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Australasian Agribusiness Review

2020, Volume 28, Paper 3

ISSN: 1883-5675

Factors Affecting the Demand for and Supply of Beef in East Kalimantan¹

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Abstract

Demand for beef has been increasing in recent decades in metropolitan areas across Indonesia, including Balikpapan and Samarinda in East Kalimantan, as a result of population and income growth, and urbanisation. However, local supply has been unable to meet the growing demand, with beef prices rising continuously. The gap has been filled by the interisland live cattle trade, as well as frozen beef imported from overseas. Lack of local supply and rising beef prices are a common issue across Indonesia in spite of a range of policy measures aimed at increasing local production and stabilising prices. The objectives of this study were to identify the factors that affect the demand for, and supply of, beef in East Kalimantan, and to draw policy implications. This paper was based on desktop research, informant interviews of key market chain players, and consultations with government officials. Field research was conducted in two major cattle producing districts in East Kalimantan (Penajam Paser Utara and Paser) and in two major cities (Samarinda and Balikpapan) where most beef was consumed. Factors affecting the demand and supply of beef were identified, including demand seasonality, supply shortages and disruptions in interisland trade, imperfect market structure, changing consumer beef purchasing behaviour, increasing beef imports, and government interventions in the market chain. All of these factors have contributed to a highly unstable beef market. The highly seasonal demand, unpredictable supply, and long and complex market chain mean it is difficult, if not impossible, to effectively balance demand and supply or stabilise prices through government interventions. Rather, our analysis shows that beef market chain players are entrepreneurial, innovative and capable of responding to changing market conditions if they can be supported by a stable business environment and evidence-based development and trade policies.

Key words: demand for beef, seasonality, market chain analysis, East Kalimantan.

¹ This study is part of the market chain research in the INDOBEEF program funded by the Department of Foreign Affairs and Trade (DFAT) and the Australian Centre for International Agricultural Research (ACIAR). We thank both DFAT and ACIAR for their generous financial support and technical guidance, and various government agencies for providing data, as well as the farmers and stakeholders who shared their knowledge, experiences and viewpoints in cattle marketing and integrated cattle palm production systems with us. We would also like to thank the reviewers for their very useful comments and suggestions.

Introduction

Demand for beef is predicted to increase in Indonesia in coming decades as a result of population growth and the rise of a middle class, as well as increasing urbanisation (MLA, 2018; EY Sweeney, 2018), and as was forecast by Rosegrant et al. (2001) for most developing countries. However, even at a per capita consumption of 2 kg per annum in 2018 (OECD, 2020; Hirschmann, 2020), local supply has been unable to meet demand. Supply shortages at around 30-40 per cent at the national level have been met by live cattle and frozen beef imported from overseas. Supply shortages are also evident, and sometimes more severe, at the provincial level, such as East Kalimantan, with local production meeting only around 25 per cent of total demand in 2018. Much of the gap has been filled by live cattle imported from neighbouring provinces within Indonesia and increasingly by frozen beef imported from overseas.

Governments, both national and local, have put in place a range of measures, in an attempt to increase local beef production, reduce the reliance on imports, and stabilise prices. However, not all the measures have been effective in either increasing local supply or stabilising prices. The main reasons seem to be the lack of understanding of the complexity of the beef market chain and the many factors affecting the demand for and supply of beef, as well as the lack of reliable data for aiding policy making. As a result, assertions and predictions about how the market has grown or will grow may be flawed, as are the policies attempting to meet that growing demand by increasing local supply or imports. The objectives of this study were: to understand the market chain and the many factors, including technical, socio-economic, and institutional, that may have affected the demand for and supply of beef; to identify key issues; and to make recommendations for improving the functioning of the beef market chain in Indonesia. This is done by using East Kalimantan as a case.

This research was based on desktop research, stakeholder consultations and informant interviews, and the collection and analysis of secondary data. Field research was conducted in two major cattle producing districts in East Kalimantan (Penajam Paser Utara and Paser) and in two major cities (Samarinda and Balikpapan) where most beef was consumed. It included a scoping study conducted in July 2018 and more in-depth informant interviews in January 2019 based on semi-structured questionnaires. Informants interviewed in January 2019 included: interisland traders and local butchers (three in Penajam Paser Utara, and three in Samarinda); government-owned and -managed slaughterhouses (one each in Balikpapan and Samarinda); one frozen meats distributor; the quarantine office in Samarinda; and (provincial and district) Dinas of livestock service/agriculture/plantation in Penajam Paser Utara, Balikpapan and Samarinda.

Excellent previous research on the Indonesian beef sector has been conducted (Dahlanuddin, 2017; Waldron et al., 2013; Mahendri et al., 2012; Deblitz et al., 2011; Nimmo-Bell and ICASEPS, 2007). This study contributes to the existing literature in several ways. Firstly, our focus is on the beef deficit region of East Kalimantan while previous research focuses on the major cattle production regions in eastern Indonesia (Nusa Tenggara Timur (NTT), Nusa Tenggara Barat (NTB), South Sulawesi and East Java). Secondly, while seasonal demand for beef in Indonesia is well recognised in previous studies, it is discussed mostly in general terms. In this study, demand seasonality is examined in detail based on annual, monthly and daily slaughter data, as well as field work and informant interviews. Thirdly, the complexity of the Indonesian beef market chain is highlighted, including how market chain operators respond and manage that complexity, and the implications for market chain management and policymaking.

The paper begins with an overview of the beef sector in East Kalimantan, which is followed by an analysis of the demand for beef and demand seasonality, and changes in consumer preferences and purchasing behaviour for beef. Local supply, live cattle trade and beef imports into East Kalimantan

are then discussed. The paper then summarises the factors affecting beef demand and supply and the key issues facing the beef market chain in East Kalimantan. It ends with some concluding remarks.

Overview of the Cattle Sector in East Kalimantan

East Kalimantan (EK) is a small cattle producing province, accounting for less than 1 per cent of total cattle production in Indonesia. However, beef consumption is relatively high because of a thriving mining sector which is the backbone of the EK economy. Large supply shortages mean a large portion of beef demand is therefore met by live cattle imports from neighbouring provinces and frozen beef imports from overseas. Table 1 provides an overview of the beef sector in EK, based on annual data from 2013 to 2017. Although the data series are insufficient to detect any trends, they do show how changeable the market is from year to year, and how some variables have been constructed based on some formulas, as opposed to real data collected from the field.

Average annual cattle population over 2013-2017 was 108,952 head and the average annual beef consumption was 9,777 tonnes (bottom row of Table 1). The latter comes from two sources: fresh beef produced (averaging 6,831 tonnes) from the daily slaughtering of cattle in local slaughterhouses (54,055 head) and frozen/chilled beef imported from both neighbouring provinces and, mainly, from overseas (2,946 tonnes). Therefore, beef imports make up 30 per cent of total beef consumption (last column, Table 1) over the 5-year period.

Table 1. Overview of the beef sector in East Kalimantan, 2013-2017

	Cattle population (head)	Beef consumption (t)	No. cattle killed (head)	Fresh beef production (t)	Live cattle import (head)	Beef import ¹ (t)	Beef imports (%)
2013	95,085	9,595	54,500	6,887	56,887	2,709	28.23
2014	101,743	10,415	55,781	7,049	59,216	3,365	32.31
2015	110,097	10,679	57,787	7,304	59,323	3,376	31.61
2016	118,712	8,804	51,462	6,504	47,054	2,300	26.13
2017	119,123	9,394	50,743	6,413	45,655	2,981	31.73
Average	108,952	9,777	54,055	6,831	53,627	2,946	30.00

Source: Dinas Livestock and Animal Health, East Kalimantan (2019). Notes: ¹ Beef imports are derived by taking the differences between total beef consumption (column 3) and local fresh beef production (column 5).

