Recent Developments of Malaysian Palm Oil Stock Level

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ABSTRACT

The level of palm oil stock is a strong indicator of its price and it comprises crude palm oil and processed palm oil. In the past, the palm oil stock has for a long time hovered around 1 million tonnes, and this volume has become the psychological level below and above which prices tend to be bullish and bearish, respectively. The end stock mainly depends on the production and export of palm oil, while imports and local consumption play minor roles. Based on changes in the supply and demand factors, it was estimated that 1.8 million tonnes could be considered as the new level of palm oil stock for the Malaysian palm oil industry.

INTRODUCTION

The inventory or stock level plays vital role as a critical buffer that moves the market in adjusting to supply and demand shocks. As such, amount of palm oil end stock has been widely used to gauge the market outlook, as it acts as a proxy to the underlying supply and demand fundamentals. It reflects also changing market pressures on crude palm oil (CPO) prices, thus providing a barometer for CPO price changes in the short run.

The supply of Malaysian palm oil comes mainly from the production of CPO, imports of CPO and the beginning stock of palm oil. Substantial increases in palm oil production by 2.2 million tonnes, 1.4 million tonnes and 1.9 million tonnes were registered in 1998/1999, 2002/2003 and 2007/2008, respectively. These upsurges were driven by more mature areas coming into production in east Malaysia, expanding by approximately 100

000 ha in Sabah in 1996/97 and 1999/2000, and by 123 924 ha in Sarawak in 1998/99. On the other hand, significant increase in 2007/2008 was driven by higher productivity when yield of fresh fruit bunch (FFB) breached 20 t/ha/yr while oil yield exceeded 4 t/ha/yr. Production of CPO comprises about 90% of total supply of palm oil.

The demand for palm oil is an aggregate demand for CPO and processed palm oil (PPO). Total CPO demand comprises those from refineries and oleochemical plants and also export demand. The number and processing capacities of refineries and oleochemical plants have increased consistently every year, in line with the government's policy of producing and exporting more value-added products. In 2008, there were 50 refineries with a total capacity of 19.2 million tonnes per year, and 17 oleochemical plants with a total capacity of 2.6 million tonnes per year. Meanwhile, the PPO demand

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consists mainly of export demand and a small portion of domestic demand, as well as the demand from oleochemical plants for further processing. The proportion of export demand to local demand has reduced from 90% in the 1990s to about 86% in recent years.

The volume of the palm oil stock, especially 1 million tonnes, was once a strong psychological factor that indicated bullishness of the Malaysian palm oil market, presumably in the belief that the stock level would affect prices. However, with rapid production growth in the recent decade, particularly in Sabah and Sarawak, as well as expanding global demand, the 1 million tonnes is now inappropriate. A new level of palm oil stock for Malaysian palm oil industry needs to be determined.

DATA AND METHODOLOGY

MPOB data on annual production, exports, imports and closing stocks of Malaysian palm oil from January 1987 to December 2008 were used in this analysis. The stock of palm oil refers to the total physical amount of crude and processed palm oil at the mills, refineries, bulking installations and oleochemical plants.

A day's forward cover analysis or day's supply was used to gauge how long the inventory could have lasted without replenishment at the current rate of daily demand (Pursell and Dietert, 2000). The average daily demand (ADD) was computed by dividing the annual total demand by 365 days. Then, the usable inventory, or end stock was divided by ADD to determine the number of days' supply (DS). Finally, estimated end stock was calculated by multiplying the average ADD by the average DS.

The domestic demand for PPO was calculated as follows:

$$DDPO_t = ESPPO_{t-1} + PCPO_t - XPPO_t - ESPPO_t$$

where:

$DDPO_t$ = amount of PPO domestic demand at year t.

$ESPPO_{t-1}$ = amount of PPO end stock at a year previous to year t.

$PCPO_t$ = amount of CPO processed at year t.

$XPPO_t$ = amount of PPO exported at year t.

$ESPPO_t$ = amount of PPO end stock at year t.

For comparison purpose, average Stock Usage Ratio (SUR) method is used to calculate expected level of stock based on current level of demand.

