

The Indonesian beef cattle industry¹

Highlights

- Indonesia is a mid-sized producer ranked 27th in the world, but the largest in Southeast Asia with 13-16 million cattle in 2013, and a slaughter of 2.6-3.3 million head (depending on source and assumptions).
- Cattle are produced in a range of systems, predominantly by small-holders in integrated crop-livestock systems (e.g. Java), but also grazing (e.g. Eastern Indonesia) and in plantation systems (Sumatra and Kalimantan).
- Unlike China, economic growth has not provided large scale opportunities for farmers to work off-farm, so rural livelihoods remained rooted in agriculture, including livestock (4.8 million households) and cattle (perhaps 2 million).
- With low opportunity costs of labour, and innovative ways to access low cost feed, many rural households still want to raise cattle, but more as a source of “savings” than to maximise productivity or profits.
- Markets are serviced by low-cost and efficient chains, dominated by spot markets, and small butchers that slaughter service slaughter plants and distribute generic beef through wet markets.
- While transport in the archipelago is logistically challenging, there is a significant trade in live cattle (and, increasingly, beef) around the country.
- Economic growth, population growth and urbanisation has increased demand for beef which has an established place in the Indonesian diet.
- Beef prices in Indonesia are high by world and regional standards and an average of three times more expensive than the most highly-consumed meat, chicken.
- Indonesia therefore imports large quantities of beef and cattle (730,000 head in 2014), although policy settings have a large bearing on trade flows. These cattle are finished predominantly on plantation residues, in a feedlot sector with a capacity to turn off around one million head per year.
- There is an informal cattle and beef trading sector in Indonesia but it does not appear to be as large as that in China and the Mekong.

¹ Scott Waldron, Erwidodo and Yati Nuryati (2015), The Indonesian Beef Industry in “Regional Workshop on Beef markets and trade in Southeast Asian and China”, Ben Tre, Vietnam, 30th November – 3rd December, 2015.

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1. National industry

1.1. Background

Cattle have a significant place in Indonesian society. Beef is a key ingredient in some of Indonesia's most famous dishes such as Bakso and Rendang, and consumption is increasing with a large, growing, urbanising and largely Muslim population. This demand has traditionally been met by small-holder based cattle production systems that fit into integrated crop-livestock systems (e.g. in East Java). However, cattle production systems in Indonesia are diverse, and extend to more extensive systems in dry parts of Eastern Indonesia, to growing and more commercialised plantation systems (Sumatra, Kalimantan).

Cattle play an important role in small-holder livelihoods, especially as a source of "savings" and cash income, and secondarily in some areas for cultural purposes and consumption in festivals. Partly because of their role in rural development (and political constituencies), government has sought to stimulate the production sector through a large range of mechanisms (from breeding to cattle distribution to import constraints).

Cow-calf and feeder cattle production systems are, however, not cost-competitive with more extensive systems overseas (especially Australian northern systems), which is highly complementary to the plantation-based fattening systems in northern Indonesia. Indonesia therefore has a large import sector and is highly exposed to international markets, although policy settings have a large bearing on trade flows.

Large numbers of producers and consumers are linked through low-cost, rudimentary and largely efficient domestic cattle marketing and processing systems. Transport operators have to navigate congested roads and shipping across the archipelago country. Indonesia is now starting to invest in industry infrastructure (i.e. abattoirs, livestock and food markets) and soft infrastructure (i.e. certification schemes and standards, food safety regulations).

1.2. Macro drivers of the industry change

Indonesia has the largest population in Southeast Asia with 253 million people, and a growth rate of 1.3% between 2010 and 2014. The proportion of the urban population has increased from 30% in 1990 to 54% in 2014 (World Bank Database). The 1997 Asian Financial Crisis brought about an economic shock and heavy depreciation of the Rupiah. Amongst other effects, beef and cattle imports crashed, while farmers capitalised on high prices by selling cattle. Since 2000, Indonesia has enjoyed economic stability and average GDP growth of 5.6% (but has declined over the last year). The GNI per capita in 2013 was \$3,650, making it a low to middle income country (UNDP). Poverty levels have decreased to 16% (at \$1.25 per day) but almost 50% of the population live on \$2 per day, with increasing levels of inequality. Economic growth is largely confined to Java and Bali (and extraction in Sumatra and Kalimantan). The share of agriculture in GDP has remained steady at around 14% since 2005, of which livestock makes up 1.8%. With the exception of fisheries, livestock has grown faster than other agricultural sectors (including plantations). Without a growing manufacturing base, job creation in Indonesia has largely been in the informal agriculture and service sectors (Henstridge *et al.*, 2013).