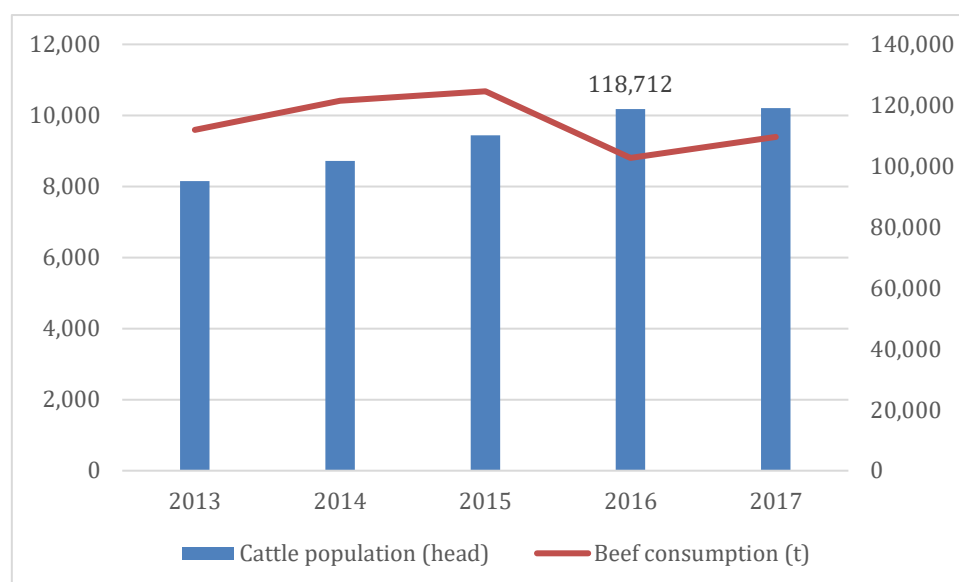
Beef imports are mainly from Australia, New Zealand, United States, and India. The total number of cattle slaughtered (54,055 head) comes from two sources: live cattle imported from neighbouring provinces (53,627 head) and cattle raised by local farmers within EK. The majority of live cattle imported are cattle ready for slaughter, but a small percentage (around 10 per cent) may be kept for short-term compensatory weight gains or for fattening by local farmers. They come mainly from Nusa Tenggara Timur (NTT), Nusa Tenggara Barat (NTB) and Sulawesi. No official statistics are available for the cattle being raised locally and slaughtered. But it can be estimated at around 16,450 head ($108,952 \times 0.151$) based on a slaughter rate of 15.1 per cent suggested in Waldron et al. (2013).² This implies that local cattle accounted for about 30 per cent ($16,450/54,055$) of the total number slaughtered. It also means that local cattle accounted for about 20 per cent of total beef consumption while imported cattle and imported beef accounted for 50 per cent and 30 per cent, respectively.

² Waldron et al. (2013) show that the slaughter/turnoff rate (no. slaughtered/herd size) in Indonesia was around 15.1 per cent in 2010. It is low compared with the world average (21 per cent) and Australia (31 per cent). But it could be around 19 per cent if illegal slaughtering was accounted for. Slaughter rate is an overall indicator of cattle productivity, reflecting the performance in reproduction and weight gains, and the capacity of producers to turn off cattle for market.

From our field work, we found that there are growing concerns regarding the heavy, and increasing, reliance on imports. Firstly, live cattle imports incurred high costs (e.g. the shipping cost for live cattle from Palu in Sulawesi to Samarinda was Rp. 650,000/head (equivalent to \$A65/head, at an exchange rate of \$A1=Rp.10,000). Secondly, beef shortages, and associated price hikes, could be exacerbated by bad weather that disrupts cattle shipments, as well as cattle collections in the villages. Thirdly, as more and more frozen beef is being imported, the demand for local cattle is reduced. Cattle slaughter numbers in Balikpapan have been reduced by half.

However, some recent changes in cattle population and beef consumption were detected, as shown in Figure 1. There has been a slowdown in cattle population growth from 2016 to 2017, and a decline in beef consumption from 2015 to 2016. A possible reason for the former is the reduction in live cattle imports, resulting in the slaughtering of local cattle; the latter may be explained by the economic slowdown due to declining coal prices and mine closures in 2015.

Figure 1. Beef consumption (in tonnes) and cattle population (in head), East Kalimantan, 2013-2017



Source: Dinas Livestock and Animal Health, East Kalimantan (2019)

The economy of EK depends heavily on earth resources such as oil, natural gas, coal and gold, as well as oil palm plantations. EK produces almost half of the total national coal production in Indonesia; most of it (70-80 per cent) is exported (Apriando, 2017). However, like most export commodities, coal and palm oil are susceptible to price fluctuations on world markets, resulting in changing economic conditions and purchasing power of EK residents. The coal price dropped significantly from \$US118.4/tonne in 2011 to \$US60.1/tonne in 2015, in part due to sluggish demand from India and China (Indonesia-investments, 2018). In 2015 alone, 125 mining companies in EK went bankrupt (Apriando, 2017). The coal price rebounded in late 2016, and in 2017 it was back to \$US85.9/tonne (Indonesia-investments, 2018). The oil palm industry has also been experiencing large price fluctuations in recent years.

Given the complexity of the beef market chain in Indonesia, it is conceivable that a range of other factors may have also contributed to the ups and downs in the demand for and supply of beef in East Kalimantan. Those factors are examined in more detail based on, firstly, data at the district/city levels in 2017 and, secondly, more disaggregated and more complete data from Balikpapan.

Beef Consumption and Utilisation in EK

East Kalimantan had a population of 3.575 million people in 2017 (BPS, 2019). The most populated areas were Samarinda (the Capital City of EK), Balikpapan, and Kutai Kartanegara district. Total cattle numbers in East Kalimantan were 119,123 head in 2017, spread across 10 districts/cities (see Table 2), but concentrated mainly in Kutai Kartanegara, Paser and Penajam Paser Utara (PPU). Total beef consumption in 2017 was 9,394 tonnes. Nearly 60 per cent of consumption was in Balikpapan and Samarinda, which accounted for 42 per cent of the total population in EK in 2017.

Table 2. Cattle production and beef consumption in East Kalimantan, by district, 2017

	District/City	Cattle population (head)	Beef consumption (t)	No. killed (head)	Beef consumption (kg/person)	Human population
1	Paser	21,984	609	4,056	2.22	274,206
2	Kutai Barat	9,197	182	1,210	1.24	146,998
3	Kutai Kartanegara	29,466	784	5,221	1.04	752,091
4	Kutai Timur	17,785	636	4,237	1.83	347,468
5	Berau	14,485	558	3,720	2.53	220,601
6	PPU	16,888	412	2,745	2.61	157,711
7	Mahakam Ulu	510	1	8	0.04	26,305
8	Balikpapan	1,993	2,911	11,665	4.58	636,012
9	Samarinda	5,683	2,726	14,043	3.23	843,446
10	Bontang	1,132	576	3,838	3.38	170,611
Total	East Kalimantan	119,123	9,394	50,743	2.63	3,575,449

Source: Dinas Livestock and Animal Health, East Kalimantan (2019); BPS (2019)

Average per capita beef consumption in 2017, derived from dividing the total beef consumption by the population in EK as a whole, was 2.63 kg. However, there are large regional differences. For example, it was 4.58 kg in Balikpapan, 3.23 kg in Samarinda and 2.61 kg in PPU, but hardly any in Mahakam Ulu. These differences can be explained partially by differences in affordability and accessibility in different locations. In Indonesia as a whole per capita beef consumption is low (2.0 kg) because it is expensive when compared to fish and chicken (EY Sweeney, 2018). This is also true for EK. In 2018, beef accounted for 12 per cent of total meat consumption in EK, while chicken was 78 per cent (Dinas Livestock and Animal Health, East Kalimantan, 2018). A visit to the wet market in Samarinda in mid-July 2017 showed that retail meat prices were Rp.110-120,000/kg (\$A11-12/kg), Rp.30,000/kg (\$A3/kg) and Rp.20,000/kg (\$A2/kg) for beef, chicken and fish, respectively.

In addition to price differentials, geography, culture, and religion also play a part. While the Javanese prefer beef, some ethnic groups such as Banjar and Bugis prefer fish over chicken or beef. Fish is abundant in EK because of the many large rivers and lakes scattered across all districts and cities. With 85 per cent of population in EK being Muslims, pork consumption is substantially forbidden. With fewer substitutes due to religion, beef consumption is therefore projected to increase proportionally more with increases in meat consumption as the Indonesian economy grows.

The markets for fresh beef³ and frozen beef appear to be segmented. The majority of beef is for business use through the food service sector (80-90 per cent), especially the bakso⁴ makers, and only a small proportion is for direct consumption by households (10-20 per cent). Interviews with a beef retailer at the wet market and a frozen meat distributor revealed that, while fresh beef is sold mainly to bakso makers (70 per cent), households (20 per cent) and hotels and restaurants (10 per cent), frozen beef is used mainly by catering companies (70 per cent), hotels (5 per cent), and restaurants (10 per cent), with the remaining (15 per cent) going to supermarkets, wet markets, hospitals and households. Frozen meats were only allowed to be sold through modern retail outlets (supermarkets and hypermarkets) until 2016, when there was a policy change (Ministry of Agriculture (MOA) Regulation No. 34/2016) which allows the sale of imported beef in traditional markets. Since most households shop at traditional markets, making cheaper imported frozen beef more accessible to the general public has resulted in changes in consumer preferences for beef.

Consumer preferences for beef

There are several types of beef on offer in the market apart from a choice between fresh and frozen beef. For fresh beef there are choices between local breeds (Bali cattle, Madura, Ongole, and PO) and exotic or cross breeds (Simmental, Brahman crosses and Limousin). For frozen beef, there is frozen and chilled beef from Australia, New Zealand and the United States, and frozen carabeef (buffalo meat) from India. Although in the past both households and bakso makers preferred fresh beef, frozen beef has become more acceptable not only because it is cheaper but also because buffalo meat is suitable for making traditional dishes such as bakso and rendang. This is especially true for the more price-sensitive clientele, such as the small-scale bakso makers and low-income households. A survey conducted in Samarinda in early 2019 found retail beef prices to be Rp.110,000-130,000/kg for fresh beef, Rp.98,000/kg for frozen beef from Australia and Rp.80,000/kg for buffalo meat from India. To put these prices into perspective, the wage for a casual worker is around Rp.100,000/day.

