

Integrated Palm Oil Plantation and Cattle to Boost Sustainable Palm Oil in Indonesia

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Introduction

Palm oil is established as an important oil crop globally and the world's most traded vegetable oil: in 2020, the share of palm oil in the global trade of vegetable oils was the highest (Figure 1). Palm oil is extracted from the fruit of the oil palm tree (*Elaeisguineensis*); the main products are crude palm oil (CPO) and palm kernel oil (PKO). According to Oil World (Independent Global Market Analyses & Forecasts), palm oil is significantly more efficient than other oil-producing crops. A single hectare of land can produce 4.17 metric tons of palm oil a year, compared to just 0.56 tons of sunflower oil, 0.39 tons of soybean oil, and 0.16 tons of groundnut oil. In 2016 oil palm used just 7 percent of the world's oil farming land while accounting for 32 percent of production and this figure is rising year by year. That means that in terms of land use, the oil palm tree is more efficient than any other oil crop, and in economic terms, palm oil is highly competitive. The value chain of palm oil and its derivatives has a strong degree of vertical integration, and its production costs are relatively low compared to other vegetable oils. It is therefore seen as one of the cheapest and most attractive vegetable oils traded on the world market.

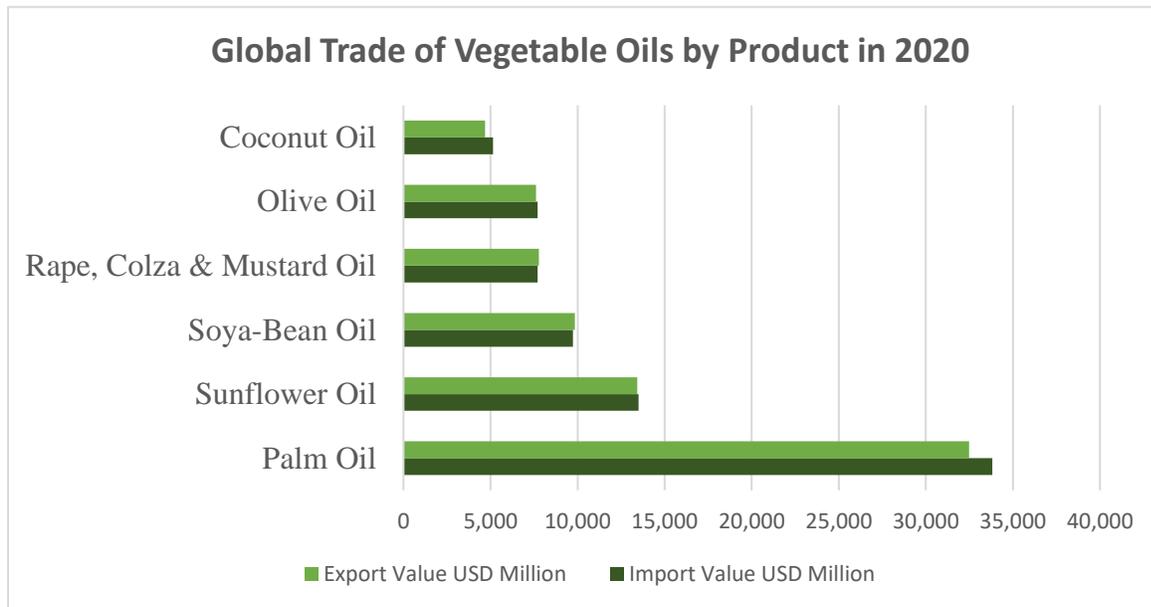


Figure 1. Global Trade of Vegetable Oils by Product in 2020 (Source: <https://www.exportgenius.in/>)

Recently, the announcement by the Indonesian government that it plans to ban the export of palm oil puts pressure on the global food and personal care market. The export ban had caused prices to rise drastically went up 200% or higher on the international markets. Palm oil, being a multi-purpose vegetable oil, offers good prospects for further expansion. There is a growing demand from the commercial food and oleo-chemical industries that use oil palm in processed foods, cosmetics, soaps, pharmaceuticals, industrial and agrochemical products, and as a feedstock for biodiesel. In 2020 Indonesia exported \$17.9B in palm oil, making it Indonesia the 1st largest exporter of palm oil in the world. In Indonesia, the palm oil industry accounts for 1.6 percent of GDP and employs 4.5 million people. As the majority of the harvest is exported the industry brings in more than \$18 billion a year in foreign exchange, the single biggest contributor in the country (Figure 2).



