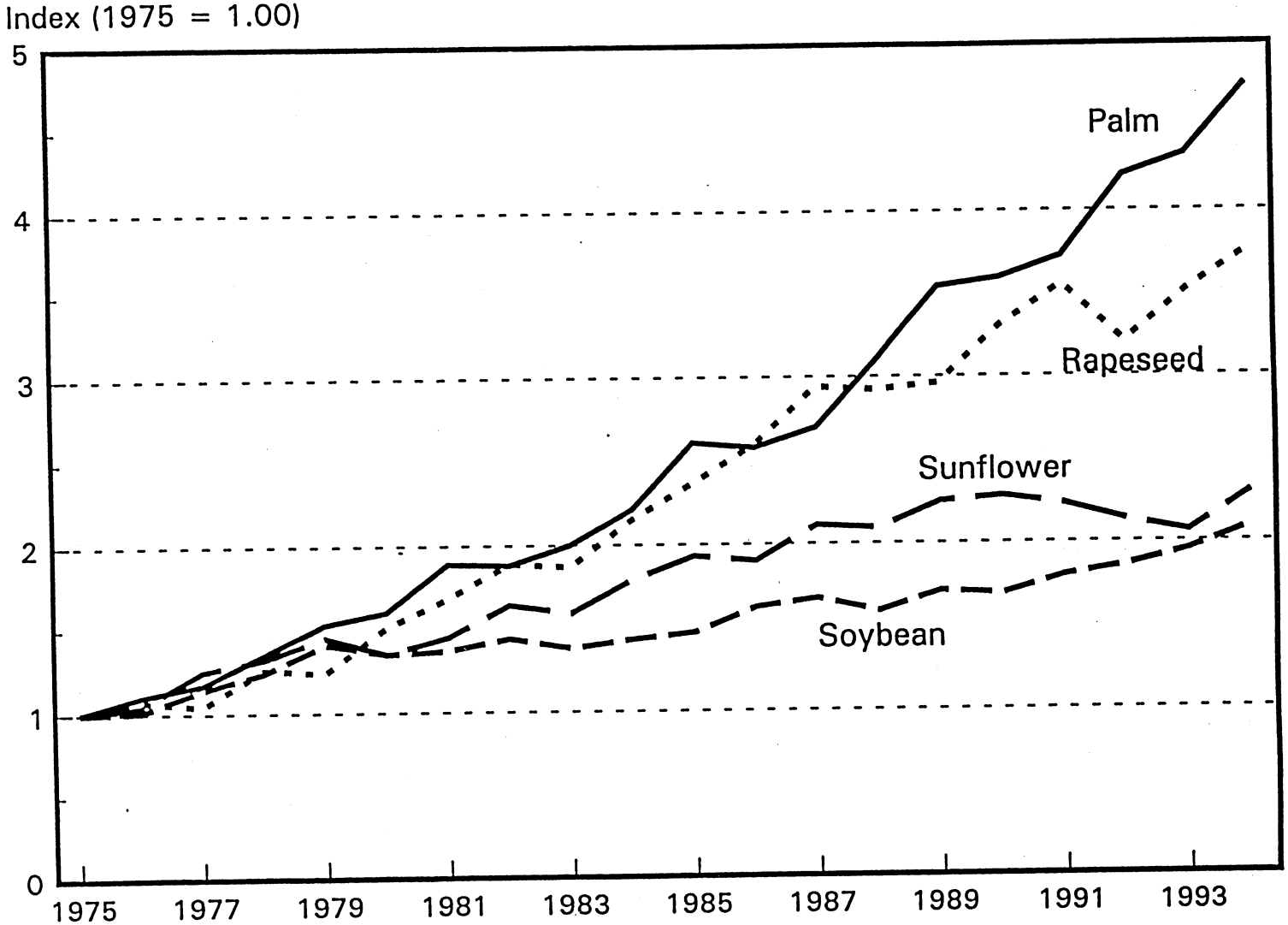
- Normal (average) weather.

Changes in any of the assumptions can significantly alter the projections, and actual conditions that emerge will alter the outcomes.

The palm oil outlook was conducted primarily by the Commercial Agricultural Division of the Economic Research Service, and reflects a composite of model results and judgmental analysis. The projections and the report were reviewed and cleared by the Oilseed Chairman of the Interagency Agricultural Projections Committee.

Figure I

Production of Major Oils, 1975-94 1/



1/ October-September marketing year.

The Fats and Oils Market

Fats and oils are glycerides of fatty acids. The most common distinction among oils is their saturated fatty acid content. The degree of saturation normally reflects the condition of the oil at room temperature. Oils with a high percentage of unsaturated fatty acids are normally liquid at room temperature, while oils high in saturated fat have a solid or semi-solid form. (Palm oil is a semi-solid oil, while palm kernel oil is solid.)

The market for fats and oils is extremely complex due to the variety of sources from which products are derived and for which they are used. Origins include animal (butter, lard, tallow), marine (fish, whale), and vegetable. Vegetable oils are derived from both perennial (palm, olive, and coconut) and annual crops (soybeans, rapeseed, sunflowerseed, cottonseed, and groundnuts) and are produced in all regions of the world. Vegetable oils are used for both human consumption--for instance as cooking oils--and in non-edible products such as lubricants, soaps, paints, and alternative fuels.

Nearly three-fourths of the world's fat and oil consumption is provided by vegetable oil. Soybean, palm, rapeseed, and sunflowerseed oil account for about 75 percent of all vegetable oil consumption. While demand for vegetable fats and oils has surged in the last decade, demand for animal fats has stagnated.

Demand for individual fats and oils is affected by health, technical and economic factors. During the 1980's, health concerns regarding saturated fat began affecting human diets, and thus fat and oil consumption. In the United States especially, but also in other developed countries, concern over saturated fats has reduced the intake of animal fats, and vegetable oils high in saturated fat. Technological innovations in genetics as well as processing hastened this trend, by making edible oils highly interchangeable and thus allowing industries to substitute one oil for another with increasing flexibility. Nonetheless, the costs of additional processing (for example, winterization) to facilitate oil substitution does affect demand by increasing the price, which is the most important element influencing substitutability among oils.