One butcher interviewed said that his customers prefer local fresh beef over frozen beef because they want to ensure that the meats they purchase are Halal compliant. Most bakso makers also prefer local beef. However, because of rising prices of fresh beef, some bakso makers have started using a mix of fresh and frozen beef, as well as offal, to reduce production costs. Another butcher interviewed said that his customers have no preference, and therefore he has no preference either. Another butcher stated that, in general, Indonesian consumers prefer lean meats, and this is also true for EK. And for this reason, fresh beef from local breeds, especially Bali cattle, that are normally grass-fed and less fatty, is preferred. However, he went on to say, if local beef is not available or too expensive, then consumers have little choice but to consume crossbreeds or cattle from the feedlot. These statements mean that, when analysing demand, a distinction needs to be made and understood between what is preferred and what is actually purchased. That is, consumers and bakso makers may prefer fresh/local beef over frozen/crossbred beef, but actual consumption or purchase depends on income, as well as relative prices between competing products, including different types of beef, as well as other meats, such as chicken and fish. The top five important considerations for beef purchases in Indonesia are:

³ In Indonesia, fresh beef is referred to as freshly cut warm beef that is produced from cattle slaughtered early in the morning on the same day it is to be sold. Fresh beef comes either from the feedlots using cattle imported from Australia, or from cattle, mostly local breeds, raised by smallholder farmers. The latter makes up 90 per cent of the cattle population in Indonesia (Agus and Widi, 2018).

⁴ Bakso is meatballs normally served in noodle soup, heavily spiced, delicious and cheap (Ainsworth, 2018). It is the most popular fast food in Indonesia. Bakso is traditionally made from fresh beef. However, due to its high prices, fresh beef has been gradually substituted, at least partially, by cheaper alternatives, such as beef offal, chicken and Indian buffalo meat, with creative recipes.

Halal, freshness, safety, natural and value (MLA, 2018). Local beef is perceived to be Halal compliant and fresher, and of high quality (EY Sweeney, 2018).

Seasonal demand for beef

Another characteristic of beef demand in Indonesia is seasonality. Despite low levels of beef consumption, there are large increases in demand for beef during major religious holidays, especially Idul Fitri (or Eid-al-Fitr or Lebaran) and Idul Adha (or Eid-al-Adha or Qurban). Beef demand is also slightly higher for other celebrations such as Christmas, New Year, Mawlid (Prophet Mohammad's birthday), etc, depending on socio-demographics of the region.

Seasonal demand for beef in Indonesia is long-standing and well recognised (Dahlanuddin, 2017; EY Sweeney, 2018; Waldron et al., 2013; Hadi et al., 2002; Mahendri et al., 2012; Nimmo-Bell and ICASEPS, 2007). However, none of those studies show quantitatively how profound and complex it really is. In this study, we show how demand for beef and live cattle is changing during the year and around those high demand periods based on secondary data and informant interviews, and the implications for market chain management and policymaking.

Idul Fitri

Idul Fitri marks the end of the holy Islamic fasting month (Ramadan). It is a national holiday that can span an entire working week or more, allowing people who live and work in the cities to return to their hometowns to celebrate with their families (the Mudik tradition). Public transport for returning home is subsidised by the government. There are several reasons why demand for beef, and food consumption in general, peaks at Idul Fitri. Firstly, families get together and eat traditional food to celebrate the holiday. Secondly, beef is an essential item for such an important occasion to entertain, and to show appreciation and respect to their guests and the elderly. Thirdly, at Idul Fitri, workers are paid out with the 13th-month salary so there is more to spend. Finally, demand is price inelastic, i.e. price is not a major concern as the purchase is for religious purposes.

For these reasons, demand for beef can increase substantially. Hadi et al. (2002) note that beef sales can increase by 50 to 400 per cent, depending on the province and area. EY Sweeney (2018) find that nearly 90 per cent of their survey respondents indicated that they either bought more beef or consumed more beef products at Idul Fitri even though retail beef prices may be increased by 20-30 per cent.

Demand seasonality is illustrated in Table 3 based on the official number of cattle being slaughtered at the Rumah Potong Hewan (RPH) in 2018, which does not account for cattle slaughtered in other facilities, such as TPH (Tempat Pematangan Hewan), home kills or illegal slaughter. In Indonesia, there are two types of slaughterhouses, RPH and TPH. RPHs are slaughterhouses that are certified by the government to produce ASUH (Safe, Healthy, Whole, and Halal) meat. They are owned mostly by the local government and managed by the Dinas of Livestock. At RPHs, butchers kill the animals themselves, but pay a fee for using the facilities. TPHs are small-scale butchering facilities owned and used by local butchers themselves. TPHs are registered but not certified, and hygienic and sanitary conditions vary greatly. In addition, cattle may be slaughtered in large numbers for traditional ceremonies, especially by households for events (weddings, funerals, graduations) and by mosques for Idul Adha. In addition, there is illegal slaughter by operators that are not registered or licenced to kill. Illegal slaughter could account for 25 per cent of total slaughter in some areas (Waldron et al., 2013). Finally, the slaughter number is often used as a proxy for the demand for local beef. However, it could be misleading because it does not account for the actual slaughter weight. We learned from

the field work that a butcher may slaughter one large animal during high demand periods, rather than one or two small animals. This means slaughter data must be used with a great degree of care.

In 2017, across EK, 58 per cent of cattle were slaughtered at RPHs. However, there were significant differences between metropolitan cities and the districts. For example, in PPU the percentage of cattle slaughtered at RPHs was around 25 per cent while in Balikpapan and Samarinda it was about 70 per cent. Based on regulation, Australian cattle must be slaughtered at RPH.

It can be seen from Table 3 that there is a jump in slaughter numbers in June for the three areas as Idul Fitri fell on 15 June in 2018. In particular, compared to the monthly average slaughter number over the ten normal demand months (ie excluding the months of Idul Fitri and Idul Adha), there are 86 per cent, 84 per cent and 69 per cent increases in the slaughter number in the month of June in 2018 in Balikpapan, Samarinda and PPU, respectively.

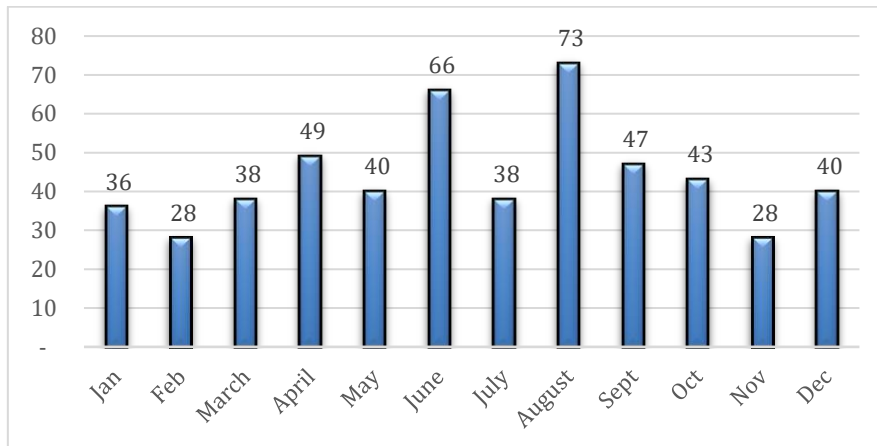
Table 3. Monthly cattle slaughter numbers in Balikpapan, Samarinda and PPU, 2018

Month	Balikpapan	Samarinda	PPU
Jan	598	621	36
Feb	597	613	28
Mar	673	690	38
Apr	650	677	49
May	700	759	40
Jun ¹	1,057	1,282	66
Jul	592	655	38
Aug ¹	588	680	73
Sep	463	689	47
Oct	430	685	43
Nov	430	737	28
Dec	549	830	40
Total	7,327	8,918	526
Average (over 12 months) ²	611	743	45
Average (over ten months) ³	568	696	39
% increase at Idul Fitri ⁴	86	84	69

Source: Dinas of Livestock and Animal Health, East Kalimantan (2019). Notes: ¹In 2018, Idul Fitri fell on 16 June, and Idul Adha fell on 21 August. ²Monthly averages over 12 months (January-December). ³Monthly averages over 10 months, excluding June (Idul Fitri) and August (Idul Adha). ⁴Percentage increases in slaughter number in the month where Idul Fitri fell.