RESULTS AND DISCUSSION

Supply of and Demand for Palm Oil

Figure 1 shows the upward movement in palm oil supply and demand from 1987 to June 2008. The gap between supply of and demand in palm oil, *i.e.* the end stock of palm oil, had widened over the years. This implied that supply was growing faster than demand at 6.32% p.a., compared to demand at 6.31% p.a. In addition, the production of CPO had expanded by 6.40% p.a., outpacing the growth of the aggregate export of palm oil which was 6.07% p.a. Thus, the ending stock of palm oil had grown by 6.36% p.a. during the period.

Palm Oil End Stock

Figure 2 displays the increasing trend in annual end stock of palm oil over the years. Before the year 2000, the stock of palm oil fluctuated generally below the 1 million tonnes level, with only very few occasions when it rose above that level, *i.e.* in 1989, 1993 and 1999. By contrast, post-2000, the end stock was generally above 1 million tonnes and reached nearly 2 million tonnes in 2008.

Palm oil end stock for each year also determines the monthly stock level for the following year because the seasonal production and export cycle always exhibit the same pattern every year. *Figure 3* shows the monthly index of palm oil stock in a year, which the index is normally above average from September to January, with November showing nearly 19% above average. By contrast, the index is below average from February to August, with the lowest in May when it drops by 14%. The low stock level in March,
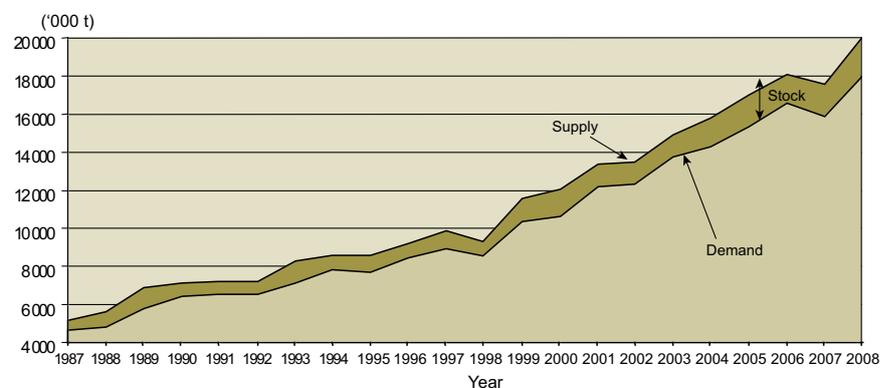

Figure 1. Supply of and demand for palm oil (t) from 1987-2008.

April and May is corresponding also to low production cycle that usually occurs in the first quarter of the year. The palm oil stock level can dip even further if supply of world vegetable oils has tightened, while amount of demand increases or remains the same.

In general, an unanticipated high production of CPO leads generally to a build-up of palm oil stock, especially when the export demand is sluggish. Therefore, demand creation is critically important in helping the palm oil market to adjust to any sudden surge in supply, so as to hold the palm oil stock at the desired level for maximum benefit to the industry (Ahmad Borhan *et al.*, 2007).

The composition of the palm oil end stock (CPO + PPO) since 1987 was usually at an approximate ratio of 60:40, except in 1998 when PPO was more than CPO. The CPO end stock grew by about 6.73% p.a., while, the end stock of PPO expanded by 5.89% per annum, *i.e.* slightly slower than CPO but at a consistent rate.

The Demand for CPO and PPO

Figure 4 shows the components of CPO demand, namely export demand and processing demand either by refineries or oleochemical plants. The total amount had increased from 10.6 million tonnes in 2000 to 18 million tonnes in 2008. In terms of demand share, the export demand had increased substantially from 4% in 2000 to 13% in 2008, thus, reducing the processing share of refineries from 95% to 86%. However, the processing share of oleochemical plants remained at 1% over the same period. The increment of CPO export demand was partly due to offshore investment by local companies that sourced CPO mainly from Malaysia.
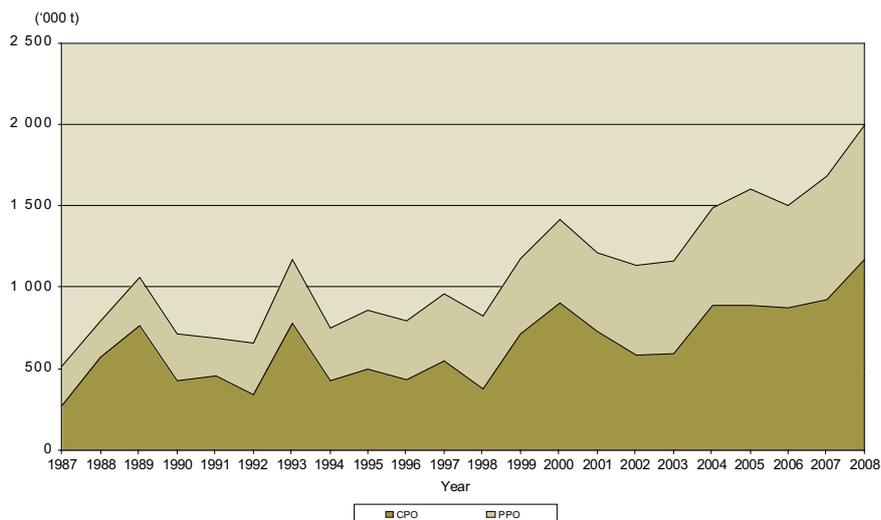