As most fats and oils are joint outputs of a primary product or by-products of processing, edible oil supply can depend to a large extent on both direct oil demand and indirect demand for a range of associated products. Demand for soybeans, for example, is derived from the demand for soybean meal and oil. Products such as cottonseed and fish for industrial use are produced primarily for their fiber and protein meal. Butter, lard and tallow are by-products of milk and meat products. In the case of the fruit of oil palm, however, price depends largely on direct palm oil demand, because supply is highly inelastic. As a result,

the market fundamentals of palm oil differ from those of other edible oils, in that the palm oil price is the prime determinant of the oil palm fruit's value.

Supply of Palm Oil

Palm oil is derived from the fruit of the oil palm tree, which grows primarily in the humid climates of Southeast Asia, Africa, and South America. The ideal climate for palm fruit production includes 1,800-2,200 mm of regularly distributed annual rainfall and 2,000 hours of sunshine. While palm fruit can be successfully harvested from wild trees, the highest yields are found on modern estate plantations where controlled levels of nitrogen and potash fertilizer can be applied and regular tree maintenance undertaken. A sufficient labor supply at harvest time as well as a good transportation system between the field and mill are also essential to ensure high-quality oil output.

After the oil palm tree is planted, 3-4 years of growth are required before initial palm fruit harvests can take place. Palm fruit yields peak as trees reach 8 to 10 years of age and then gradually decline thereafter. As trees mature, their height continues to increase, adding to harvest costs. Palm trees generally remain economically viable for 20 to 30 years. Successful selection and hybridization programs as well as the introduction of advanced management techniques, especially in Asia, have significantly increased palm fruit yields and have helped the trees reach peak yields more rapidly.

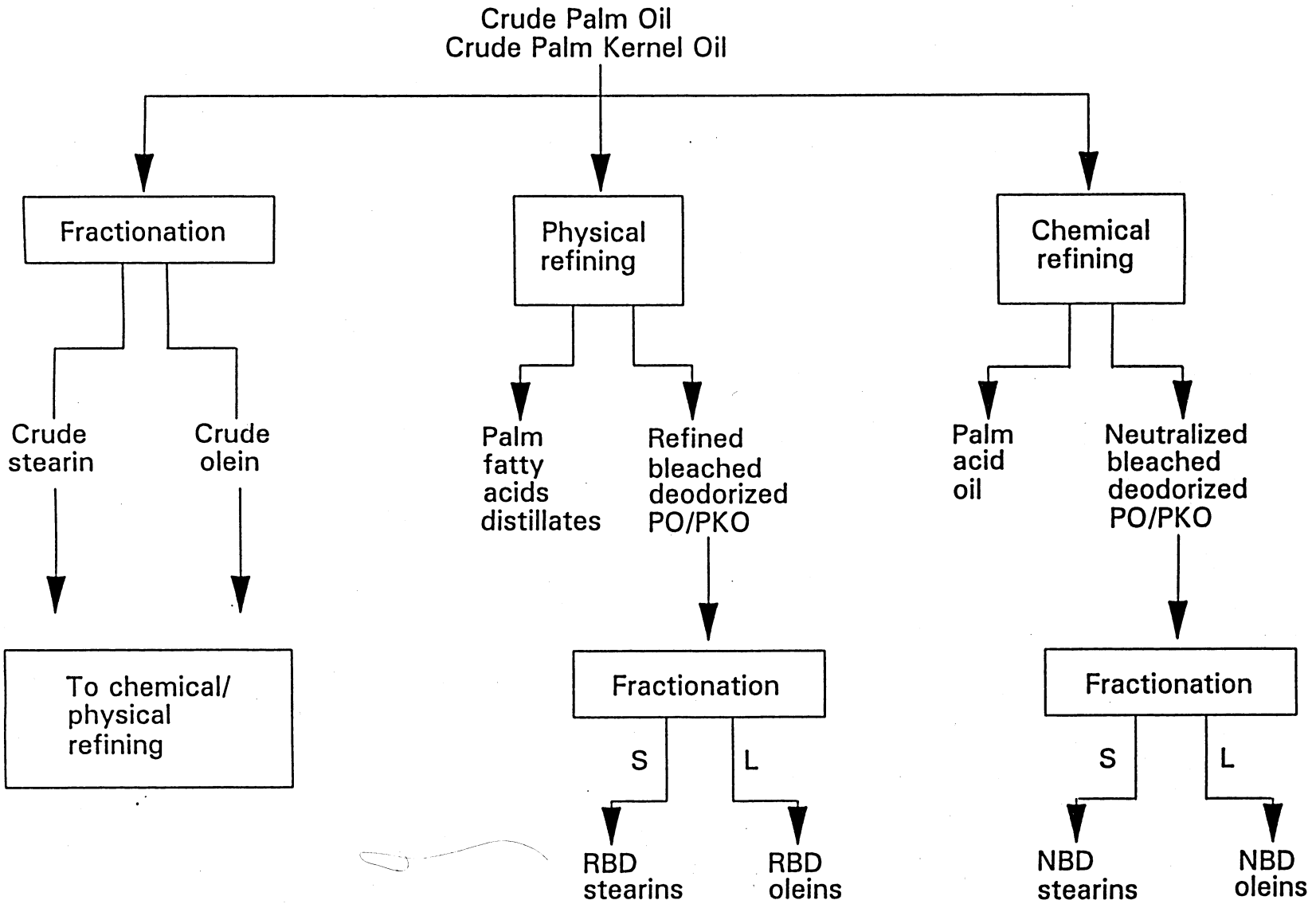
After harvest, fresh palm fruit bunches are milled to separate the mesocarp (outer layer containing crude palm oil) and the endosperm (palm kernel). The crude palm oil is further processed to produce refined, bleached and deodorized palm oil (RBD-PO) which can itself be used in a wide variety of applications, but is more often fractioned to produce palm olein and stearin (fig. 2). Palm olein is used primarily for frying, cooking, or as a margarine and, unlike RBD PO, is liquid at room temperature. Palm stearin is more solid and is used primarily in shortenings, margarine and other industrial uses. The palm kernels, which can be considered an ancillary product to crude palm oil, are crushed to produce both palm kernel oil and meal for use in feeds. Both palm and palm kernel oil can be further refined to produce oleochemicals for the production of soaps, emulsifiers, cosmetics, plastics, and other products.