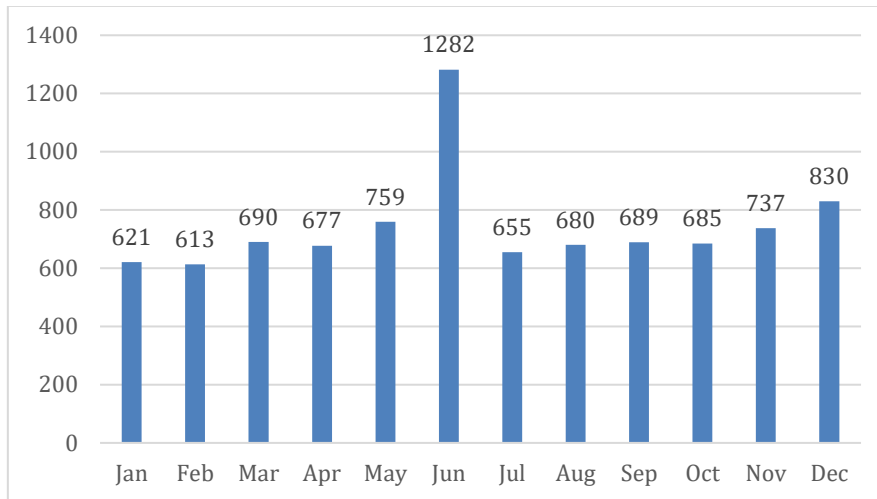
For ease of illustration, demand seasonality in the three locations is shown in Figures 2-4 for PPU, Samarinda and Balikpapan, respectively. There are three things to note from Figures 2-4. Firstly, although there is clear a spike in the month of June in which Idul Fitri falls, the consumption patterns differ. Secondly, there is no significant change in cattle numbers slaughtered at RPH for Idul Adha, which fell on 21 August in 2018, except in PPU. Thirdly, Islamic holidays, such as Idul Fitri and Idul Adha, are based on the Islamic calendar which moves differently from the Gregorian (Western) calendar. Therefore, the consumption patterns seen in 2018 based on the Gregorian calendar will also change from year to year. Religious holidays are important to note because they help explain the changing beef consumption patterns across Indonesia.

Figure 2. Numbers of cattle slaughtered at RPH in PPU, head/month, 2018



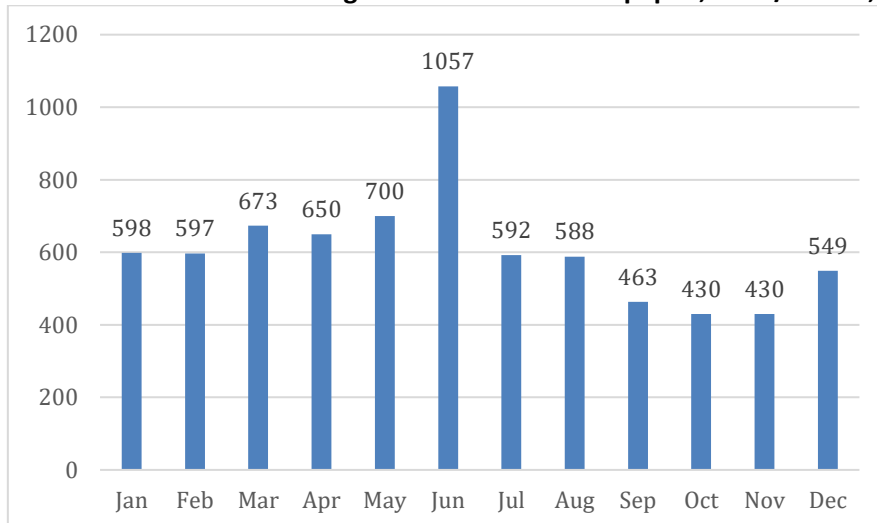
Source: Dinas of Livestock and Animal Health, East Kalimantan (2019)

Figure 3. Numbers of cattle slaughtered at RPH in Samarinda, head/month, 2018



Source: Dinas of Livestock and Animal Health, East Kalimantan (2019)

Figure 4. Numbers of cattle slaughtered at RPH in Balikpapan, head/month, 2018

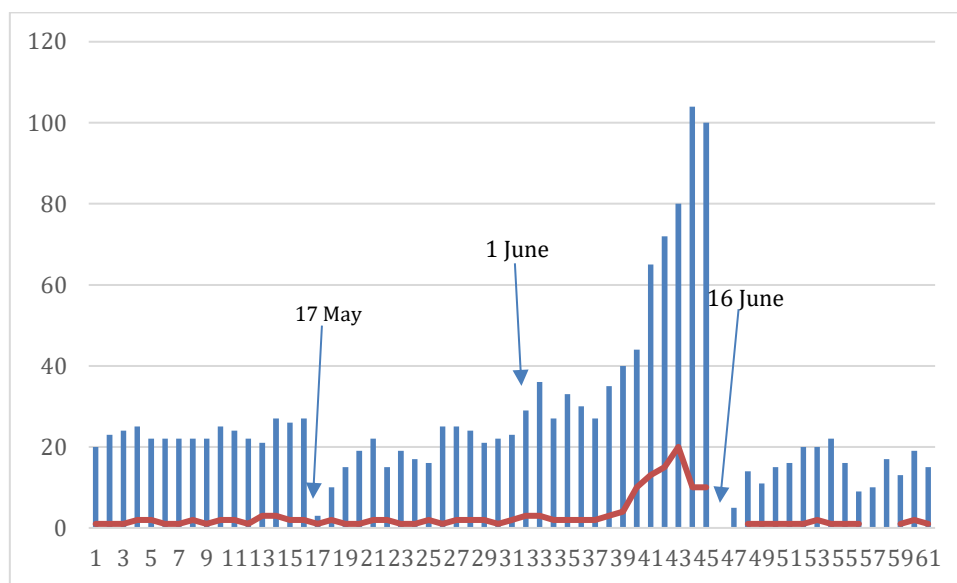


Source: Dinas of Livestock and Animal Health, East Kalimantan (2019)

Major Islamic holidays, on the Gregorian calendar, are shown in Appendix 1.

How demand for beef changes around Idul Fitri is illustrated based on the daily slaughter numbers in Balikpapan several weeks before and after Idul Fitri (16 June). Figure 5 shows the daily slaughter numbers from 1 May to 30 June in 2018, covering Ramadan from 17 May to 15 June. It can be seen that slaughter numbers are normal from 1 May to 16 May, then there is a drop in beef demand in the first week of Ramadan (starting on 17 May). Beef demand seems to return to normal in the second week, which is followed by a steady increase in beef demand for two weeks, reaching the peak in the last two days of Ramadan (14-15 June). There is no slaughtering on the day of Idul Fitri. Demand for beef decreases soon after Idul Fitri. Therefore, there may be inter-temporal substitution occurring, which means the demand spike during Idul Fitri may have little impact on the total demand for that year.

Figure 5. Daily slaughter numbers around Idul Fitri (16 June) in Balikpapan, 1 May- 30 June 2018



Source: Dinas of Livestock and Animal Health, East Kalimantan (2019)

In addition to the changes in total slaughter numbers, there are also changes in the number of female cattle being slaughtered (indicated by the orange coloured line in Figure 5). In particular, the data show that the female cattle slaughtered accounted for 5.7 per cent of total number slaughtered in 2018 (418 out of 7,327). However, this figure increased to 17-20 per cent for a week prior to Idul Fitri. Waldron et al. (2013) also note that higher proportions of females are slaughtered during Idul Fitri and periods of cattle scarcity and high prices. The slaughter of productive females has been an issue facing the Indonesian cattle industry, despite government policy prohibiting such a practice. The more productive females that are slaughtered, the less breeding stock there is for future production.

Idul Adha

The other spike in the demand for beef occurs at Idul Adha, the Day of Sacrifice. On this public holiday, Muslims commemorate a story about Ibrahim (Abraham)'s willingness to sacrifice his son Ismael to God that is known to both Muslims and Christians. Although this event is not celebrated by Christians, it is an important day to remind Muslims of the importance of sacrifice. Each family who has a higher living standard is obliged to slaughter cattle, sheep or goat during this celebration. Usually, a group of (seven) people will contribute to buy the cattle together. On the day, cattle are slaughtered on local squares, around mosques and other public places, and the event is usually joined and watched by

large crowds. The meat is then divided in three equal parts for: the household, friends and family, and the poor. Mosques coordinate the slaughtering and the distribution of meat to the poor. Beef consumption at Idul Adha is also significant in that the beef distributed to the poor at Idul Adha could be the only time in the year that poor households had consumed fresh beef.

The number of cattle slaughtered in 2018 both at the RPHs for daily consumption and at the mosques for Idul Adha⁵ in Balikpapan, Samarinda and PPU are shown in Table 4. The annual totals for cattle slaughtered at the RPHs in 2018 were: 7,327, 8,918 and 526 for Balikpapan, Samarinda and PPU, respectively. The corresponding figures for cattle slaughtered specifically for Idul Adha in the three days leading up to Idul Adha were: 2,380, 1,942 and 631. This means the numbers of cattle slaughtered in three days in Balikpapan, Samarinda and PPU accounted for 25 per cent, 18 per cent and 55 per cent of the annual totals, respectively. The large increase seen in PPU is not unique. A similar case was found in Riau province where in 2018, 21,354 head of local male cattle were slaughtered in the three days leading up to Idul Adha. It made up 85 per cent of the total number of local male cattle slaughtered in that year (25,250 head) (Chang et al., 2020).