Nearly 4.2 million farmers raise livestock in Indonesia, 1.98 million of which are in East Java (DGLAHS, 2011).

Thus, sustained economic growth and urbanisation in Indonesia has had several effects. Demand for beef has increased (see Section 9). However, unlike China, economic growth has not provided large scale opportunities for farmers for work migration or manufacturing, especially in outlying provinces, but also in many parts of rural Java and Sumatra.² Thus, opportunity costs of labour for most farmers engaged in cattle production are low, which impacts on incentives for cattle production and downstream activities.

1.3. Macro statistics

Production indicators for the Indonesian cattle and beef industry (Figure 1) are drawn from the Director General of Livestock and Animal Health Services (DGLAHS) which collects cattle production data on an annual basis from reports submitted by local government offices responsible for livestock services. Statistics reported by DGLAHS are equivalent to those reported in FAOStat for cattle production and cattle meat production.

² Deblitz *et al.* (2011) show that when opportunity costs of labour, land and capital are taken into account, producers in NTT and NTB are more profitable (and therefore competitive) than producers in Sulawesi. Rutherford *et al.* (2004) produce similar findings in the cases of Sumbawa (less developed, more extensive systems) compared to Lombok (more developed, more intensive systems).

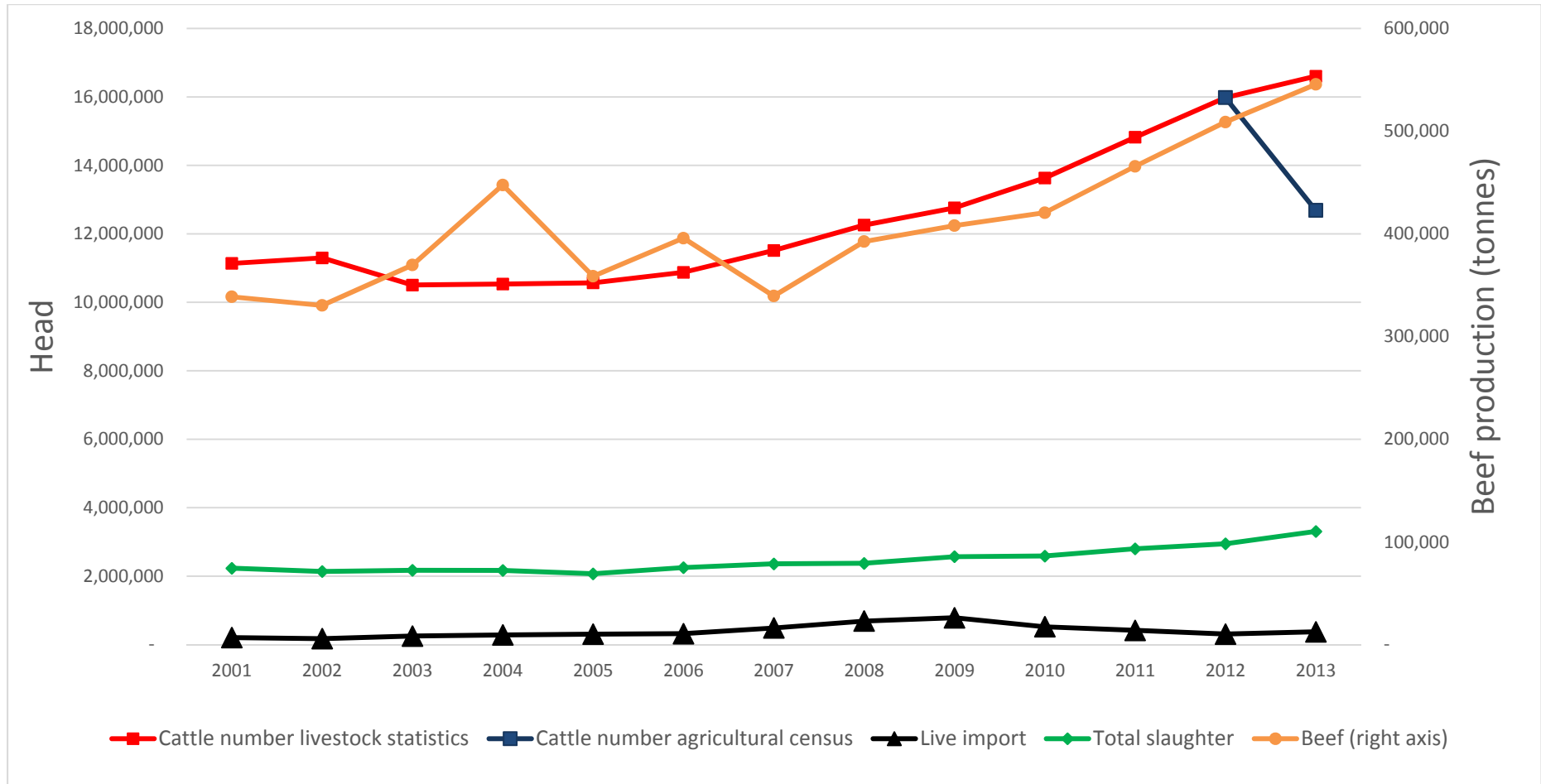


Figure 1. Production trends and policies in the Indonesian beef industry, 2001-2013.

Source: Directorate General of Livestock and Animal Health services (various years)

The data suggest that cattle numbers increased by an average of 5.3% per year in the 1980s, but slowed to 0.4% in the 1990s, partly because of the Asian Financial Crisis. With economic recovery in the 2000s, beef consumption increased and cattle numbers grew at 2.3%. These rates are widely thought to be below potential as cattle productivity is low and can be increased by smallholders adopting simple production and management practices. There is also