Figure 2. Annual end stock of palm oil (1987-2008).
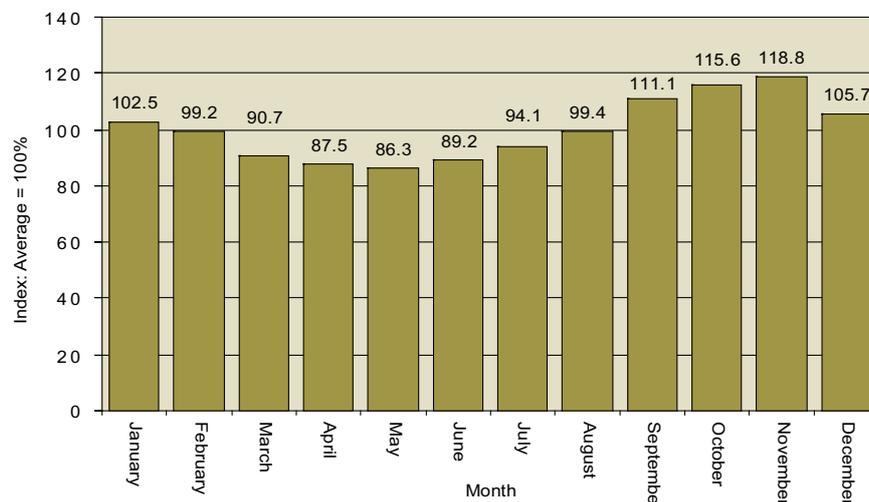
Source: *Malaysian Oil Palm Statistics.* Various edition.

Figure 3. Monthly index for end stock of palm oil over a year.

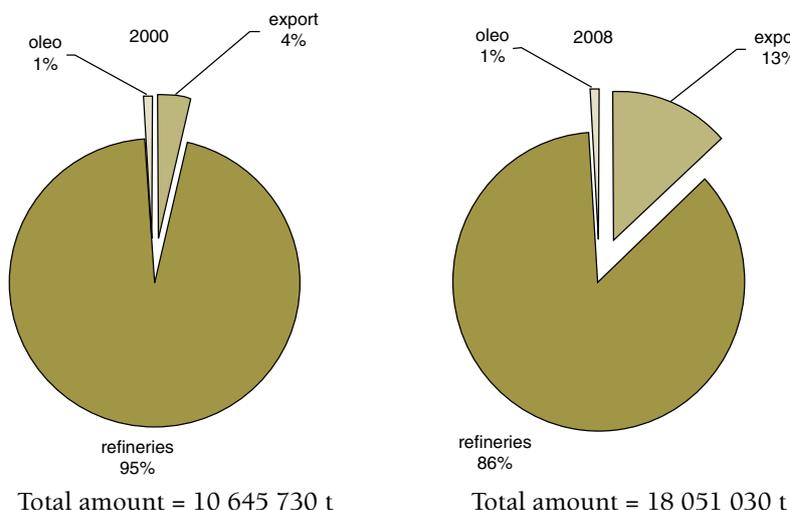Total amount = 10 645 730 t   Total amount = 18 051 030 t

Figure 4. Proportion of crude palm oil (CPO) demand.

Table 1 shows the annual amount of CPO exported and processed domestically by refineries and oleochemical plants. The total amount also reflected the annual demand for CPO, which can be estimated on a daily basis through dividing by 365 days, giving ADD.