Prospects for Palm Oil Supply

World vegetable oil production during the last decade has increased at a 3.6-percent annual rate. Most of the increase has been driven by the growth in world palm oil production, which has

Figure 2

Processing of Palm and Palm Kernel Oils



S = Solid fraction
L = Liquid fraction

Source: Palm Oil Research Institute of Malaysia Porim

expanded at an annual growth rate of 7 percent over the past decade. The rapid growth in palm oil output has resulted from both strong growth in global vegetable oil food demand and from the increasing industrial uses of fats and oils. Palm oil's low production costs and low price relative to other oils have helped to boost its market share. Additional support for greater palm oil production has come from changes in global oil and meal demand coupled with the palm fruit's relatively low meal content (palm kernel meal). Figure 3 shows an index of growth in total protein meal and oil consumption since 1970. Oil consumption since 1985 has grown at a faster rate (3.8 percent) than that of protein meal (2.8 percent), modifying a 20-year pattern.

These same factors will keep future palm oil output strong, with growth expected at about 6 percent per year through 2005, roughly 3 percent faster than overall projected vegetable oil production in the same period (table 1). Geographically, regional production trends are expected to follow the patterns of the recent past. Asia will continue to account for most future expansion in palm oil output. As a result, Asia's share of world palm oil output will increase from 81 percent presently to nearly 87 percent in 2005. While South American production will remain active, reaching 1.4 million tons in 2005 from present output, political and economic factors will continue to impede growth in Africa despite high potential, especially in Nigeria and Zaire.

Indonesia will likely contend with Malaysia as the world's largest palm oil producer sometime after 2005, but the potential for continued rapid output growth in both countries remains high due to a number of factors. First, palm oil production costs are considerably lower than costs of producing other edible oils, allowing palm oil to be sold at a discount. Second, there is still significant potential for the development of new land areas suitable for oil palm production, especially in Indonesia, which will likely be exploited as part of overall development plans. Third, because of palm oil's perennial nature and low production costs, output would likely remain high even at significantly lower prices. Fourth, palm oil requires only 0.13 worker per hectare, less than all other plantation crops including rubber (which requires 0.29 worker per hectare). As the economies and wage rates in Southeast Asia continue their rapid expansion, the lower labor requirements of palm estates will continue to induce a shift in land use away from traditional Southeast Asian estate crops, such as rubber, and into palm oil.

Demand for Palm Oil

All fats and oils compete with one another in both qualitative and quantitative markets. The qualitative market tends to be more price inelastic, since special properties dominate demand, and buyers are willing to pay higher prices for specific chemical

Table 1--Palm oil prospects for 2000 and 2005

Palm oil	1990	1995	2000	2005	Growth rate 1990-95	Growth rate 1995-2000	Growth rate 2000-05
Major exporters and producers:		1,000 metric tons					
World							
Production	11,087	15,528	21,404	26,995	7.0%	6.6%	4.8%
Consumption	11,390	15,170	20,140	26,893	5.9%	5.8%	6.0%
Exports	8,400	10,846	13,626	17,008	5.2%	4.7%	4.5%
Malaysia							
Production	6,031	8,400	10,654	12,318	6.9%	4.9%	2.9%
Consumption	914	1,700	2,515	3,572	13.2%	8.1%	7.3%
Imports	221	220	294	394	-0.1%	6.0%	6.0%
Exports	5,433	6,700	8,406	9,119	4.3%	4.6%	1.6%
Indonesia							
Production	2,650	4,300	7,210	10,283	10.2%	10.9%	7.4%
Consumption	1,330	2,225	3,282	4,656	10.8%	8.1%	7.2%
Imports	10	50	75	100	38.0%	8.4%	5.9%
Exports	1,460	2,017	3,785	5,610	6.7%	13.4%	8.2%
Nigeria							
Production	600	587	694	886	-0.4%	3.4%	5.0%
Consumption	620	695	819	973	2.3%	3.3%	3.5%
Imports	20	129	131	94	45.2%	0.3%	-6.4%
Exports	0	0	0	0	0	0	0
Major importers and consumers:							
European Community							
Production	0	0	0	0	0	0	0
Consumption	1,497	1,606	1,786	1,947	1.4%	2.1%	1.7%
Imports	1,698	1,958	2,110	2,300	2.9%	1.5%	1.7%
Exports	204	289	321	350	7.2%	2.1%	1.7%
China							
Production	0	0	0	0	0	0	0
Consumption	1,194	1,400	2,098	2,788	3.2%	8.4%	5.9%
Imports	1,291	1,605	2,328	3,043	4.5%	7.7%	5.5%
Exports	97	205	230	255	16.1%	2.3%	2.1%
India							
Production	0	20	45	70	0	17.6%	9.2%
Consumption	259	310	460	700	3.7%	8.2%	8.8%
Imports	209	280	418	635	6.0%	8.3%	8.7%
Exports	0	0	0	0	0	0	0
Pakistan							
Production	0	0	0	0	0	0	0
Consumption	800	1,225	1,494	1,818	8.9%	4.0%	4.0%
Imports	777	1,245	1,497	1,822	9.9%	3.8%	4.0%
Exports	0	0	0	0	0	0	0
Mid-East & North Africa							
Production	0	0	0	0	0	0	0
Consumption	1,178	1,890	2,470	3,190	9.9%	5.5%	5.3%
Imports	1,276	2,036	2,657	3,431	9.8%	5.5%	5.2%
Exports	98	145	185	239	8.1%	5.1%	5.2%
Latin America							
Production	641	889	1,128	1,368	6.8%	4.9%	3.9%
Consumption	830	1,096	1,499	2,003	5.7%	6.5%	6.0%
Imports	266	293	472	757	1.9%	10.0%	9.9%
Exports	61	78	99	119	5.0%	4.9%	3.7%
United States							
Production	0	0	0	0	0	0	0
Consumption	116	158	222	272	6.4%	7.0%	4.1%
Imports	129	165	225	275	5.0%	6.4%	4.1%
Exports	2	2	3	3	0.0%	8.4%	0.0%
Other Countries							
Production	1,165	1,352	1,718	2,141	3.0%	4.9%	4.5%
Consumption	2,652	3,181	3,939	4,975	3.7%	4.4%	4.8%
Imports	2,503	3,195	3,869	4,707	5.0%	3.9%	4.0%
Exports	1,045	1,202	1,210	1,210	2.8%	0.1%	0.0%

