Commercial Aspects of Lauric Oils: Production

T.P. Pantzaris

Lauric oils are oils in which the fatty acid composition shows a high percentage of lauric acid (C12:0). This article will deal with the production, of lauric oils as it is of great concern to the users and buyers.

We shall first take a quick and somewhat simplified look at the composition, properties and uses of the two principal lauric oils, coconut and palm kernel.

Composition and Properties of Lauric Oils

In Malaysia palm oil (PO) is big news. It is so much talked and written about that it is easy to overlook the country's second most important oil, palm kernel oil (PKO). The two oils are of course derived from the same fruit, that of *Elaeis guineensis*, and yet they are entirely different in composition and physical properties. In fact PKO is very similar to coconut oil (CNO), which is another kernel oil, from *Cocos nucifera*. *C. nucifera* and *E. guineensis* belong to the same family Palmae, which goes far towards explaining the chemical similarity of the two oils (*Tables 1* and *2*). Palm oil, though not a lauric oil, is included in these tables for comparison. The composition and properties of any natural oil vary between samples of course, but the figures in *Tables 1* and *2* are representative of the oils concerned, rounded to whole numbers. The data are averages from various published sources and in the case of PKO and PO, PORIM's own analyses.

TABLE 1. TYPICAL PERCENTAGE FATTY ACID COMPOSITION OF COCONUT OIL (CNO), PALM KERNEL OIL (PKO) AND PALM OIL (PO).

	CNO	PKO	PO
C10 & lower	13	8	—
C12 : 0	47	48	—
C14 : 0	19	16	1
C16 : 0	8	8	44
C18 : 0	3	2	5
C18 : 1	9	15	40
C18 : 2	1	3	10
	100	100	100

TABLE 2. TYPICAL PHYSICAL AND CHEMICAL PROPERTIES OF CNO, PKO AND PO (refined, bleached and deodorized - RBD).

	CNO	PKO	PO
Iodine Value	8.5	18	53
Melting Point (slip point: °C)	25	27	36
Saponification Value	257	245	196
NMR Values 20°C	37	40	23
25°C	2	17	14
30°C	0	0	8.5
35°C	—	—	6
40°C	—	—	3.5

Uses of Lauric Oils

Lauric oils have much lower melting point in relation to their iodine values than other oils (*e.g.* PO) and their solid phase-temperature profile is much steeper. This gives them valuable organoleptic properties and makes them particularly suitable for the manufacture of margarine, creaming fats and speciality confectionery fats. In these applications PKO is more useful than CNO.

In the manufacture of good quality soap lauric oils are indispensable for conferring good lathering and hardness and they yield about 30% more glycerine than most other oils or fats.

Lauric oils are of course very valuable raw materials in oleo-chemical production because of their high level of lauric, myristic and other shorter-chain fatty acids. In this field as well as in soap manufacture CNO is more valuable than PKO.

The United States Department of Agriculture (USDA) estimated that in 1984, 32% of CNO was used for edible purposes against 65% in the case of PKO. For the two oils combined, food use was 42% and technical use 53%: animal feeds, waste *etc.* accounted for the remaining five per cent.

As already stated, CNO and PKO are classified as lauric oils because of the high content of lauric acid (~ 50%) in their fatty acid composition. In fact they are the only two oils of any commercial importance in this group. Other members are Babassu, Tucum, Murumuru, Oricuri and Cohune but these are very minor oils which do not enter international trade and will not be discussed further here.

CNO and PKO are so similar to each other that admixtures of them are very difficult to prove unless the analyst goes to extraordinary lengths.

In the world of oils and fats, the lauric family are the aristocrats. They are few in number, they have a unique composition and unique properties, they are not easily replaceable by other oils and their prices tend to move on a higher plane, aloof from the other, commoner oils.

Production of Oils and Fats

Every year the world uses more oils and fats, not only because of the growth in population, but also because of increased per capita consumption which is especially evident in developing countries.

The more common types of oils and fats are highly interchangeable commodities and so if there is reduced production of a particular fat or

oil in any year, it can be replaced by any of several other oils. Lauric oils however, because of their unique composition, cannot be easily substituted by non-lauric oils. Their statistics therefore, as well as their future prospects are of vital concern and are followed closely by all companies and organizations using them.

In the last 22 years, viz, from 1958/62 to 1980/84 the production of the 16 major oils and fats of the world increased at an average annual rate of 3.3% while world population increased at 1.9% (*Table 3*).

TABLE 3. WORLD POPULATION AND PRODUCTION OF OILS AND FATS.