The export demand for CPO had expanded from less than 1 million tonnes in 2000 to more than 2 million tonnes in 2008. As a result, the ADD of CPO for export had increased from 1091 t/day to 6402 t/day over the same period. Meanwhile, the ADD for domestic processing by both refineries and oleochemical plants had risen quite substantially from 28 065 t/day in 2000 to 43 053 t/day in 2008. Hence, the total ADD for CPO had increased from 29 166 t/day in 2000 to 49 455 t/day in 2008, or approaching to 50 000 t/day.

The demand for PPO comprised export demand, a modest amount for processing by oleochemical plants, and also the estimated domestic demand for cooking oil, margarines and other finished products. *Figure 5* shows the proportion of those components in 2000 and 2008, respectively, for comparison purposes. The share of processing demand by oleochemical plants had increased slightly from 4% in 2000 to 6% in 2008, while the domestic demand had increased also by 11% to 12% over the same period. The expansion of processing demand and domestic demand caused a small reduction in the export share from 85% in 2000 to 83% in 2008.

Table 2 shows the amount of those components of demand, which amounted to 15.6 million tonnes in 2008, increasing from approximately 10.1 million tonnes in 2000. The ADD in PPO for export had increased by more than 10 000 t from 23 790 t/day

Year	Amount of CPO (x1000 t/yr)			Average daily demand* for CPO (t/day)		
	Export	Processing	Total	Export	Processing	Total
2000	398	10 247	10 646	1 091	28 075	29 166
2001	1 276	10 800	12 076	3 495	29 589	33 084
2002	1 166	11 226	12 392	3 194	30 756	33 950
2003	1 240	12 477	13 716	3 396	34 183	37 579
2004	1 324	13 026	14 351	3 629	35 689	39 317
2005	1 612	14 230	15 842	4 415	39 794	43 402
2006	2 377	14 525	16 901	6 511	39 794	46 305
2007	1 936	14 372	16 307	5 304	39 374	44 678
2008	2 337	15 714	18 051	6 402	43 053	49 455

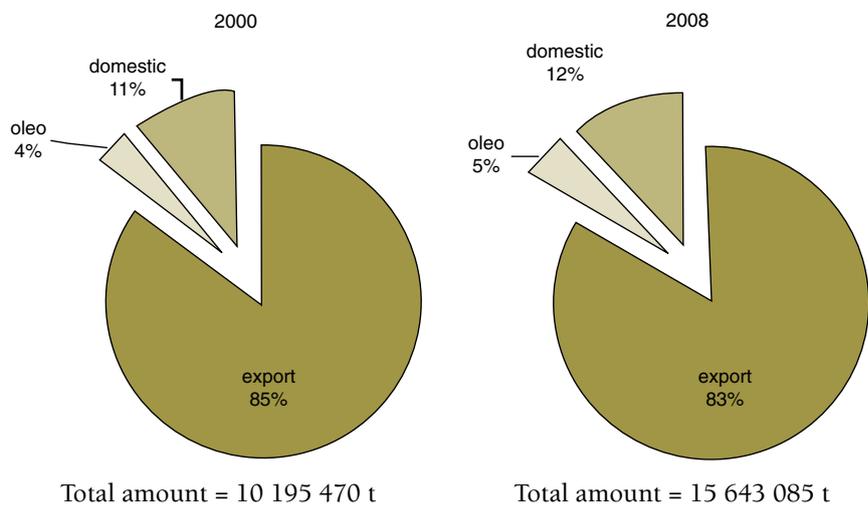Note: *Annual demand divided by 365 days.

Figure 5. Proportion of processed palm oil (PPO) demand.

in 2000 to 35 814 t/day in 2008. The ADD in PPO for processing by oleochemical plants had doubled from 1010 t/day in 2000 to 2089 t/day in 2008, while the ADD in PPO for domestic use had also increased from 3089 t/day to 4955 t/day over the same period. Overall, the total ADD for PPO had increased from 27 933 t/day in 2000 to 42 858 t/day in 2008, or approaching nearly 43 000 t/day.

Table 3 shows the number of days' supply (DS), which indicates the duration of the end stock, estimated by dividing the amount of available end stock by ADD. For the CPO end stock, DS varied from

a minimum of 16 days in 2004 to a maximum of 31 days in 2001. The average DS that CPO end stock could last was 21 days. For the end stock of PPO, the variation in DS was rather small, *i.e.* between 16 and 19 days, averaging 17 days.