Note: Baseline projections shown in this report present one plausible scenario, representative of the long-term direction for the palm oil section. The projections were prepared during summer 1995 based on policy decisions and other information known at that time.

Figure 3
Consumption of Protein Meal and Edible Oils

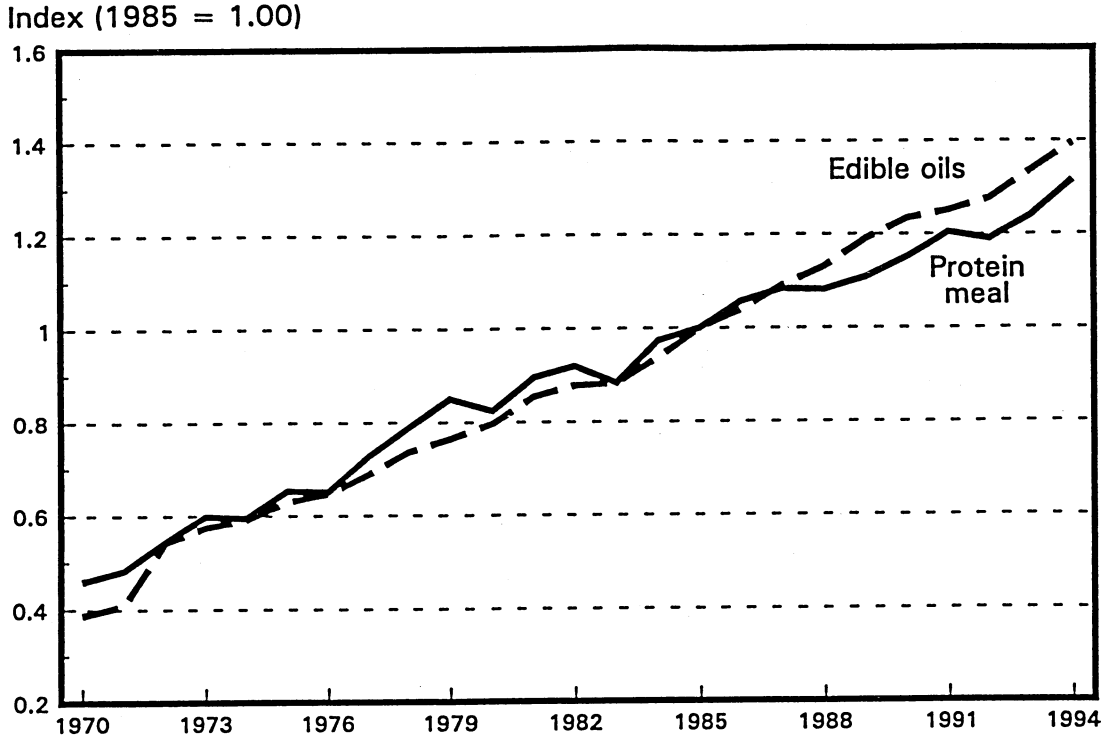
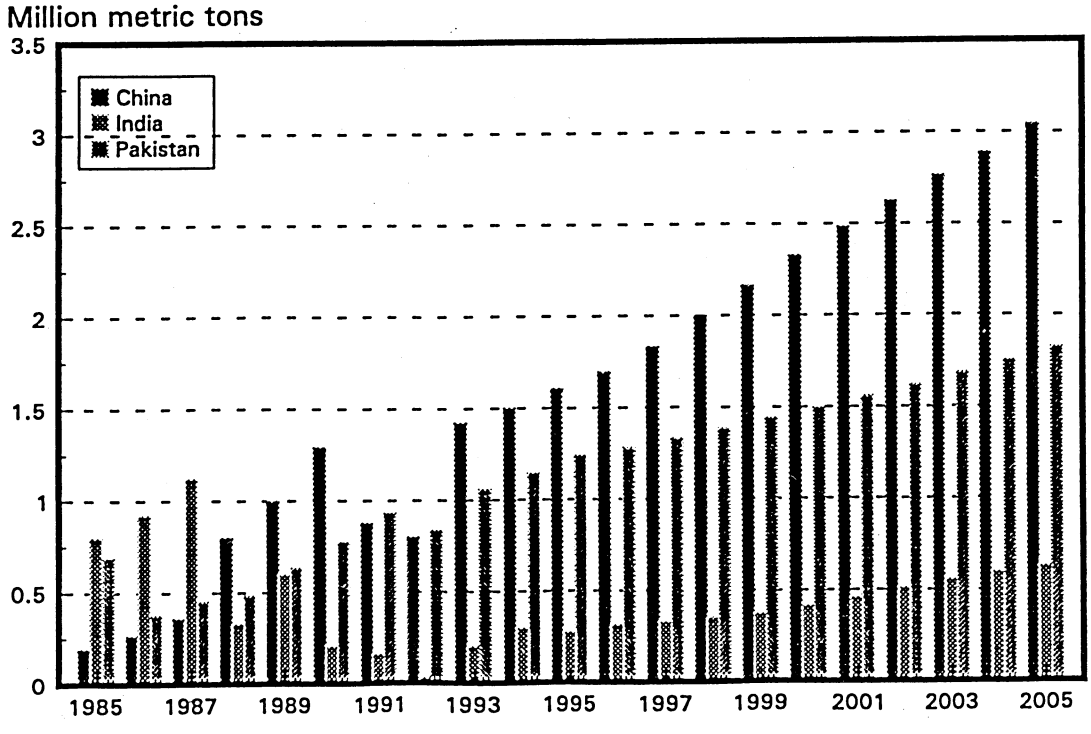