Table 4. Cattle slaughter numbers at Idul Adha in Balikpapan, Samarinda, PPU and Riau, 2018

No. slaughtered	Balikpapan	Samarinda	PPU	Riau
Annual normal demand	7,327	8,918	526	3,896
In 3 days leading up to Idul Adha	2,380	1,942	631	21,354
Annual total	9,707	10,860	1,157	25,250
% slaughtered for Idul Adha of annual total	25	18	55	87

Source: Dinas of Livestock and Animal Health, East Kalimantan (2019) and Dinas of Livestock and Animal Health, Riau (2019)

High demand at Idul Adha triggers a price hike⁶ for live cattle. In most cases, the increases are between Rp.1-2 million/head (or a 10-20 per cent increase) for farmers (Dahlanuddin, 2017; Waldron et al., 2013 and 2016; Nimmo-Bell and ICASEPS, 2007). As a result, many farmers target their cattle sales at Idul Adha which, amidst increasing beef imports, could be the only remaining attractive market niche for domestically produced cattle (Ainsworth, 2019).

Local Cattle Supply

A heavy reliance on imports, whether they are from overseas or interisland, is a concern because they can be unreliable at times. Therefore, there is strong desire to increase local production through integrated cattle oil palm production (ICOP), as well as rehabilitation of ex-mining sites and development of mini ranges.

ICOP appears to be particularly promising for EK, which has two million hectares of oil palm plantations. Typically, limited availability and poor quality of feed, especially during the dry season, is the most important constraint to cattle production (Lisson et al., 2010). However, feed is not an issue for cattle grazing in an oil palm plantation as they can utilise the understory and fronds. Research has shown that ICOP can reduce weeding costs by 47-60 per cent and increase fresh fruit bunch yield by

⁵ Data on cattle numbers slaughtered for Idul Adha outside the slaughterhouses are collected from the mosques that coordinate the slaughtering of the animals and recorded separately from those that are slaughtered daily at the slaughterhouses for normal daily consumption.

⁶ Unfortunately, no relevant price data are available for EK at the time of research.

up to 30 per cent, plus provide some environmental benefits (Devendra, 2011). In addition, combining cattle with oil palm can help stabilise income in times of low commodity prices.

Like other parts of Indonesia, cattle in EK are raised by smallholders who keep them as part of a farming system, and they serve as a savings device. Normally, cattle are sold only when there is a need for cash although, as mentioned earlier, some farmers have targeted the Idul Adha market. Therefore, to have substantial impact on cattle supply, ICOP needs to be taken up by oil palm companies. However, interest in ICOP from the estate companies is limited. Various concerns have been cited, one of which is relative profitability. That is, oil palm has been the most productive and profitable enterprise in recent decades, so why would anyone, especially profit-oriented private companies, be bothered with cattle production? Lack of profit motivation is also true for smallholders. This is because mining (coal, gold and natural gas) is a large sector in EK, and provides better and more regular income sources to cattle farming. This highlights the importance of relative returns to, and the opportunity costs of, labour in smallholder farmers' decision making.

Several other issues were identified by Sudaryanto (2017), including:

- Difficulties in sourcing sufficient numbers of local cattle in the country for a massive cattle development;
- Oil palm enterprises consider raising cattle under plantation a burden, from both technical and economic perspectives;
- There is a common concern that cattle grazing can cause certain diseases in oil palm, such as Ganoderma, as well as soil compaction; and
- Lack of infrastructure in the remote areas where oil palm plantations are located.

These issues need to be addressed for ICOP to have any chance of success. See Chang et al. (2020) for a comprehensive overview of ICOP in Indonesia and Malaysia.

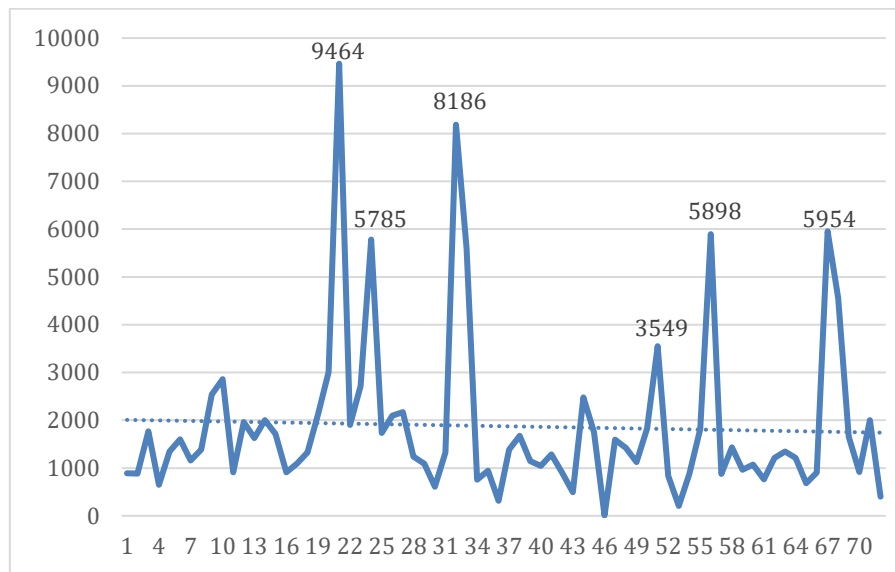
Live Cattle Imports

With limited local cattle production, in EK, live cattle imported from neighbouring islands makes up almost 50 per cent of total beef supply. Main suppliers are NTT, NTB, Sulawesi and East Java. In Figure 6, monthly live cattle imports into Balikpapan are shown from January 2013 to December 2018.

Several observations can be made from Figure 6. Firstly, there is great variation from month to month. Secondly, there is a slightly downward trend. Thirdly, there are several spikes, corresponding primarily to demand hikes at Idul Fitri and Idul Adha. And finally, the height of the spikes is substantially reduced from 8,000-9,500 head in the first half of the series to around 6,000 head in the second half. Several interviews with butchers/cattle traders were helpful in shedding light on some of the patterns seen in Figure 6, as well as identifying a range of issues in interisland cattle trading.

Sources of supply

Faced with uncertainties in both demand and supply, butchers have a range of risk management strategies, including vertical integration and supply diversification. For the former, butchers in Indonesia may integrate across many parts of the chain. They buy their own cattle, slaughter and sell beef themselves or through their relatives. It means that these actors can be knowledgeable and flexible across several parts of the chain. In terms of diversification, not only did the butcher we interviewed in Samarinda have a diverse source of supply for live cattle and buffalo, he sold frozen beef alongside fresh beef. His supply sources included:

Figure 6. Monthly live cattle imports into Balikpapan (in head), Jan 2013-Dec 2018

Source: Dinas of Livestock and Animal Health, East Kalimantan (2019)

- Cattle from NTT;
- Cattle and buffalo from North Maluku;
- Cattle from Central Sulawesi, South Sulawesi, Gorontalo and North Sulawesi;
- Buffalo from Kutai Kartanegara and West Kutai districts, East Kalimantan; and
- Frozen beef and buffalo meat from a frozen-meat distributor based in Samarinda.

In recent months, around 70 per cent of the live cattle imported by the butcher were sourced from NTT and 30 per cent from Sulawesi. Live cattle that came from NTT were sourced from an interisland trader based in Samarinda. Live cattle that came from South Sulawesi were sourced directly through his employees who were based in Sulawesi and collected cattle from the cattle market, local traders and farmers. Volumes traded and supply sources are determined based on weather and price. For example, the buying price of cattle from NTT in Samarinda is around Rp.45,000 - Rp.47,000/kg of live weight, while cattle from Palu/Sulawesi cost around Rp.50,000/kg. The cattle price in Sulawesi is also more variable because of fluctuations in demand. Therefore, buying cattle from Sulawesi only happens if there is a lack of supply from NTT. The latter can happen due to bad weather that affects shipping as well as cattle collection in the village. Bad weather often occurs in December, January and February when strong west winds create large waves at sea. When supply is disrupted, the number of cattle slaughtered could be reduced from 15-20 head/day to 10 head/day.

He prefers cattle from NTT to that from Sulawesi for the following reasons: (1) NTT cattle are cheaper than those of Sulawesi; (2) purchase/pricing is based on actual live weight using a weighing scale⁷; (3) the price is more stable; (4) it is less risky as animals are already in Samarinda and hence there is no issue with weight loss/injuries/sometimes death associated with long distance transport (weight loss is on average 10-12 per cent); (5) cattle from NTT are all males, which are preferred, as females produce less meat compared with males of similar size (cattle from Sulawesi are both males and females); and (6) cattle from NTT are Bali cattle which taste better than some cattle from Sulawesi

⁷ There are a series of rules about export of cattle from NTT – quota, numbers, weight limit, vaccinations etc. Weighing may be necessary for meeting the regulatory requirements. Sumbawa island of NTB also has similar export controls, but there is no weighing.

that are PO or draught cattle. However, if the price per kg is the same, he prefers cattle from Sulawesi because they are bigger, compared to that from NTT, because the bigger the cattle, the higher the dressing percentages.

Interisland trade

Cattle production in Indonesia is not evenly distributed. The major cattle production areas are in eastern Indonesia, including East Java, South Sulawesi, NTB and NTT. Together, they account for over 60 per cent of total cattle inventory in Indonesia. Beef deficit areas are Jakarta, West Java, Kalimantan and Sumatra (BPS, 2019). Therefore, interisland trade plays a major role in filling the demand gaps⁸.