Figure 2. Economic Impact of Palm oil Plantation in Indonesia

(Source: Ministry of Industry of Indonesia)

At the beginning of the 21st century, the total area planted by palm oil was only four million hectares, but it expanded to more than 14 million hectares by 2020 (Figure 3). The total planted area has grown more than 300% in the last 10 years.

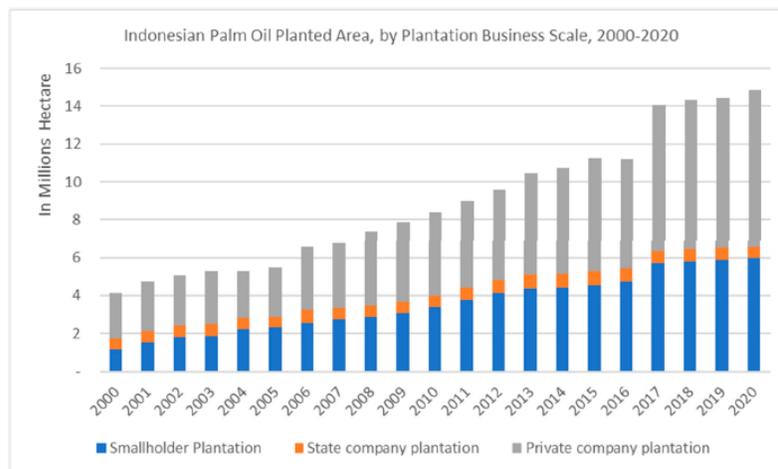


Figure 3. Indonesia palm oil planted area, by business scale category, 2000-2020

(Source: Putri et al.2022)

Palm oil plantation development in Indonesia indicates that the industry has a positive prospect, particularly in relation to the added value and competitiveness. However, the development of the palm oil industry is also facing various challenges especially environmental issues. The rapid expansion of oil palm plantations in Indonesia has been touted as one of the main drivers of deforestation. Satellite data from Global Forest Watch show that between 2002 and 2020, humid primary forests shrunk by 10% in Indonesia. In addition, the imbalances in the environment are found in the forms of disturbances in the soil, the loss of carbon from biomass, as well as the accumulation of organic matter due to peat swamps for oil palm establishment. The use of agrochemicals such as fertilizers, rodenticides, and pesticides also threaten the terrestrial and aquatic ecosystems within the region. Recently global consumers become more selective about choosing products based on sustainable production processes, suppliers must increasingly provide evidence that their goods are made without damaging the environment. Demand for sustainable palm oil is driven by concerns associated with the social and environmental impacts of palm oil production. It is mean that supporting sustainable palm oil is a crucial role for Indonesia ensuring palm oil industry growth in the future.

Integrated Oil Palm and Cattle to Boost Sustainable Palm Oil

Based on the World meter elaboration of the latest United Nations data, the current population of Indonesia was 279 million or equivalent to 3.51% of the total world population in 2020. The OECD-FAO forecast the human consumption of beef and veal in Indonesia in 2025 to be around 2.3 kilograms per capita. According to the data trend Indonesia's meat consumption had been increasing in the last few years (Figure 4). Based on that Indonesian government has been striving for years to increase national beef self-sufficiency up to 80 % more than a decade ago but cattle grazing land in Indonesia has a declining trend of around 0.3% per year.

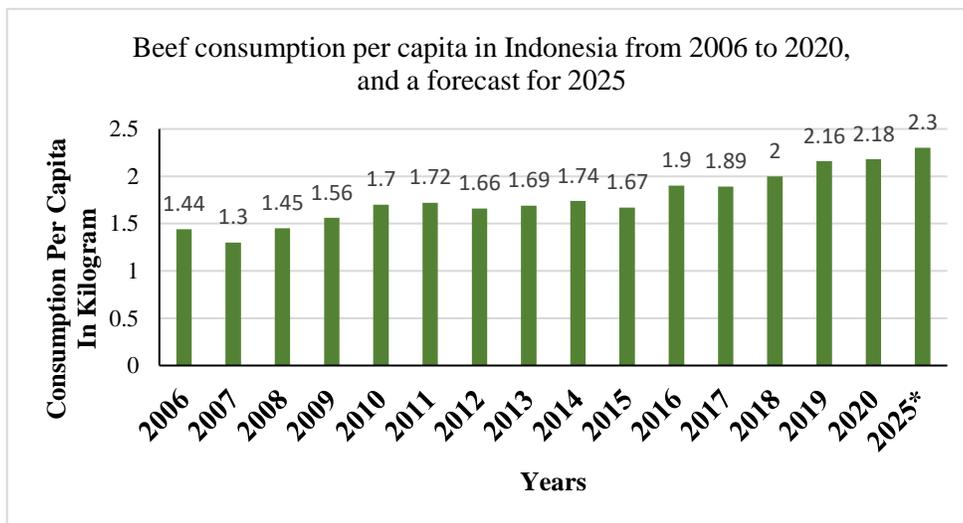


Figure 4, beef consumption per capita in Indonesia from 2006 to 2020, and a forecast for 2025