Figure 4
Palm Oil Imports through 2005
China, India and Pakistan



and physical properties. In the quantitative market (high substitutability levels), the demand for oils is influenced by the overall supply and demand for fats and oils, and is highly elastic. Although heavy marketing during the last decade has enhanced the ability of palm oil to compete in the qualitative market, palm oil demand remains mostly quantitative. Nonetheless, new developments and uses in the oleochemical sector (see box) will increasingly provide palm oil with specific demand. For instance, fatty esters, fatty nitrogens and glycerine produced from palm oil have wide applications in a variety of industries (plastics, cosmetics, emulsifiers). With the expansion of domestic processing in Malaysia and Indonesia, there is the potential for increasing exports of palm oil-derived oleochemicals rather than additional palm oil.

Except for palm oil derivatives (oleochemicals), most of the demand for crude palm oil is driven by the overall demand for fats and oils. This demand is primarily a function of population and income growth. World population growth is expected to continue its gradual decline from about 1.67 percent to 1.5 percent in 2005. Per capita income growth (adjusted for inflation) in most countries is expected to recover from the levels of the 1980's. Growth rates after 2000 will likely increase faster in response to trade liberalization arising from the Uruguay Round Agreement (URA).

Developing economies account for nearly 70 percent of all palm oil disappearance, with Asian countries consuming more than 50 percent of world demand. Although food use dominates overall palm oil consumption, growth in industrial utilization is expected to rise faster than in the 1980's. Increasing demand for petroleum alternatives, environmentally friendly fuels and other products will stimulate the demand for bio-fuel and oleochemical products.

In most developed countries, calories from fats and oils are near saturation, leaving only the nonfood oil sector for growth. In contrast, many developing economies have low per capita caloric intake, and fats and oils are an inexpensive method of increasing caloric consumption as incomes rise. And palm oil is in many cases the lowest cost-benefit source of dietary fat in developing countries.

Income growth in India, China, Pakistan, and Indonesia, which account for nearly one-fourth of total world population, is expected to be significant in the next decade. This growth, coupled with lower domestic vegetable oil prices resulting from market liberalization, will boost consumption. China, Pakistan, and India are expected to meet most of their vegetable oil deficits through palm oil imports mainly because of price

advantage and proximity to producers[2] (fig. 4). Indonesia, as a major producer, will consume much of its own palm oil.

World palm oil consumption is projected to increase to about 26.9 million tons, a 6 percent annual rate of growth between 1995 through 2005. Palm oil disappearance will almost double in the next decade, and its share of global edible oil consumption will continue to rise, reaching 28 percent in 2005/06, up from 21 percent in 1994/95.

OLEOCHEMICALS

Organic chemicals are derived from petroleum, oleochemicals, and by-products of pulp and paper production. Although surface active chemicals are produced primarily from petroleum hydrocarbons, there is growing interest in the use of renewable inputs, such as oleochemicals, in organic chemical production. Oleochemicals are chemicals derived from fats and oils. The five basic oleochemicals are fatty acids, fatty esters, fatty alcohol, fatty nitrogens and glycerine. Oleochemical derivatives (like soaps and fatty amides) are produced by further processing the basic oleochemicals (table 2).

Although palm oil is primarily used for food purposes (about 84 percent), the potential for growth in nonfood applications is enormous. The use of palm oil in the production of oleochemicals began only in 1979. Since the first plant was built in Malaysia, the Government of Malaysia launched a campaign to promote additional processing of RBD palm oil. By 1993, at least 11 companies were producing basic oleochemicals, and more than 33 licenses to produce oleochemicals had been issued.

Asian palm oil producers are expected to gain most from the expansion in the oleochemical industry, due largely to the potential for expansion in raw material output. In addition, Asian governments have given continuous support to the development of the industry through raw material export taxes and financial incentives, such as tax breaks to processors, which are likely to be continued. Political stability has encouraged companies from developed countries such as the EU, United States, and Japan to invest in additional plants in the region. Moreover, Malaysia's pattern of adding value to their products will be enhanced, and propagated in other Asian countries, thus further increasing processing of RBD palm oil and production of oleochemicals.

An oleochemical study by S. Appalasimi and R.J. Vries (Palm Oil Developments Volume No 14) reports that Asian capacity to produce oleochemicals will expand from 11 percent in 1990, to about 35 percent in 2000. Malaysia alone will account for about 20 percent of all basic oleochemical production in 2000.

Although developed countries are expected to continue as the largest consumers of oleochemicals, developing countries' consumption share, especially in Asia, will substantially increase. The current push away from the use of petroleum-based chemicals will further encourage global production and disappearance of oleochemicals.

[2] This assessment is based on palm oil prices being lower than those for other vegetable oils for most of the projected period.