thought to be potential to more fully utilise plantation residues (e.g. in Sumatra), crops residues (e.g. in Java) and pastures in provinces like Nusa Tenggara Barat (NTB) and Nusa Tenggara Timur (NTT). There is also widespread concern about the slaughter of productive females especially in periods of rising cattle prices.

In developing industry policy, Indonesian policy-makers were working off data from the last agricultural census of 2003. In 2011 the Ministry of Agriculture and the Central Statistics Agency conducted the national bovine census, called the Data Collection of Beef Cattle, Dairy Cattle and Water Buffalo (PSPK) which found that the national herd had already reached 14.8 million head, well above the figure used in annual reporting (12.6 million head). Based on these numbers, projections for 2013 and 2014 were increased to 16 and 16.8 million head. However a broader agricultural census was conducted in 2013, which found the number was dramatically lower at 12.6 million head in 2013 (see Figure 1).

Slaughter statistics used in this section are derived from the DGLAHS, which are higher than those of FAO or Indonesian Central Statics Agency (BPS). DGLAHS slaughter figures derive from reports from staff of slaughterhouses and from Dinas officials who check slaughter based on interaction with village leaders, consumption patterns and fee and tax collection. However, they are not able to report on all local-level slaughter activity and uncertified slaughterers. Statistics collected in NTT and NTB and through several studies (e.g. in Mataram City, Hermansyah and Mastur, 2008) suggested that around 25% of all cattle are slaughtered in uncertified plants (but this can be as high as 41% in some places). While not discernible in Figure 7.11, slaughter numbers fluctuate significantly year to year. They increased at an average rate of 4.3% per year in the 1980s, 3.3% in the 1990s, 1.7% in the 2000s and 6% between 2011 and 2013.

Long term cattle meat production has increased broadly in line with slaughter numbers (1.4% in the 1980s, 2.9% in the 1990s, 2.4% in the 2000s and 5% between 2011 and 2013).