Live cattle used to be transported across islands by cargo ships (with a 250-500 head capacity) and by trucks on the ferries (11-15 head/truck/ship). Several problems in cattle shipping were identified (Hadi et al., 2001; Deblitz et al., 2011; Waldron et al., 2013). Firstly, ships were not specifically designed for shipping cattle; secondly, ships had limited capacity and no regular shipping schedule; thirdly, interisland shipping could be affected by bad weather; and finally, there could be higher rates of weight loss and injuries. A solution was making purpose-built vessels available for shipping cattle, which became a reality in late 2015.

KM Camara Nusantara I was officially launched in November 2015 (see Figure 7). It was the first of six such vessels being built by the Indonesian Government specifically for delivering live cattle from the main cattle exporting regions (NTT/NTB/Sulawesi) directly to ports across Java and Kalimantan islands. The stated objectives were to reduce transport costs and improve the flow of cattle between islands to reduce the beef price in the main importing regions across Indonesia, especially in Greater Jakarta. Previously, live cattle from NTT were transported to Jakarta firstly by cargo ship from Tenau port in Kupang in NTT to Tanjung Perak port in Surabaya in East Java, and after quarantine/observation they continued on by trucks to holding ground in Bekasi, West Java, then to markets in Jakarta (Nimmo-Bell and ICASEPS, 2007). The journey could take up to 3 weeks (Deblitz et al., 2011) and incur a range of expenses (Waldron et al., 2013).

Figure 7. KM Camara Nusantara I



Source: Brilio.net (2016)

⁸ Interisland trade is of significant interest in terms of understanding the supply of domestic cattle. However, information on trade flows by sources is not available for EK. Interisland cattle trade for South Kalimantan and related issues are covered in detail in Chang and Sumantri (2020).

Traders in Samarinda interviewed said that, prior to Camara Nusantara, shipping cattle by cargo ships occurred on average four times per month in good weather, but there could be only one shipment if the weather was bad with rough seas. With Camara Nusantara, there are regular shipments of 2-3 times per month from NTT to EK (approximately 1,000-1,500 head/month). Furthermore, before Camara Nusantara, interisland cattle shipping was said to have been available only to, or monopolised by, several large cattle trading companies, which created entry barriers for small players. But now, small traders can also be involved. In fact, 30+ traders have applied for import permits from the Dinas of Agriculture of Samarinda City. Since there is no import quota, supplies have increased, and cattle prices have been made more stable, and some traders even claimed that fresh beef prices have come down.

It seems that the attempt by the Indonesian government to improve interisland cattle trading has been successful, at least for Samarinda, in terms of increasing competition and cattle supply, and lowering and stabilising beef prices. However, in addition to the large capital investment by the government building the six ships, the freight rates for Camera are heavily subsidised. Therefore, there are concerns about sustainability, not only financially, but also potential supply depletion of cattle stock in NTT as special efforts are made in order to fill the ships regularly. Some private shipping operators were unhappy about the government competing “unfairly” with the private sector while others claimed that the five ships targeting Jakarta were too many considering the Jakarta market for live cattle has been shrinking for years because of frozen beef imports.

Cattle pricing

Cattle are priced in two different ways: by estimation/visual appraisal or by objectively measured live weight. From a marketing perspective, objective measurement of weight using a weighing scale is preferred because it provides price signals and pricing transparency. It speeds up price negotiations, avoids suspicion/distrust between trading parties (because of perceived imbalanced market power between traders and farmers), and enables off-site transactions. All of which help reduce the cost of marketing and improve marketing efficiency. And, equally importantly, it allows the collection and provision of market information on volume and price for better-informed policy making and business planning. However, weighing scales have not been popular with traders, butchers or farmers. Even when a weight scale is provided by the local government at the livestock market or the slaughterhouse, it is hardly used. The practical issue of weighing is that it is logistically difficult to determine the “right” location for the scale. Other questions are: do you take the scale out to households, who would provide the weighing service (set up on flat ground, calibrate, quiet cattle, etc), and how will the service be charged or paid for, and by whom?

Some butchers interviewed claimed that they made good money by estimation because of their ability to accurately predict the meat yield, while others said that sometimes they lost money because of poor judgment. The butcher in Samarinda interviewed prefers buying cattle based on actual live weight because it allows him to more easily calculate the amount of meat obtainable, and when buying in bulk the misses even out. However, he needs to make sure he is paying for meat, rather than water. Apparently, some cattle are denied access to water first and then forced to drink a lot of water before weighing/sale. It is conceivable that traders have the upper hand in estimation and price negotiation with farmers because they are more informed about demand and supply conditions, as well as more experienced in buying and selling. However, nearly all farmers interviewed prefer estimation over weighing, claiming that they make more money that way. One interesting case is a small feedlot operator in South Kalimantan who prefers buying by weighing while selling by estimation. No experiment has been done to assess whether estimation or weighing produces a higher profit for farmers or traders.

Cattle supply shortages in NTT

NTT has been the dominant cattle producer and exporter in Indonesia for decades, supplying mainly the Jakarta market and Kalimantan island. According to interviews with butchers and traders, cattle supply from NTT has been decreasing in the past few years, not only in numbers, but also in live weight. One butcher claimed that because of a shortage of supply from NTT, his slaughter number has been halved, from 400 head/month to 200 head/month. A large trader based in Samarinda claimed that it is getting more difficult to source the numbers he needs. For example, it used to take him one week to collect 500 cattle; now it may take two weeks.

Several reasons for the alleged supply shortages in NTT were put forward, including:

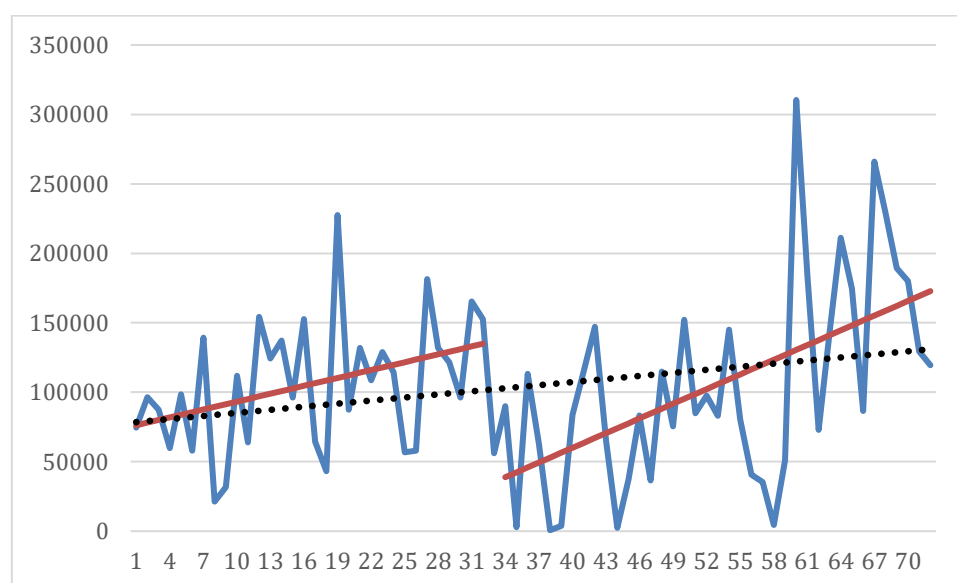
- Cattle are getting smaller because of inbreeding;
- Cattle are sold prematurely (weighing only around 200kg) because of high demand;
- Since most bulls are exported for high prices, local demand in NTT is met by slaughtering females, which reduces future supply of cattle;
- Too many cattle are being exported (despite export quotas);
- The long dry season, lack of feed and poor feeding management; and
- Low calving rates and high calf mortality rates.

Similar observations have been made previously (e.g. Nimmo-Bell and ICASEPS, 2007; Deblitz et al., 2011). However, it seems that supply shortages persist, and may have worsened in the recent decade.

Frozen Beef Imports into Balikpapan

Indonesia has been importing frozen beef from overseas for nearly three decades. The main suppliers are Australia, New Zealand and the United States. However, in mid-2016, a lower cost competitor, Indian buffalo meat (IBM), was allowed in despite concerns over its FMD status. In the following sections, we examine frozen beef and IBM imports into Balikpapan, and their impact on the demand for local beef. As can be seen in Figure 8, frozen beef imports experienced significant variations from month to month with a small, but increasing trend (the dotted line), as well as a structural change around August 2015 due to import restrictions.

Figure 8. Monthly frozen beef imports into Balikpapan, Jan 2013- Dec 2018



Source: Dinas of Livestock and Animal Health, East Kalimantan (2019)

When two separate trend lines were fitted to two different periods, January 2013 - August 2015 and September 2015 – December 2018, respectively, they show two different slopes. The latter series appears to be starting at the lower level, but growing at a higher rate, compared to the former. In addition, import volumes in the second period were mostly below the general trend (the dotted line) for about two years, and only picked up in 2018 (the last 12 months of the series) when the volumes were above the dotted line. Again, we rely on the informants to help us with the interpretation.