	1958/62	1980/84	% Annual Increase
World population ($\times 10^9$)	3.02	4.57	1.90
16 major oils and fats ($\times 10^6$ tonnes)	29.1	60.0	3.34

Source: Oil World

Coconut Oil Production

Total world lauric oil production only amounts to about 3.3 million tonnes or 5% of total oils and fats and is dominated by CNO which is much more abundant than PKO. The latter however is gaining fast. For example in the period 1970/74 its share of total lauric production was only 16%, during 1980/1984 it rose to 21%, and in the mid-nineties it is expected to reach 32% (Oil World).

Figure 1 shows the world production of CNO since 1958: it was 1.8 million tonnes in 1958, reached 2 million in 1961 and remained more or less at that level for the following nine years. From 1970 onwards production became extremely erratic. It reached an all-time peak of 3.2 million tonnes in 1976, but since then the trend has been downward and last year after drought and typhoons in the Philippines production had another catastrophic fall to 2.1 million tonnes, a level not much higher than in 1961, 23 years earlier. This year (1985) although production is forecast to be appreciably higher than last year, it will still fall far short of its 1976 peak.

In the last 22 years (1958/62 to 1980/84) the average annual increase has been only 1.64%, which is far below the rate for all oils and fats and is even lower than world population growth.

The largest CNO producer is the Philippines with about 50% of the world production, followed by Indonesia with 20% and India with 8% (*Table 4*). However, because of her large population, Indonesia is a minor and erratic exporter, while India has never been an exporter. The second largest CNO exporter is in fact Malaysia for even though her production is little more than 2 % of the total, her population is only 15 million.

Palm Kernel Oil Production

In contrast to CNO, production of PKO was static at around 400 000 tonnes for the 12 years between 1958 and 1970. Since then however growth has been rapid and in the last 10 years (1970/74 to 1980/84) it averaged 5%per annum against 3.6% for all oils and fats and 1.6% for CNO (*Figure 2*).

TABLE 4. MAJOR PRODUCERS OF COPRA ('000 tonnes).

	1981/82	1982/83	1983/84	Average share of total (%)
Philippines	2500	2250	1660	49
Indonesia	960	1000	730	21
India	376	385	345	8
Mexico	120	117	110	3
West Malaysia	105	107	86	2
World	4828	4602	3676	100

Source: Oil World

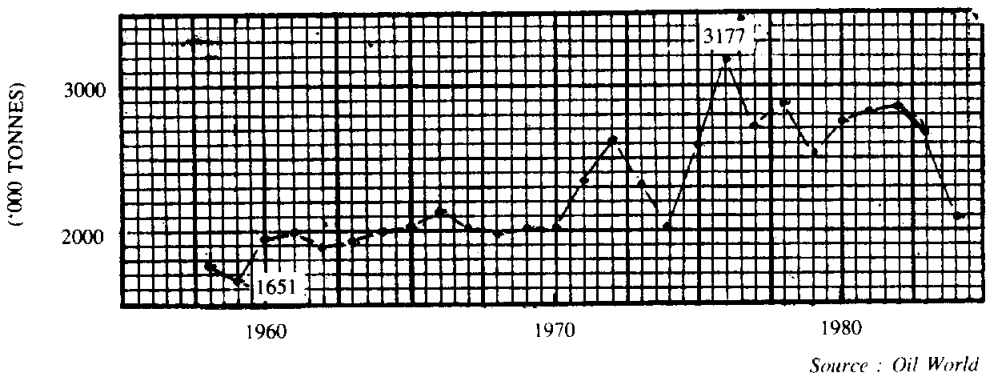


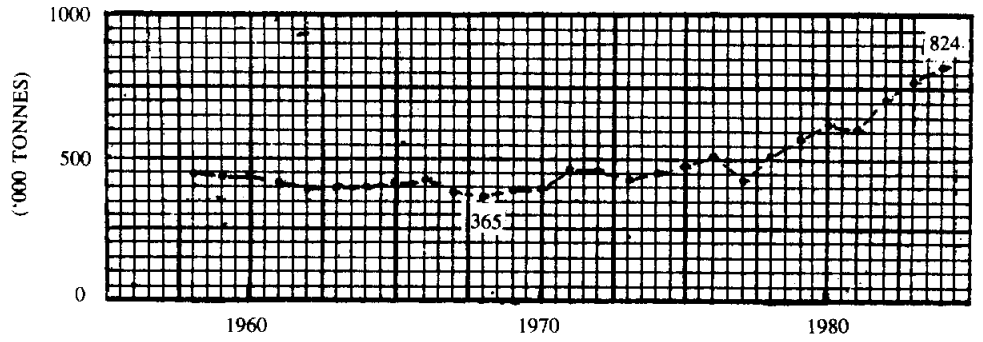
Figure 1. World Production of Coconut Oil, 1958 — 84.