As discussed in more detail in Section 11, Indonesia imports large quantities of cattle and beef. Imports of live cattle reached a peak of 781,000 head in 2009 to constitute 6% of the Indonesian cattle herd (at heavier weights) and 38% of slaughter numbers. Live cattle imports dropped dramatically to just 305,000 in 2012 due to import restrictions. Beef imports also decreased over these years from 68,000 to 545,000 tonnes. Facing escalating prices and political pressures, government increased the quota allocation of live cattle sharply in 2014 to reach 730,000 head from Australia alone.

Table 1. Key industry indicators

	2013	Compounded Annual growth, 2000-2013 (%)
Cattle number DGLAHS statistics (head)	16,607,000	3.4%
Cattle number agricultural census (head)	12,686,280	
Live import (head)	371,695	5.2%
Total Cattle (head)	16,978,695	3.4%
Certified slaughter (head)	2,645,370	3.3%
Certified and uncertified slaughter (head)	3,306,713	3.3%
Beef production (tonnes)	545,600	4.1%
Beef imports (tonnes)	42,364	8.2%
Slaughter rate - DGLAHS statistics + imports / slaughter in certified and uncertified plants (%)	19%	-0.1%
Average carcass weight domestic cattle (kg)	165	0.7%

Source: Source: Directorate General of Livestock and Animal Health services (various years) and UNComtrade

Table 1 provides a summary of cattle and beef indicators in 2013 and annual compounded growth since 2001. The incorporation of additional data – on imported cattle and uncertified slaughter – leads to an alternative estimate of slaughter rate of 19% in 2013. However, using lower cattle numbers recorded in agricultural census, the turnoff rate would be much higher at 25%. Average carcass weights for domestic cattle have increased little over the period.

2. Regional distribution and issues

To show the regional distribution of the cattle sector, Figure 2 provides a snapshot of the distribution of beef cattle by province in 2011, while Table 1 presents data aggregated to a regional level. Both draw on statistics from the 2011 bovine census.