Table 2--Basic and Derivatives of Oleochemicals

Raw materials	Oils/Fats				
Basic oleochemicals	Fatty acids	Fatty esters	Fatty alchohols	Fatty nitrogens	Glycerol
Uses of Basic oleochemicals	*Candles* *Plasticizer/ Stabilizer* *Cosmetics*	*Fuels* *Lubricants Grease* *Cosmetics*	*Water evaporation prevention*	*Antislip Antiblock* *Water repellents* *Foam stabilizer* *Ore Flotation* *Antirust*	*Humectants in several end uses*
Derivatives	Sodium salt Other metallic salts Medium chain triglycerides	Sulphonated methyl esters	Fatty alchohol sulphates Fatty ethoxylates Fatty ether sulphates	Quaternary ammonium compounds	Mono-, Di-glycerides Polygly-cerides esters
Uses of derivatives	*Soaps* *Animal foods* *Infant foods* *Cosmetics* *Plastics* *Internal lub.*	*Detergents*	*Washing and cleaning products*	*Conditioners* *Softeners* *Anti-microbial*	*Emulsifiers in food and nonfood applications*

Source: Salmiah, A. "Palm Based Oleochemicals and Their Uses," pp. 178.

Palm Oil Trade

Global vegetable oil trade is expected to maintain a relatively high level of growth through 2005. Most of this growth will come from exports of palm oil[3]. Palm oil's share of total edible oil trade is expected to increase from an average of 41 percent in the period 1991-93 to 49 percent in 2005. Large increases in Malaysian and Indonesian palm oil consumption, however, will prevent palm oil exports from growing as fast as consumption and production.

Trade volume in palm oil is projected to grow at 4.6 percent per year between 1995 and 2005. The projected strong growth throughout the projection period is driven by both population and income growth, particularly in Asia, Latin America, the Middle East, and North Africa. Higher imports by developing countries will more than offset stagnant or declining demand by developed countries (primarily in food uses). Export gains will be mainly limited to Southeast Asian countries.

Major Importer Developments for Palm Oil

Most of the growth in palm oil imports will come from the Pacific Rim countries, where increasing incomes and less government intervention will boost consumption beyond increasing levels of production. Despite strong growth in palm oil imports for food uses in Asia, imports are also likely to rise in markets for oleochemicals.

Currently **India's** palm oil imports are relatively small compared with those of China and Pakistan. Gains in India's per capita income, however, will boost overall demand for vegetable oil and especially palm oil. The Government of India has begun opening the vegetable oil markets, but imports remain hampered by high tariffs and policies favoring state trading. Although gradual changes in domestic pricing policies and preferential treatment given to state trading will enhance palm oil imports after 2000, long-term vegetable oil imports will remain below earlier peaks. However, if India further modifies or eliminates its oilseed production support policies, India's import demand for edible oils, especially palm oil, would significantly increase.

Strong economic growth in **China**, combined with limited gains in oilseed production, is projected to dramatically increase its

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[3] Although all trade statistics refer to palm oil, 90 percent of Malaysian exports and about 58 percent of world trade are in some form other than crude palm oil. The most common palm oil products exported are RBD-PO, NBD-PO, palm olein, and palm stearin.

vegetable oil imports in the next decade. Per capita consumption of vegetable oils is projected to grow from 6.2 kg. in 1992 to 8.2 kg. in 2005, with total oil imports growing from 1.5 million to 4.2 million tons over the same time period. Palm oil's share of imports will increase at the expense of soybean and rapeseed oil, which are domestically produced.

Pakistan's palm oil imports are expected to rise by 4 percent per year to 1.8 million tons in 2005. The rise in demand, driven by income growth, will lead to a per capita annual oil consumption of 16 kg. by 2005. Palm oil will remain the single largest oil consumed in Pakistan. Palm oil's relatively low price compared with other vegetable oils, coupled with closeness to suppliers, will encourage palm oil imports over other edible oils. This analysis assumes that the Government of Pakistan will maintain import tariffs and control over vegetable oil imports.

North African and Middle Eastern import demand for palm oil is projected to grow steadily on the strength of population growth coupled with negligible edible oil production. The economies of North Africa and the Middle East are expected to grow more slowly than those of most other developing regions. Reduced EU rapeseed and soybean oil exports, combined with palm oil's price advantage and preferential trade agreements with Malaysia, will cause palm oil's share of the region's total oil imports to rise from about 40 percent in 1994 to more than 60 percent by 2005.

Latin American imports are expected to rise rapidly, spurred by high population growth and improved economies as a result of greater trade liberalization. Even with strong growth in production, Latin American palm oil imports are projected to grow at about 10 percent per year.

As the potential for expanding food oil consumption dwindles in the **developed countries**, an increasing share of palm oil production will be marketed as oleochemicals. Because imports of palm oil derivatives are not considered as palm oil, imports by the **EU-15 (EU-12 for this study)** and other developed countries are projected to grow more slowly than in the 1980's.

U.S. palm oil imports are expected to grow marginally from the 1993-1995 levels through 2005. Health issues and higher consumption of domestically produced vegetable oil will generate little demand for food uses, with modest gains in the nonfood sector.

Major Exporter Developments for Palm Oil

Of the more than 15 countries producing over 30,000 tons of palm oil, only Malaysia and Indonesia are currently and will likely remain significant exporters through 2005. Nonetheless, in both

countries, domestic use is expected to increase at a faster rate than overall production, resulting in exports growing more slowly than output. However, a growing percentage of domestic use in both countries is in fact exported in the form of value-added products. These exports, in the form of oleochemicals, are not counted as palm oil in export statistics. As a result, export statistics and the projections presented here understate palm oil trade to some degree.

This is especially true in **Malaysia** where domestic use is projected to rise by more than 7 percent per year through 2005. Currently, more than 80 percent of total production is exported, although that percentage is expected to fall to 75 percent by 2005. An increasing percentage of the growing domestic demand is expected to be consumed in the manufacture of oleochemicals. In **Indonesia**, industrial use is also expected to expand rapidly. Domestic demand for palm oil as a food source, however, will continue to account for the bulk of domestic absorption.

Despite growing domestic palm oil demand in both countries, Malaysian exports are projected to grow nearly 3 percent per year, with exports reaching 9 million tons in 2005. Export growth in Indonesia will expand 11 percent per year, reaching 5.6 million tons in 2005.