(Source: Tenrisanna, 2020)

Integrated Palm Oil and Cattle can be a way to Boost Sustainable Palm Oil. The Integration not only can improve cow population and productivity but also improve business efficiency in oil palm plantations. A positive synergy that can be achieved by integrating cows with the oil palm is a guarantee of food supply for the cows, saving the use of inorganic fertilizers for palm oil plants and labor savings. The integration system can improve soil productivity to produce organic fertilizer. Organic fertilizer can increase the added value of palm oil products and makes the plantation environmentally friendly. The ecosystem can create a

balance that avoids the explosion of pests like locusts and supplies organic matter to ensure the natural fertility of the soil. The model Integrated Oil Palm and Cattle can be shown in **Figure 6**.

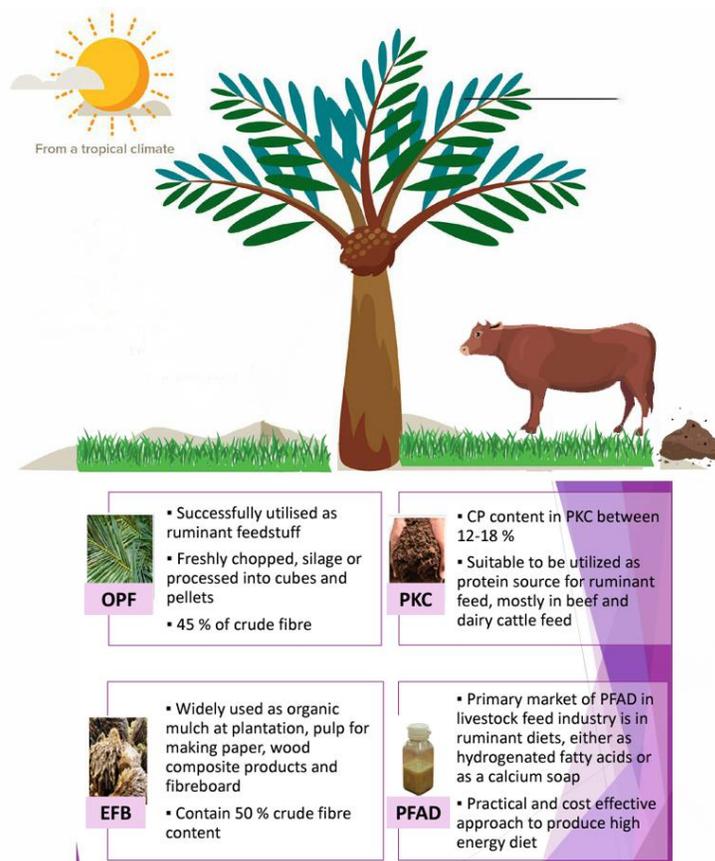


Figure 6, The model Integrated Oil Palm and Cattle

Palm oil plants produce 3 main types of by-products, namely palm leaf midrib, mud/palm solid, and palm kernel. By-products of Oil palm plantation have potential as Animal feed, this waste can be a mainstay and can be developed into raw materials for ruminant animal feed industry, especially for cattle. Based on the results of research conducted by the Agency for the Assessment and Application of Technology (BPPT)(Figure 7), weed control savings of between IDR 70,000 and IDR 170,000 per ha per year (depending on location) can be achieved in the plantation blocks grazed by cattle. Further, no additional organic fertilizers need to be applied in the grazed areas. This provides a cost-saving of approximately IDR 250,000 per ha per year. These savings are able to be realized after the third year of grazing. When these benefits are included in the financial calculations, the IRR values increase by 2-3%. Experience of implementing the integration of cowherd in oil palm plantations at PT. Buana Karya Bakti in South Kalimantan can also reduce weed control costs (grass growing between palm trees) by 24–43% compared to before cattle grazing. Furthermore, a study on the implementation of controlled cattle oil palm integration in Siak Regency, Riau showed an increase in fresh oil palm fruit production by 15-25% and fertilization costs reduced by 30-40%. The integration model has the potential to be profitable because can produce feeder cattle at least 16% cheaper than imported feeders.