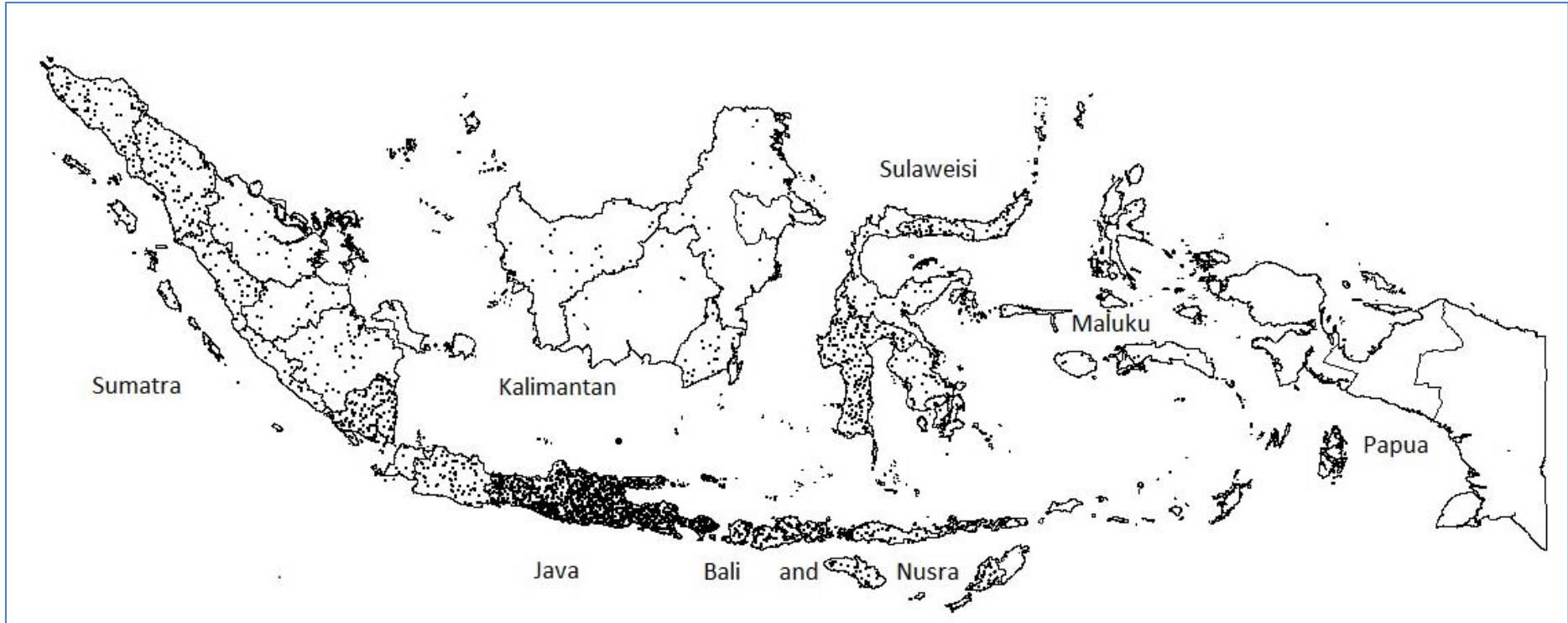


Figure 2. Distribution of Beef Cattle Population in Indonesia by province in 2011.

Source: Data from MoA and BPS (2011). Map generated by authors. One dot equals 5,000 cattle

Table 2. Cattle indicators for regions of Indonesia, 2011

	Indonesia	Java	Sumatra	Bali and Nusra	Kalimantan	Sulawesi	Maluku and Papua
Total cattle (mil. head)	14.8	7.5	2.7	2.1	0.4	1.8	0.3
% of national herd	100	51	18	14	3	12	2
Average annual growth, 2003-11	5.3	3.9	9.7	5	4.9	7.8	4.8
Breed composition (% of herd)							
Bali	32	3	25	95	63	79	83
Ongole	29	42	29	4	11	8	14
Madura	9	16	2	1	12	0	2
Other	30	40	44	0	14	12	1
Sex							
% females in herd	68	68	68	67	64	71	67

Source: MoA and BPS (2011)

Three main cattle breeds are identified in the statistics – Bali, Ongole (imported from India by the Dutch) and Madura (originating from the island in East Java by the same name). The remainder (“Other”) are Limousin, Simmental and Brahmans or their crosses. Bali, Ongole and “Other” breeds each make up roughly 30% each of Indonesia’s cattle with Madura accounting for the remainder. Female breeders make up around 68% of all cattle in Indonesia, with little difference by region (or province). Differences in age profiles of cattle are also subtle, but some exceptions are noted below.

The highest and most dense cattle population is in Java, which holds half the national beef cattle herd. Some 57% of Indonesia’s human population also live in Java. Cattle numbers in Java have grown at rates below the national average perhaps reflecting resource (especially land and labour) constraints, which is significant given the number of cattle. Ongole crosses are the most populous breed, but East Java in particular is also the major centre for the Madura breed. “Other” breeds that have been introduced for fattening and for distribution schemes make up 30% of the cattle herd.

For Java as a whole, 42% of the male cattle are yearlings (the highest in the country), while this figure is above 50% for provinces like West Java and Banten. Accordingly, these provinces have very low proportions of female breeders. Java also has the youngest herd, with only 27% being “adult” (i.e. older than yearlings). In upland areas, farmers tend to keep cattle longer and sell mature animals. In all areas, cattle are kept primarily for cash income and only secondarily for draught power and manure. Java also has a number of large feedlots and mechanised abattoirs.

While Sumatra has a much smaller cattle herd, it is the next largest in Indonesia and has grown at the fastest rate. While most cattle are produced in small-holder systems, there

are large feedlots throughout Sumatra that utilise feeds from plantation estates (palm, pineapple, cassava etc.). Reflecting the greater focus on fattening (and imported cattle), Sumatra has the highest proportion of imported crossbreeds in Indonesia. While the island has traditionally focused on supplying the Jakarta market, recent economic growth in the island has seen increasing intra-island demand.

