Integrated livestock business and industry in Indonesia

Syahruddin Said

Research Center for Biotechnology, Indonesian Institute of Sciences
Jalan Raya Bogor Km. 46 Cibinong 16911
Email: syahruddinsaid01@gmail.com

Abstract. Currently, Indonesia's population reaches 261 million people is the fourth largest country in terms of population. The current average meat consumption of 2.72 kg/capita/year is projected to continue to increase due to the growing population, income, and animal protein consumption. The increasing demand for meat has not been matched by domestic beef production, the supply of which is less than 60% of the national demand for beef, and the gap between beef supply and demand is increasing. To fulfill the demand for meat, the Indonesian Government has been importing meat and live feeder and slaughter cattle and some breeding stock. To encourage an increase in population and genetic quality of livestock in Indonesia, LIPI collaborates with PT. KAR create a model of beef cattle breeding industry in Indonesia and has been implemented in the private beef cattle industry. The collaboration focus on increasing population and genetic improvement of Indonesian cattle especially in Sumba Ongole (SO) cattle. The regulations for feedlot companies to import feeder cattle and female breeding stock at a ratio of 5:1 within every period of feedlot creates difficulties for feedlot companies due to a shortage of resources including capital and land. Control of female breeding cattle which are slaughtered, breeding and reproductive technologies, feeding strategies, integrated cattle farming system and developing inclusive business models are among the issues that could be considered to improve domestic beef production and develop cattle business in Indonesia.

Keywords: livestock, industry, meat, innovation, business model.

1. Introduction

For many years beef cattle have been an important part of Indonesian livelihood, especially for people who live in rural and agricultural areas. In the early 1970s, live cattle were exported to Taiwan and Hong Kong. During the period from 1980 to present, beef cattle were considered a means of achieving self-sufficiency. A beef meat self-sufficiency program (Program SwasembadaDagingSapi, PSDS 2000-2004) which was formally launched by the government in 2001, seemed to be unsuccessful, and the target was delayed until 3 times (2004-2019).

Indonesia is an emerging economy, with high population growth and economic progress being the major driving forces for the growing demand for animal sources of foods [1]. The increasing demand for meat has not been matched by domestic beef production, the supply of which is less than 60% of the national demand for beef, and the gap between beef supply and demand is increasing. To fulfill the demand for meat, the Indonesian Government has been importing meat and live feeder and slaughter cattle and some breeding stock.

Commencing in 1990 until now, Indonesia has been importing live cattle including beef cattle, mainly from Australia. Intensive beef cattle feedlot production has developed since that time. Beef cattle production can thus be classified into two major systems: smallholder farming systems, and intensive feedlot systems [2].
Figure 1 shows that until 2017 no cows were imported from Australia. Since the enactment of the Indonesian Minister of Agriculture Regulation Number 02/Permentan/PK.440/2/2017 that the government has been applying regulations for feedlot companies to import feeder cattle and female breeding stock at a ratio of 5:1 within every period of a feedlot. This policy aimed to support breeding programs in Indonesia. Unfortunately, this regulation creates difficulties for feedlot companies due to a shortage of resources including capital and land. Considering the limited housing capacity and capability of feedlot companies to keep 20% breeding stock of every single period of a feedlot, we recommend keeping breeding stock as much as 20% of barn capacity or the government provides land for breeding purposes and reduce interest rate would be financially applicable.

2. Cattle and Beef Value Chains

The supply chain of a commodity is closely related to the price. Therefore, supply chain analysis is immensely needed to identify the critical points in the pricing formation process. Price is a multidimensional issue in business and industrial structure [3,4]. Price is an important factor in the calculation of inflation and even inflation is connected to price increases. Price also indicates the market structure of an industry.

Agricultural commodities are vulnerable to such unnatural price formation mechanisms due to cartel dominance and a tendency toward oligopoly [5]. Agricultural commodities at the global marketing level are interesting for investors and speculators. In Indonesia, this sector is vulnerable to cartel behaviors that cause an oligopoly market structure. Some empirical research in Indonesia reveals that agriculture and its supporting industry have an oligopoly structure, for example, dairy cows [6], and agriculture in general [7].

Indonesia is a developing country with a large population so its demand for food commodities is encouraged to increase but the supply of food commodities especially meat and milk is not enough to meet that demand. To fulfill the demand for meat and milk, the Indonesian Government has been importing meat and live about 30% and milk about 80% of the national demand. Indonesia is a country with a market that tends to turn to oligopoly in both commodity and industry markets [8]. The oligopoly market causes the process of price formation not to be solely based on supply and demand mechanism. Commodity price plays an important role in stabilizing the economy of a developing country.