In PKO production Malaysia occupies a similar position to that held by the Philippines in CNO production, i.e. it accounts for 50% of the world total (*Table 5*); however, the growth of Malaysia's PKO industry has been far more consistent and stronger. Malaysia suffers much less from drought than do the Philippines and typhoons are unknown. Also Malaysia's growers and refiners, very often the same people, have displayed a much greater degree of knowledge and management ability in expanding planted acreage and yields and in diversifying their oils to meet market needs. But underpinning all that is the fact that oil palm, under Malaysian environmental conditions, is inherently far more profitable than any of the major annual oilseed plants of the world such as soya, rape and sunflower.

PKO production in Malaysia received an extra boost recently from the introduction of the pollinating weevil. It had the effect of packing the fruit bunches more densely with the result that the PKO/PO ratio went up from 9% to 11%.

TABLE 5. MAJOR PRODUCERS OF PALM KERNELS ('000 tonnes).

	1981/82	1982/83	1983/84	Average share of total (%)
Malaysia	816	884	928	50
Indonesia	145	167	213	10
Nigeria	229	254	195	13
China	41	45	47	3
Zaire	44	40	39	2
World	1658	1179	1821	100



Source : Oil World

Figure 2. World Production of Palm Kernel Oil, 1958 — 84.

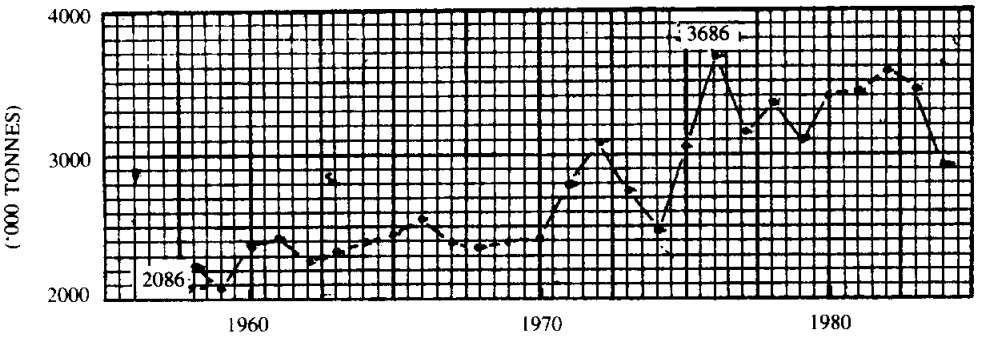
Lauric Oil Production

Given the interchangeability of CNO and PKO in most applications, it will be useful to discuss the combined production of the two oils and this is shown in *Figure 3*.

Total world production of lauric oils varies greatly from year to year but it is around 3.3 million tonnes per annum and is dominated by CNO which accounts for nearly 80% of total supplies.

Between the periods 1958/62 and 1980/84 total lauric oil production increased from 22.7 to 33.6 million tonnes, an average annual growth rate of 1.8% (*Table 6*). As in the case of CNO alone, this rate is well below that of all oils and fats together and also does not quite reach the rate of growth in world population. However in the last 10 years growth has been 2.2% due to the increasing impact of PKO.

The effect of PKO is also seen in the general shape of the lauric oil curve which, as would be expected, is very similar to that of CNO but with the extreme fluctuations reduced. For example the rise between 1972 and 1974 is 23% in *Figure 1* and 20% in *Figure 3*: similarly, the rise between 1974 and 1976 is 57% in *Figure 1* and 49% in *Figure 3*.



Source : Oil World

Figure 3. World Production of Lauric Oils, 1958 — 84.

TABLE 6. WORLD POPULATION AND PRODUCTION OF OILS AND FATS ('000 tonnes) per annum

	1958/62	1970/74	1980/84
World Population (million)	3020	3821	4572
16 major oils and fats	29088	42070	60053
CNO	1849	2267	2644
PKO	425	436	713
Laurics	2274	2703	3357

Source: Oil World

TABLE 7. ANNUAL GROWTH RATES (%) FOR WORLD POPULATION AND FOR PRODUCTION OF OILS AND FATS

	1958/62 to 1980/84 (22 years)	1970/74 to 1980/84 (10 years)
World Population	1.90	1.81
16 Major Oils and Fats	3.34	3.6
CNO	1.64	1.55
PKO	2.38	5.04
Laurics	1.79	2.19

Source: Oil World

The various growth rates discussed in this article are summarised in *Table 7.*