Cows' Costs	
Feed cost (hd/day) - Cows	IDR 4,800
Operational costs (hd/day)	IDR 5,450
Sub-total Daily Cost/hd	IDR 10,250
Calving Rate	69.4%
Daily Costs/hd ind. non-productive Cows	IDR 14,780
Calves Mortality	5.6%
Total Daily Costs /hd-Cows*	IDR 15,650
Weaner Cost (100kg)	IDR 5,712,250
<i>*incl. the costs calculation o non-productive cows and calves mortality</i>	
Calf weight at weaning (kgs/hd)	100 kg
Grower weight gain (kgs/hd/day)	0.45 kg
Target weight at sale	320 kg
Months requires (Weaning to sale)	16 mnth
Growers' Costs	
Feed cost (/hd/day)- Growers	IDR 4,200
Operational (/hd/day)- Cows + Growers	IDR 5,450
Sub-total costs to weaning (/hd/day)	IDR 9,650
Grower mortalities	6.6%
Total Daily Costs (/hd/day)- Growers	IDR 10,330
Rearing Costs from Grower to Feeder /hd (320kg)	IDR 5,050,200
<i>**incl. the costs' calcultion of grower motality</i>	
Total Feeder Costs /hd (320 kg)	IDR 10,762,450

Figure7. Cost Production Running Integration of palm oil and cattle production

(Source: IACCBP)

Regulation of Sustainable palm oil by Indonesia government

Through the Ministry of Agriculture, the government has issued a regulatory instrument to support the implementation of integrated oil palm-cattle production, namely the Minister of Agriculture Regulation Number 105 of 2014 on the Integration of Oil Palm Plantation with Beef Cattle Business. The implementation of integrated oil palm and cattle production is also mentioned as one of the government's strategies to increase the livestock population. The regulation has been further followed by the Presidential Instruction Number 6 of 2019 about the National Action Plan for Sustainable Palm Oil (NAP SPO) for 2019-2024, which includes integrated oil palm and cattle production as one of the priority activities. In the future, need several policies to support the integration to make it easier to obtain permits for plantation owners who will carry out the system. The government also needs to add rules to improve the implementation of system in the form of tax incentives. The Integration palm oil can use as one of the requirements of the Roundtable on Sustainable Palm Oil (RSPO) and International Sustainability & Carbon Certification (ISCC) since 2014.

The Prospects for Korean Companies Supporting Sustainable Palm Oil

The global need for vegetable oil is soaring. It is the fastest-growing commodity today demand for edible vegetable oil has been projected to increase. The total demand for vegetable oil, including biofuel, in 2050 is projected to be about 310 million tons, up from about 165 million tons in 2013. This would require an annual growth rate of 1.7% a bit more than one-third of the 4.8% growth rate from 2001 to 2013, indicating that recent growth rates will not be replicated in future decades. Palm oil consumption is especially rising in countries with an expanding middle class, its associated in 2050 of what it was in 2008 (430). In 2015, it was estimated that a total of 175 million tons was needed globally, while a total of 220 million tons is projected to be needed to supply the planet in 2050. Meeting this demand will require growth of 3.6% per year over the entire period.

South Korea also has a big demand for palm oil, according to the Ministry of Trade, Industry, and Energy in 2005 South Korea imported around 340,000 tons of palm oil rising become 745,000 metric tons of palm oil from Indonesia in 2019. The big demand for palm oil drives some of the Korean corporations that currently run palm oil plantations in Indonesia. Korindo established its first oil palm plantation in Papua in 1998. Recent years have seen a marked expansion of its activities in the province, with 30,000 hectares of forest cleared between 2013 and 2016. Apart from Korindo, six other big South Korean companies named them as Posco International, Korindo Group, Samsung C&T, Daesang Corporation, LG Corporation, and JC Chemical have become major players in the palm oil industry in Indonesia. According to that reason, Korean corporations have a big prospect and important role in supporting sustainable palm oil ensuring this Industry grows in the future.

Conclusions

Integrated Palm Oil and Cattle can be a way to Boost Sustainable Palm Oil. The integration is a program to make dry farming become potential in increasing the breeder farming earnings, and this program can also correct and increase soil and palm plantation productivity, diversification of crops, and improve household income. Ecologically, the implementation of integration can expand the area of land cover to reduce the rate of soil erosion; the creation of an agro-climatic environment (microclimate) is more likely to introduce new crops of high economic value in addition to the enrichment of biodiversity. In the writer's opinion, the Indonesian government must be more aggressive in promoting the integration of palm oil plantations and cattle to boost palm oil sustainability. Several Korean corporations which run Palm oil plantations in Indonesia have a big prospect and important role in supporting sustainable palm oil ensuring this Industry grows in the future.

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