The marketing system for beef-type cattle from smallholders in Indonesia is rather diverse and long with large numbers of different types of traders. The price of an animal is based on a live weight estimation by the local trader and the farmer. Feedlots mostly sell their cattle directly to buyers or butchers and the prices are determined based on measured live weight using weighing scales. Only a few cattle markets in Indonesia set prices based on live weight measurement using scales.

Cattle are slaughtered by local butchers in slaughterhouses which are owned by the government, and some cattle are slaughtered in non-slaughter houses. Local butchers generally sell the meat in the
regularly organized local markets. The demand for meat from large restaurants, hotels, and catering and food industries is met by local production from butchers and feedlots and frozen meat imports from Australia. Household gets meat from both slaughterhouse and non-slaughter house and food markets (figure 2).

![Figure 2](image_url)  
**Figure 2.** Value change of cattle and meat in Indonesia

### 3. A Model of Indonesian Cattle Breeding Industry

#### 3.1. Genetic, Breeding, and Reproduction

Some Development and use of breeds adapted to tropical conditions is the first important step to achieve a sustainable breeding program. The government should be responsible for a national breeding system in Indonesia. Currently, few private companies are interested in breeding activities due to the long turn-over period and high risk compared to feedlot activities. The government needs to provide facilities and incentives for private companies to undertake breeding programs.

A model of the Indonesian cattle breeding industry has been developing collaborated between Research Center for Biotechnology, Indonesian Institute of Sciences and PT. Karya Anugerah Rumpin, a private company in cattle breeding. The collaboration focuses on increasing population and genetic improvement of Indonesian cattle especially in Sumba Ongole (SO) cattle (figure 3).

The SO cattle have excellent potential to gain higher dressing percentage (>50%) compared with other local cattle breeds in Indonesia [9]. However, this quality can be improved by selective breeding. There are two methods to generate the SO cattle population with the best productivity i.e. conventional and genetic selection. The conventional method in the SO cattle can be done by evaluating body weight and size [10]. According to [11], weight is the most important trait in the selection of beef cattle. Meanwhile, genetic selection is conducted through the identification of genetic markers that encode specific economical traits, along with its polymorphism in a population [12]. To this account, the gene that has been extensively studied in the SO cattle is the growth hormone (GH) gene [11, 12, and 13].

From the collaboration, hundreds of superior cattle have been successfully born and some of them have passed performance tests. This model is hoped that it will become a model for national local cattle breeding.
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3.2 Production System and Development
Animal agriculture is one of the most important components of global agriculture and livestock, and animal health of the Ministry of Agriculture issued a production certification SNI mark for 16 SO cows at PT. Karya Anugerah Rumpin.

A performance test in the SO cattle population was also has been conducted using 25 males and 25 females of Sumba Ongole (SO) cattle as reported [14]. The performance test was conducted in three periods (2014, 2015 and 2016) for about 535 days. Cattle with age between 300 to 600 days were used for evaluation. The result showed that the heritability value of yearling weight (YW365) was 0.77+0.68 as a high category. The highest breeding value of YW365 was 66.05 kg (male) and 41.89 kg (female). The average of corrected final weight(CFW) weight were 172.55+34.22 kg (male) and 159.80+37.73 kg (female). The performance test in this study obtained six A class (1 bull and 5 cows) based on the standard minimum of body measurements for SO cattle [14].
information was that estimates of feed resources and demands are needed to assess the fractions of food grain that is used for feed [16].

Facing the problem of a shortage of land on Java Island, and to meet the demand for meat production, various approaches to cattle production systems are required. Opportunities include:

1. Crop-livestock integrated system: This system is appropriate for Java Island due to the limited availability of land. An FAO report concluded there were benefits of restricted use of resource lands to mixed crop and livestock enterprises [17].

2. Plantation–livestock integrated system: Integrated palm oil plantation and cattle systems have been the most practical systems in Indonesia and Malaysia over the past two decades [18].

4. Concluding Remarks

Indonesia is a developing country with a large population so its demand for food commodities is encouraged to increase but the supply of food commodities especially meat and milk is not enough to meet that demand. To fulfil the demand for meat and milk, the Indonesian Government has been importing meat and live about 30% and milk about 80% of the national demand. The regulations for feedlot companies to import feeder cattle and female breeding stock at a ratio of 5:1 within every period of feedlot creates difficulties for feedlot companies due to a shortage of resources including capital and land. Control of female breeding cattle which are slaughtered, breeding and reproductive technologies, feeding strategies, integrated cattle farming system and developing inclusive business models are among the issues that could be considered to improve domestic beef production and develop cattle business in Indonesia.

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