Implications for U.S. Oilseed Producers from Palm Oil Outlook

U.S. soybeans account for about 87 percent of U.S. oilseed production. Moreover, soybean oil accounts for 84, 74, and 60 percent of total U.S. vegetable oil production, consumption, and exports. Because of the importance of the U.S. soybean industry in the world markets, most of the effect from the expansion in palm oil trade will likely be absorbed by this sector.

Since the 1980's, when rising health concerns began modifying human diets, U.S. imports and consumption of palm oil have dropped from 280,000 tons to an expected 140,000 tons in 1994/95, with most palm oil used for nonfood purposes. Future expansion in palm oil production and trade is no longer a threat for the U.S. market. In the international sector, U.S. vegetable and Asian palm oil exports will likely complement each other in the growing fats and oils market. This assessment is contingent on the assumptions of: continued strong vegetable oil demand, a reduction of barriers against global vegetable oil trade, and strong, steady growth in the production and use of oleochemicals. These factors will generate a vegetable oil market with tighter supply/use balances than experienced in the past two decades, resulting in a slower decline in inflation-adjusted edible oil and oilseed prices.

Another factor minimizing the threat from palm oil to U.S. oilseed producers has been the divergent trends in oil and protein meal demand. Growth in demand for vegetable oils rose nearly 4 percent per year during the last decade, while protein meal annual growth was only 3 percent. The production of palm oil does not add to the production of total protein meal, reducing the pressure on protein meal prices. This is important since two-thirds of soybean value commonly comes from soybean meal.

In summary, given the potential for increasing food and industrial use for fats and oils and the palm fruit's low protein meal content, palm oil growth will likely have only a very modest detrimental impact on U.S. expansion in production and exports of soybean meal and oilseeds.

Issues and Uncertainties for Palm Oil Outlook

The global growth of vegetable oil consumption and trade has outpaced that of most other agricultural products over the previous decade. With developed countries stabilizing their vegetable oil consumption, continued strong growth in consumption and trade over the projection period is highly dependent on economic and population growth in developing countries.

Malaysia and Indonesia, the major producers and exporters of palm oil, are assumed to be the major beneficiaries of increased demand for vegetable oils by developing countries. Geographic proximity to the major importing countries in Asia, combined with the lower relative price of palm oil, will stimulate the demand for palm oil relative to other oils.

Economic reform and trade liberalization in **China, India, and Pakistan** have the potential to dramatically increase vegetable oil imports should import restrictions and production subsidies be lifted. However, while the process of reform is expected to continue, the magnitude and pace of the reforms will depend on measures to control inflation and to avoid potential political unrest. Also, it is presumed that the scarcity of foreign currency may limit import demand in these countries.

Technological breakthroughs in the development of fat substitutes hold the potential to alter significantly the demand for vegetable oils, particularly in developed countries. It is assumed that no major fat-replacing innovations occur that would replace vegetable oil with chemical substitutes. However, a rapid increase in the production and consumption of oleochemicals derived from palm oil is projected through 2005. This will improve palm oil's ability to compete in the qualitative fats and oils world market.

Price Trends

Despite the high vegetable oil prices during 1993-95, the large oil shocks of the mid-1970's and early 1980's, and the 1988 weather-induced crop failure, inflation-adjusted global commodity prices over the last three decades have been trending downward. Assumptions about future trends in commodity prices are key to any projections of commodity supply, demand, and trade. The price projections used in this study were created using a combination of commodity and country analysts' judgments based on relations between U.S. and international prices of vegetable oils and protein meals, gross crush margins and price ratios among seeds, and between oils and seeds. Price prospects were also supported by historic and potential trends and the analytical assistance of ERS's linker commodity trade model. The projections maintain the decline in real commodity prices through 2000, though at a considerably slower rate than occurred during the 1980's (Chart 5). After 2001, edible oil prices are expected to show a small real growth. The projected prices The projection scenario assumed no external shocks, such as from an energy crisis or adverse weather.