The Bali and Nusra (NTB and NTT) region in Eastern Indonesia has a drier tropical climate, a longer distinct dry season, a higher incidence of seasonal grazing, poor soils and significant feed gaps. Most cattle are the Bali breed which are adapted to the harsh conditions and low input-output systems and maintain high fertility and conception rates. However they are small in size and have low growth rates, while low feed inputs and milk production and harsh climatic conditions can lead to high calf mortality and long calving intervals (Mastika, 2003). While there are very few other cattle breeds in the region there are large numbers of water buffalo in Bali and Nusra (12% the number of beef cattle) but numbers are declining. Bali-Nusra is regarded by industry as a cow-calf production region but this is not reflected in herd composition statistics (age, sex) compared with other regions and over time. The region has also been a traditional exporter of live cattle, although numbers are constrained by quota allocation in recent years. For example, NTB exported 23,000 breeders and slaughter cattle in 2012 and NTT exported 66,000 from NTT.

3. Policy

Indonesia has for many decades had interventionist policy towards beef. This has been constructed and implemented through a “hierarchy” of measures illustrated in Figure 3.

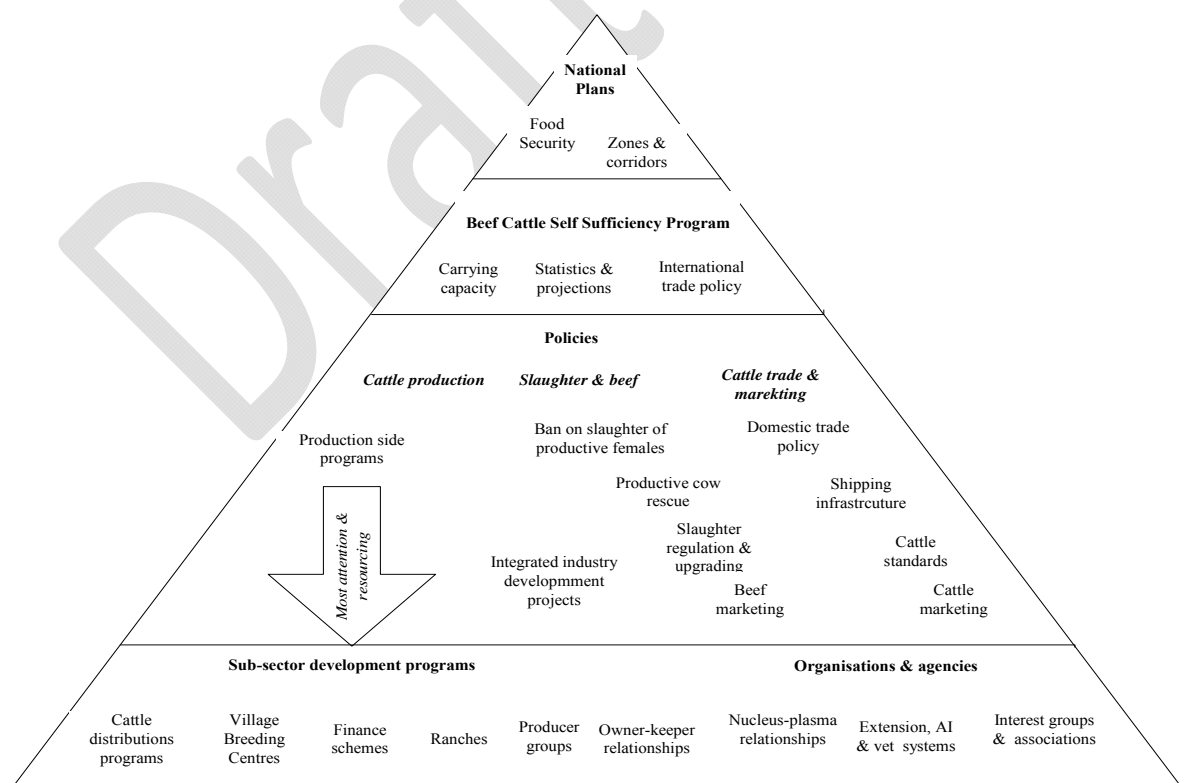


Figure 3. Policy hierarchy for the Indonesian beef industry

Source: Waldron et al. (2013)