Based on the above results, the level of palm oil stock to fulfill various categories of demand can be estimated by multiplying current ADD with average number of DS, as follows:

1) Level of CPO stock = 49 455 x 21 = 1 038 555 t
2) Level of PPO stock = 42 858 x 17 = 728 586 t
3) Level of PO stock = 1 767 141 t

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TABLE 2. THE DEMAND FOR PROCESSED PALM OIL (PPO)

Year	Amount of PPO (x1000 t/yr)				Average daily demand for PPO (t/day)			
	Export	Processing	Domestic	Total	Export	Processing	Domestic	Total
2000	8 683	369	1 144	10 195	23 790	1 010	3 133	27 933
2001	9 349	419	1 064	10 832	25 614	1 148	2 916	29 677
2002	9 720	457	980	11 158	26 631	1 253	2 684	30 569
2003	11 026	531	894	12 452	30 210	1 456	2 448	34 114
2004	11 257	554	1 189	13 000	30 842	1 518	3 256	35 616
2005	11 834	620	1 664	14 118	32 422	1 699	4 559	38 679
2006	12 047	714	1 847	14 608	33 004	1 957	5 060	40 021
2007	11 811	784	1 650	14 244	32 359	2 147	4 520	39 025
2008	13 072	762	1 809	15 643	35 814	2 089	4 955	42 858

TABLE 3. ANNUAL NUMBER OF DAYS' SUPPLY

Year	End stock (x1000 t/yr)		Average daily demand (t/day)		No. of days' supply (day/yr)	
	CPO	PPO	CPO	PPO	CPO	PPO
2000	905	460	29 166	27 933	31	17
2001	734	512	33 084	29 677	22	18
2002	589	479	33 950	30 569	17	16
2003	594	547	37 579	34 114	16	18
2004	891	572	39 317	35 616	23	17
2005	893	599	43 402	38 679	21	17
2006	879	711	46 305	40 021	19	18
2007	927	628	44 678	39 025	21	16
2008	1 168	755	49 455	42 858	24	19

Note: CPO – crude palm oil. PPO – processed palm oil.

TABLE 4. STOCK USAGE RATIO (SUR) FOR CRUDE PALM OIL (CPO) AND PROCESSED PALM OIL (PPO)

Year	End stock (x1000 t/yr)		Amount usage (x1000 t/yr)		SUR	
	CPO	PPO	CPO	PPO	CPO	PPO
2000	905	460	10 646	10 195	0.085	0.045
2001	734	512	12 076	10 832	0.061	0.047
2002	589	479	12 392	11 158	0.039	0.043
2003	594	547	13 716	12 452	0.043	0.044
2004	891	572	14 351	13 000	0.062	0.044
2005	893	599	15 842	14 118	0.056	0.042
2006	879	711	16 901	14 608	0.052	0.049
2007	927	628	16 307	14 244	0.057	0.044
2008	1 168	755	18 051	15 643	0.064	0.048

Table 4 shows the annual SUR for CPO and PPO when amount of usage is assumed to equal cumulative amount of export demand, processing and domestic demand.

The average SUR for CPO and PPO is 0.058 and 0.045, respectively. Therefore, based on current usage of CPO at 18.05 million tonnes, then the corresponding amount of CPO stock is calculated as follows; 18.05 x 0.058 = 1.047 million tonnes. Similarly, the amount of PPO stock is estimated as follows; 15.64 x 0.045 = 0.704 million tonnes. Hence, the total amount of palm oil stock equals **1.751** million tonnes.

Both methods show the estimated palm oil stock level for Malaysian palm oil industry is approaching 1.8 million tonnes as the new threshold level that can ensures adequate supply for the processing sectors as well as fulfills export demand.

CONCLUSION

The volume of palm oil stock is an important indicator of the supply and demand situation of the industry, and more importantly, can directly influence the product price. Basically, a low stock is preferred as

it implies a higher demand relative to supply, but a certain level is also required to ensure that trade can still continue efficiently, *i.e.* to avoid stock-out.

Currently, the average daily demand for CPO and PPO is nearly 50 000 t/day, and 43 000 t/day, respectively. The appropriate palm oil end stock for the Malaysian palm oil industry at the macro level is estimated at 1.8 million tonnes in order to meet demand from the processing industries and from export and domestic demand as well. Such an amount can fulfill these demands within an anticipated period of 21 days for CPO and 18 days for PPO without replenishment.

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