One frozen meats distributor in Samarinda interviewed stated that the demand for frozen meats (mainly beef, IBM and chicken) has been steadily increasing in EK in the last five years, except between 2015 and 2016 due to import restrictions. As a result, the frozen meats wholesaling business is booming in EK. In 2013, there was one frozen meat distributor in Samarinda, in early 2019 there were five, plus another five operating in Balikpapan.

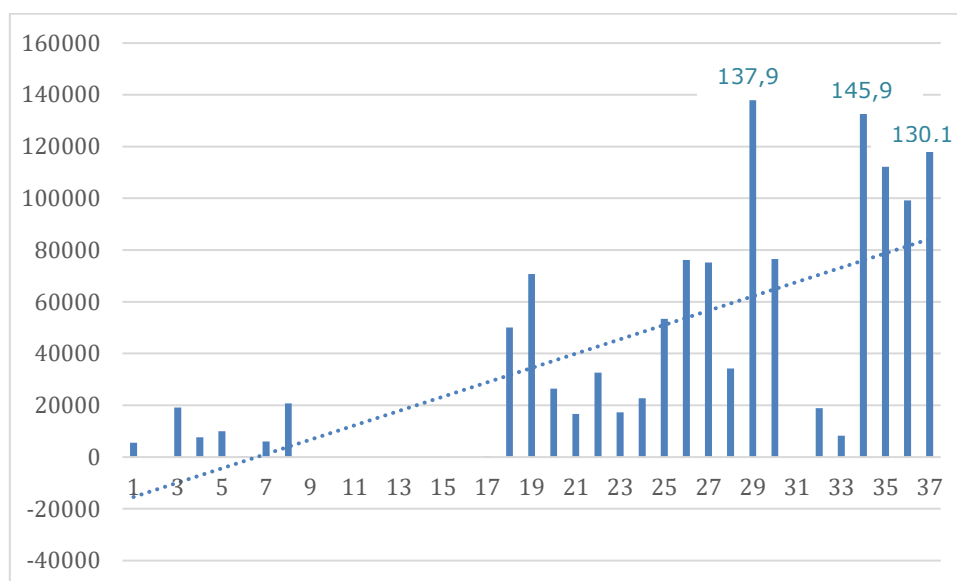
The distributor revealed that normally they order one container load (10 tonnes) of frozen beef/IBM per month. Out of the 10 tonnes, 2-3 tonnes (20-30 per cent) are IBM. During high demand periods (Idul Fitri, Christmas, New Year and Mawlid), demand doubles and there is usually one container load every fortnight. Generally speaking, meat sales vary with fluctuations in prices. Their main customers are: catering services for mining companies (70 per cent), hotels (5 per cent), restaurants (10 per cent), and supermarkets/households (15 per cent). However, frozen beef/IBM are also available at the wet market, and the volumes going there are increasing.

Indian buffalo meat imports into Balikpapan

IBM was first available in EK in December 2016 soon after a change in import policy that allowed it to be imported into Indonesia. In 2016, the Indonesian Government passed legislation to allow for the importation of beef and live cattle from Foot and Mouth Disease (FMD) free-zones of countries such as Brazil and India. Previously, only beef from FMD-free countries, such as Australia, New Zealand and the United States, could legally enter Indonesia.

The change in FMD policy aims to diversify Indonesian beef import sources beyond Australia, and to bring down beef prices and make domestic beef more affordable to ordinary Indonesians. The government also put in place regulations that restrict IBM to be sold only through modern retail outlets in the Greater Jakarta area, and at a retail price no more than Rp.80,000/kg (Respatiadi and Nabila, 2017). It is not clear how effective those regulations were initially because they were soon either relaxed or simply ignored. After that, IBM spread quickly to other regions and into the wet markets. MLA (2018) found that the majority of IBM was sold to wet markets, followed by small and medium bakso manufacturers and food service operators; only a very small proportion of IBM was sold in modern retail outlets.

IBM first entered Balikpapan legally in December 2016 – four months after it had entered Indonesia in August. Volumes of IBM imported into Balikpapan from December 2016 to December 2019 are shown in Figure 9. As can be seen, there is a clear upward trend, but with significant variations from month to month, and in some months there was no supply at all. The three highest peaks seen in Figure 9 occurred in April 2019 (137,929 tonnes), September (145,989 tonnes) and December (130,100 tonnes). However, they were unrelated to any of the peak demand periods associated with religious holidays discussed earlier. We learned from the interviews that the supply of IBM has been variable, either from BULOG, the Indonesia's state-owned food procurement agency, or from BULOG's designated distributors.

Figure 9. Frozen Indian buffalo meat imports into Balikpapan (in kg), Dec 2016-Dec 2019

Source: Dinas of Livestock and Animal Health, East Kalimantan (2019)

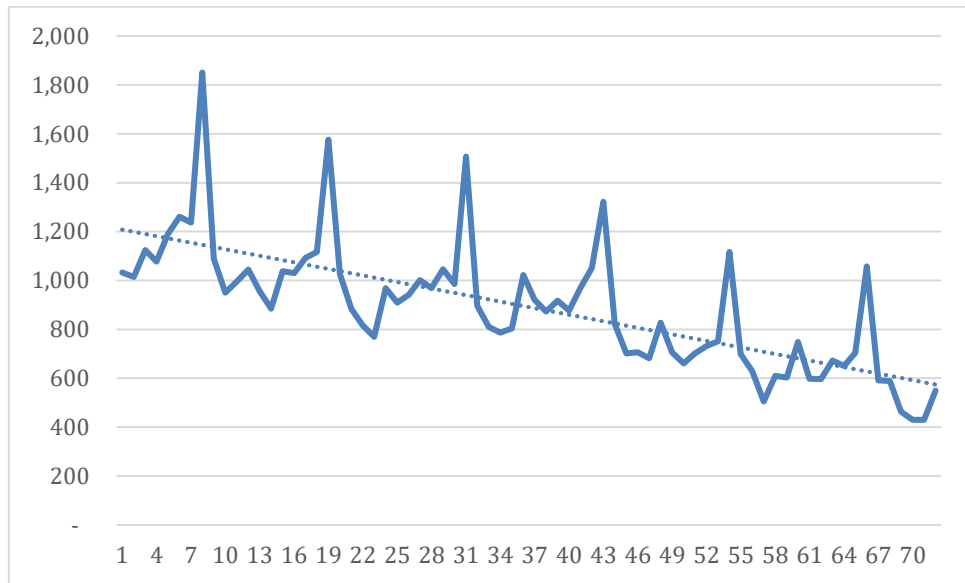
It seems BULOG was given the difficult task of managing the importation and distribution of IBM. One of the main jobs was to keep beef prices stable or from rising during high demand periods (Idul Fitri, Mawlid, Christmas, New Year). It is a difficult task, if not impossible, because it means trying to match demand and supply at different times of the year in a market with imperfections, such as market power and government interventions discussed earlier, and without reliable data. For BULOG to do a reasonably good job, it must have up-to-date, accurate and detailed demand forecasts that consider factors such as seasonality, trends, supplier lead times and delivery schedules, as well as the autonomy to use that information as it sees fit without any political interference. Supply forecasting is equally challenging as it also needs up-to-date and accurate data on live cattle supply from both feedlots and smallholders (who own nearly 90 per cent of cattle in Indonesia (Agus and Widi, 2018)) as well as frozen beef that is in the pipeline and in stock. Geographical variations, and separation between production and consumption, are further complications. Interventions in the market based on trends alone and on an annual basis for Indonesia as a whole, rather than being based on real and more disaggregated data, are unlikely to be effective.

Impact of frozen beef/IBM imports on the demand for local cattle

As a cheap alternative to locally produced beef, and with the supply of frozen beef/IBM growing, it is inevitable that it will impact on the demand for local cattle. The negative impact appears to be most apparent in big cities such as Balikpapan, where there is a large demand but small cattle population. We heard that the slaughter numbers at the RPH in Balikpapan have been reduced from around 45 head/day to around 20 head/day. As a result, many butchers have gone out of business. The claim is backed up by the statistics, as shown in Figure 10. It can be seen that the trend line shows a steep decline in monthly slaughter numbers in Balikpapan from January 2013 to December 2018.