Figure 5
Soy and Palm Oil Real Prices, 1990

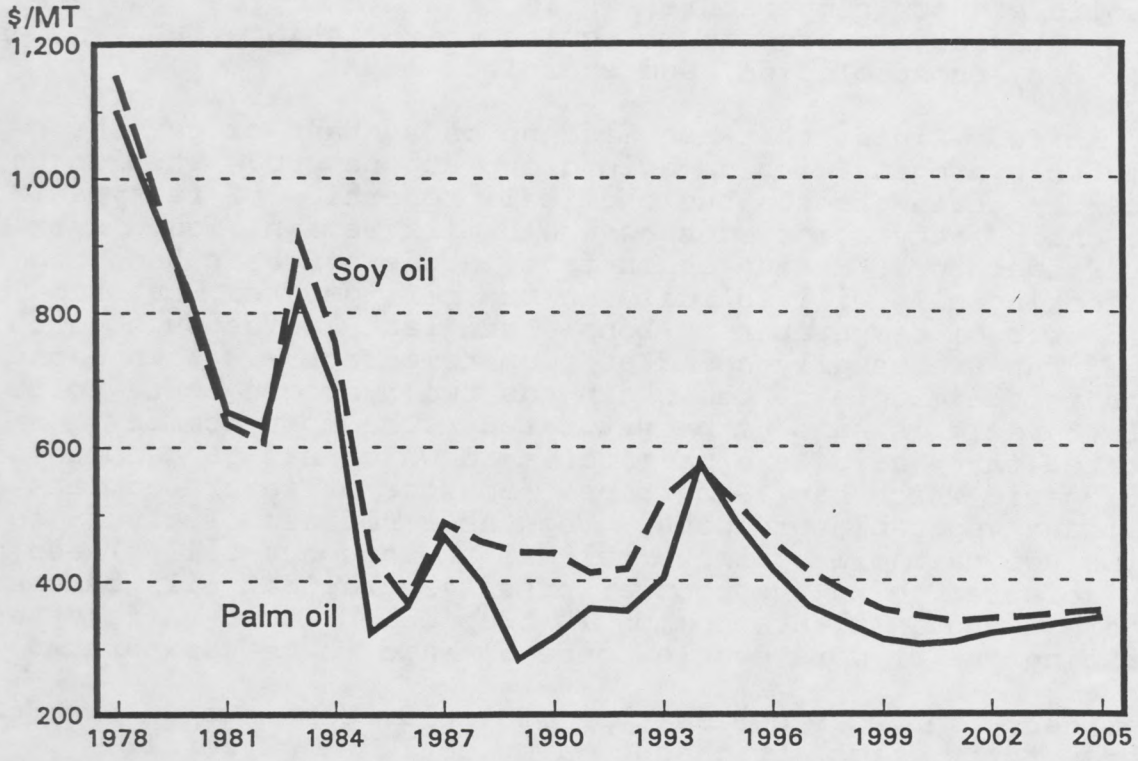
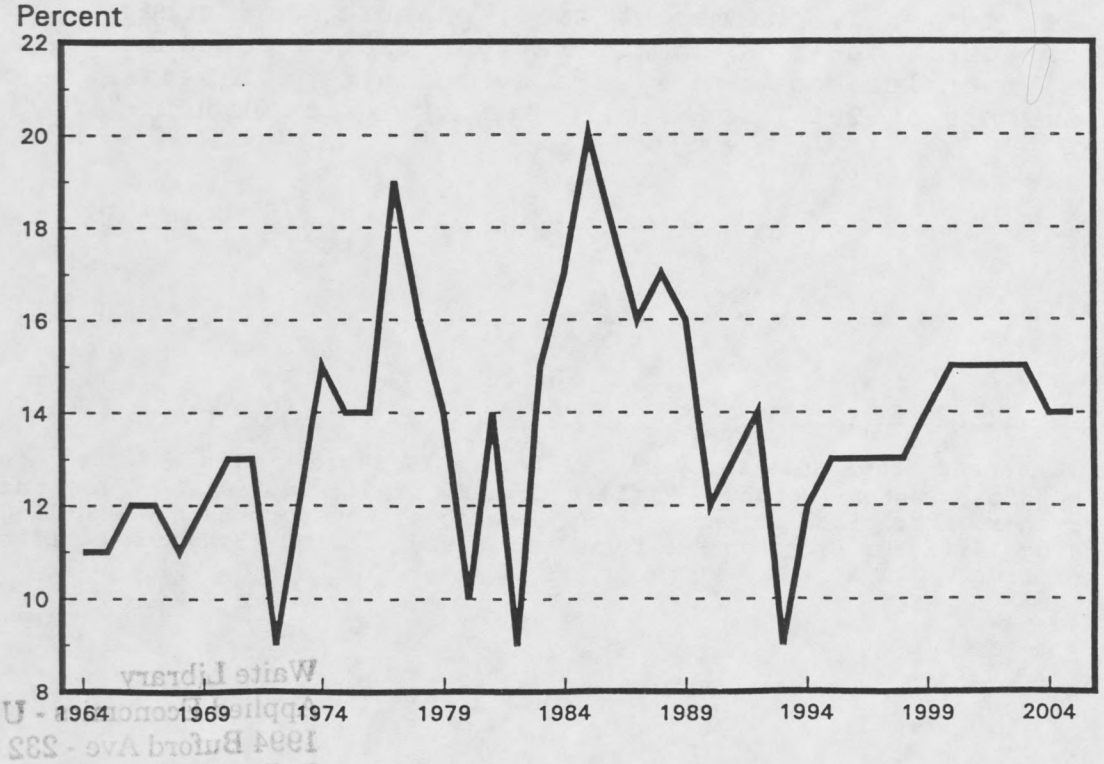


Figure 6
World Palm Oil: Stocks/Use Ratio



Glossary[4]

Fats and Oils. Technically termed lipids, fats are lipids that are solid at room temperature, while oils are lipids that are liquid. Lipids are organic molecules which include fatty acids, glicerydes, phospholipids, and sterols.

Fatty Acids. Lipids that are made up of a chain of carbons linked to hydrogens with an acid group at one end. The length of the carbon chain affects the chemical properties of fatty acids. Short-chain fatty acids such as whole milk remain liquid even in the refrigerator. Medium-chain fatty acids, such as those in most cooking oils will solidify in the refrigerator, but remain liquid at room temperature. Long-chain fatty acids such as those in beef fat are usually solid at room temperature. When each carbon in the middle of the chain has two hydrogen bound to it, the fatty acid is said to be **saturated.** The most common saturated fatty acids are palmitic acid which has 16 carbons and stearic acid which has 18 carbons. Sources of saturated fats are animal and vegetable products. Vegetable sources of saturated fat include palm oil, palm kernel oil and coconut oil. These are often referred to in the popular press as **tropical oils** because they are found in plants common in tropical plants. A fatty acid containing one or more double bonds is said to be **unsaturated.**

Glycerides. The most common type of lipid; consists of one, two, or three fatty acids attached to a molecule of **glycerol.** Glycerol is a 3-carbon molecule that forms the backbone of **triglycerides.** This is the major form of lipid found in food and the major form of storage of lipid in the body.

Fatty esters are produced by esterification and alcoholysis of fatty acids. Fatty esters are used in various industries such as textile, cosmetic, pharmaceuticals, plastic, and other applications. The most common **fatty nitrogen compounds** are fatty amides, nitriles and amines. Fatty acids or esters are reacted with ammonia at 200°C under mild pressure to produce fatty amides.

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[4] Adapted from: University of California, Berkeley. The Wellness Encyclopedia. Boston: Houghton Mifflin Company, 1991; Smolin, Lori A., and Mary B. Grosvenor, Nutrition, Science and Applications. New York Saunders College Publishing 1994; The American Heritage Dictionary. Boston: Houghton Mifflin Company, 1976.