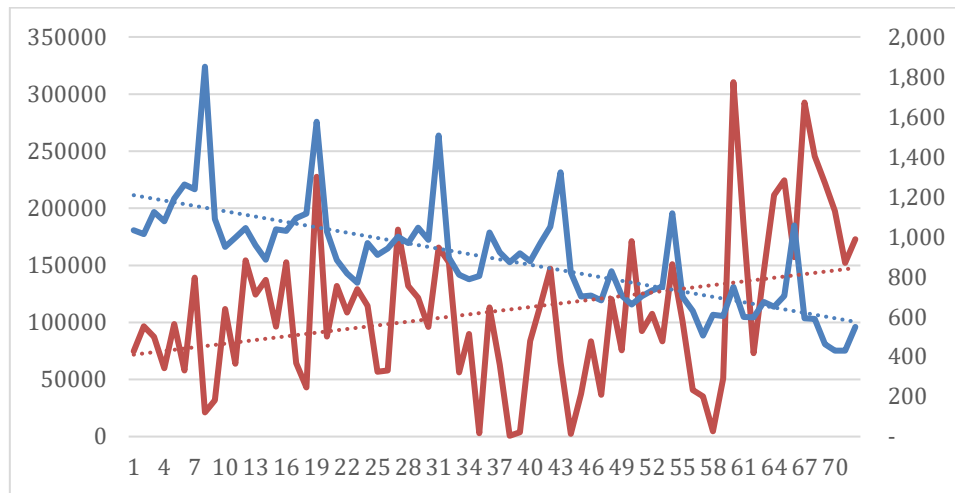
The correlation between cattle slaughter numbers and combined frozen beef/IBM import volumes is shown in Figure 11. It is apparent that the former is trending downwards while the latter is trending upwards, with a negative coefficient of correlation of -0.16. A negative correlation means that as import increases, demand for local cattle decreases. However, the correlation is not strong, and no causality in either direction can be established given the available data.

Figure 10. Monthly cattle slaughter numbers, Balikpapan, Jan 2013 – Dec 2018



Source: Dinas of Livestock and Animal Health, East Kalimantan (2019)

Figure 11. Cattle slaughter numbers (in blue) and total beef imports (in red) into Balikpapan, Jan 2013-Dec 2018



Source: Dinas of Livestock and Animal Health, East Kalimantan (2019)

However, the impact appears to be different for different operators in the beef market chain, depending on their ability to respond. One butcher, who sells both fresh and frozen beef and IBM at the wet market, said that frozen beef imports have not affected his business. Some butchers lose half of their sales while others have gone out of business because they refuse to sell frozen beef even when their customers have changed their preferences. It is common to see frozen beef being sold side by side with fresh beef. It is also common knowledge that some retailers at the wet market mix different types of beef together or pass frozen beef/IBM up as fresh beef and make extra profits. His strategy is to diversify his sources as well as product line. Consumers may not be aware of the different types of beef on offer or the marketing strategies employed by the butchers since there is no regulation requiring product disclosure or labelling.

Diversification appears to be a preferred strategy in a changing operating environment for other market chain operators as well. One large interisland cattle trader has diversified into live cattle and frozen beef imports. Some feedlot operators have integrated forward, setting up their own abattoir and brands, and even retailing shops.

Market Structure of the Beef Market Chain

Imperfect market structure and the dominance of large or influential players, and even cartels, in the beef market chain were well recognised (Nimmo-Bell and ICASEPS, 2007; Morey, 2011; and Waldron et al., 2013 and 2016). While cattle production is dominated by smallholders (accounting for as high as 90 per cent of the annual total, according to Agus and Widi (2018), cattle trading and beef importing are highly concentrated.

According to Nimmo-Bell and ICASEPS (2007), the alleged market power and entry barriers in interisland trade was partly a result of the strong networks that existed between collectors, shippers, administrators and buyers along the market chain. Morey (2011) found that the live cattle and frozen beef import sector was dominated by a small number of large players as a result of the import licencing and quota systems instituted by government. They found that in 2010, four to five importers accounted for 50 per cent, 63 per cent and 60 per cent of imports of live cattle, boxed beef and boxed offal from Australia, respectively. Waldron et al. (2013 and 2016) also found that, under the cattle distribution program, one trader in Lombok was awarded export contracts/permits for sending breeders to other provinces while at the other end, the importing traders also had won tenders from the local government. Market power when exercised has the potential to raise profit margins by increasing selling prices or reducing buying prices, or both.

Conclusion

The beef market in East Kalimantan, although small, is dynamic and complex. Based on analysis of secondary data, triangulated with interviews with stakeholders in the beef market chain, this study found that there are significant variations in demand and supply indicators, either on a daily, monthly or yearly basis. A range of contributing factors were identified, including demand seasonality, geographical variations, supply shortages and disruptions in interisland cattle trading, socio-economic issues, cattle pricing, changing consumer preferences for beef and purchasing behaviour, trade policies, government interventions, market structure, and data collection and reliability.

The complexity of the beef market chain can be summarised with the following statement made casually by a butcher/interisland trader in Samarinda: "Normally, I kill 15-20 head/day. When the weather is bad (and supply is interrupted), it is down to 10 head/day. At Idul Fitri, I kill 280 head in the three days leading up to Idul Fitri. There is no change in the slaughter number or beef sales for me at Idul Adha, but the demand for live cattle increases a lot." To succeed in such an uncertain environment, he resorts to diversifying his sources of supply and product line, as well as becoming more vertically integrated.

Given the dynamism and complexity of the beef market chain in East Kalimantan and the lack of reliable data, it appears that government interventions aimed at balancing demand and supply and stabilising beef prices are unlikely to be effective. The government agencies also lack the flexibility and capacity required to respond to changing market conditions in a timely fashion. On the other hand, beef market chain players are found to be entrepreneurial, innovative and capable of managing the market chain issues if they can be supported by a stable business environment and evidence-based development and trade policies.

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Appendix 1. Major Islamic Holidays and Schedules

Box A1. Major Islamic Holidays

Muharram (1 Muharram): The Islamic New Year

The month of Muharram marks the beginning of the Islamic liturgical year. The Islamic year begins on the first day of Muharram, and is counted from the year of the Hegira (*anno Hegirae*) the year in which Muhammad emigrated from Mecca to Medina (A.D. July 16, 622). The Islamic new year is celebrated relatively quietly, with prayers and readings and reflection upon the hegira.

Mawlid al-Nabi (12 Rabi 1): Prophet Muhammad's Birthday

This holiday celebrates the birthday of Muhammad, the founder of Islam. It is fixed as the 12th day of the month of Rabi I in the Islamic calendar. *Mawlid* means birthday of a holy figure and *al-Nabi* means prophet. The day is commemorated with recollections of Muhammad's life and significance. Fundamentalist Muslims, such as the Wahhabi sect, do not celebrate it.

Eid al-Fitr (1 Shawwal): The Celebration concluding Ramadan

Ramadan, the month of fasting, ends with the festival of Eid al-Fitr. Literally the "Festival of Breaking the Fast," Eid al-Fitr is one of the two most important Islamic celebrations (Eid al-Adha is the other). At Eid al-Fitr people dress in their finest clothes, adorn their homes with lights and decorations, give treats to children, and enjoy visits with friends and family. A sense of generosity and gratitude colors these festivities. Although charity and good deeds are always important in Islam, they have special significance at the end of Ramadan. As the month draws to a close, Muslims are obligated to share their blessings by feeding the poor and making contributions to mosques.

Eid al-Adha (10 Dhu'l-Hijjah): The celebration concluding the Hajj

Eid al-Adha, or the Feast of Sacrifice, commemorates the prophet Abraham's willingness to obey Allah by sacrificing his son Ishmael. According to the Qu'ran, just before Abraham sacrificed his son, Allah replaced Ishmael with a ram, thus sparing his life. One of the two most important Islamic festivals, Eid al-Adha begins on the 10 day of Dhu'l-Hijja, the last month of the Islamic calendar. Lasting for three days, it occurs at the conclusion of the annual Hajj, or pilgrimage to Mecca. Muslims all over the world celebrate, not simply those undertaking the hajj, which for most Muslims is a once-a-lifetime occurrence. The festival is celebrated by sacrificing a lamb or other animal and distributing the meat to relatives, friends, and the poor. The sacrifice symbolizes obedience to Allah and its distribution to others is an expression of generosity, one of the five pillars of Islam.

Muslims measure the passage of time using the Islamic (*Hijrah*) calendar. This calendar has twelve lunar months, the beginnings and endings of which are determined by the sighting of the crescent moon. Regional customs or moon sightings may cause a variation of the date for Islamic holidays, which begin at sundown the day before the date specified for the holiday. The Islamic calendar is lunar and the days begin at sunset, so there may be one-day error depending on when the New Moon is first seen.

Source: Timeanddate.com (n.d.)

Table A1. Schedule of Islamic holidays in Western calendar

	Ramadan starts	Ramadan ends	Idul Fitri	Idul Adha	Mawlid al-Nabi	Islamic NY
2010	11 August	10 September	11 September	17 November	26 February	8 December
2011	1 August	31 August	1 September	6 November	15 February	27 November
2012	21 July	19 August	20 August	26 October	5 February	15 November
2013	10 July	8 August	9 August	15 October	24 January	5 November
2014	29 June	28 July	29 July	5 October	14 January	25 October
2015	18 June	17 July	18 July	24 September	24 December	15 October
2016	6 June	6 July	7 July	12 September	12 December	2 October
2017	27 May	25 June	26 June	1 September	1 December	22 September
2018	17 May	15 June	16 June	22 August	21 November	11 September
2019	6 May	5 June	6 June	11 August	10 November	1 September
2020	24 April	24 May	25 May	31 July	29 October	20 August

Source: Timeanddate.com (n.d.)