At the formative levels at the top of the hierarchy, lies Indonesia's policy approach. Since the 1960s, Indonesia has had long-standing objectives of self-sufficiency, price stability and food security, and these were heightened during the Asian Financial Crisis. Beef was introduced into Indonesia's self-sufficiency programs in 1999 on the basis that Indonesia has high import dependency for cattle and beef, that beef is a part of a diversified diet, and that the industry comprises a large number of low income producers. The first beef self-sufficiency program aimed to achieve self-sufficiency in beef by 2005 (Ilham, 2006) and another cabinet launched a second program to achieve self-sufficiency by 2010. Interest in self-sufficiency reignited in the late 2000s with international food price spikes and international preoccupation with food security. Indonesia's National Medium-Term Development Plan (2010-14) targeted five commodities to achieve 90% self-sufficiency by 2014 – rice, soybean, sugar, corn and beef. Self-sufficiency was thought to be "easier" to achieve for beef than other commodities because pen-feeding cattle production is not land intensive.

Thus, the third beef self-sufficiency program – the Beef Cattle and Buffalo Self-sufficiency program (PSDSK) – began in 2008, with funding of Rp10.65 trillion over 5 years, or US\$156 million per year. The aim was to increase the cattle herd by 2014 to 14.23 million head and beef production to 420,200 tons, which was to restrict beef imports to 32,000 tons. Results from the bovine census (see above) were used to pronounce that the 2012 target had been achieved, the PSDSK program was on track and that the budget planned for the program could be pared back (Prabawo, 2011). As mentioned above, however, data from the Agricultural Census of 2013 suggests that the either data collected for PSDSK was over-stated, or that numbers have declined – by 23%! There was some expectation that interventionist beef policy may have been wound back under the Jokowi regime elected in 2014. However, activity in the provinces and the field suggest that the program has been continued and, indeed, in some cases, continued.

The self-sufficiency program provides a framework for a series of policies toward:

- Slaughter and beef (slaughter bans and the "rescue" (buy-back) of productive females for redistribution)
- Cattle marketing and trade
- And especially toward cattle production, which receives by far the most attention. Measures include
 - Breeding measures, including AI and village breeding centres.
 - Cattle distribution schemes where government give cows to members of farmers groups, who then return calves (from 1 to 3) back to government for redistribution.
 - Credit schemes, where banks make loans to cattle producers with interest rates subsidised by government, for either small scale fattening or larger scale cow-calf production.
 - Relationships between "nucleus" companies (importers, plantations, feedlots, abattoirs, traders) and "plasma" producers (smallholders, production groups); and

Since the colonial era the Indonesian government has restricted the domestic trade of cattle and designated particular breeds to particular regions, an approach that continues.

Diseases are contained by bans on the movement of cattle from affected regions or islands, but can be allowed for immediate slaughter or transshipment. Local governments also pursue local industry development plans through export quotas (for cattle in different sex, age, weight or height categories) and the import and redistribution of breeders. Similar policy instruments are used to regulate international trade, as detailed in 11.

Industry policies such as cattle distribution, slaughter bans, credit schemes and domestic trade restrictions pose major administrative and financial demands on government. Various international studies have modelled the efficacy of different policy measures. Hadi *et al.* (2002) and Vanzetti *et al.* (2010) both find negative net welfare effects from international trade restrictions, and that the most effective policy area to benefit smallholder producers and consumers is through research and development to increase the productivity of native cattle (although this can have lagged time to impact). Vanzetti *et al.* found that cattle distribution and credit provision has a neutral impact. Rather than a production-side approach to industry development, Deblitz *et al.* (2011) argue for a whole-of-industry and market-led approach.

4. Domestic beef value chains

The structure of the Indonesian beef industry is illustrated in Figure 4, and discussed in detailed throughout the report. In short, the vast majority of inputs (especially feed) is sourced on-farm, the production sector is dominated by household producers, cattle marketing is conducted predominantly through spot markets, cattle are slaughtered mainly by butchers in service slaughter plants, and most beef is distributed in generic form mainly through wet markets. However, next to this “low input” and disaggregated industry systems lies a series other systems, including more corporatized and collective systems (including feedlots, inter-island trading systems, abattoirs that buy cattle and limited sales of quality differentiated beef through supermarkets).

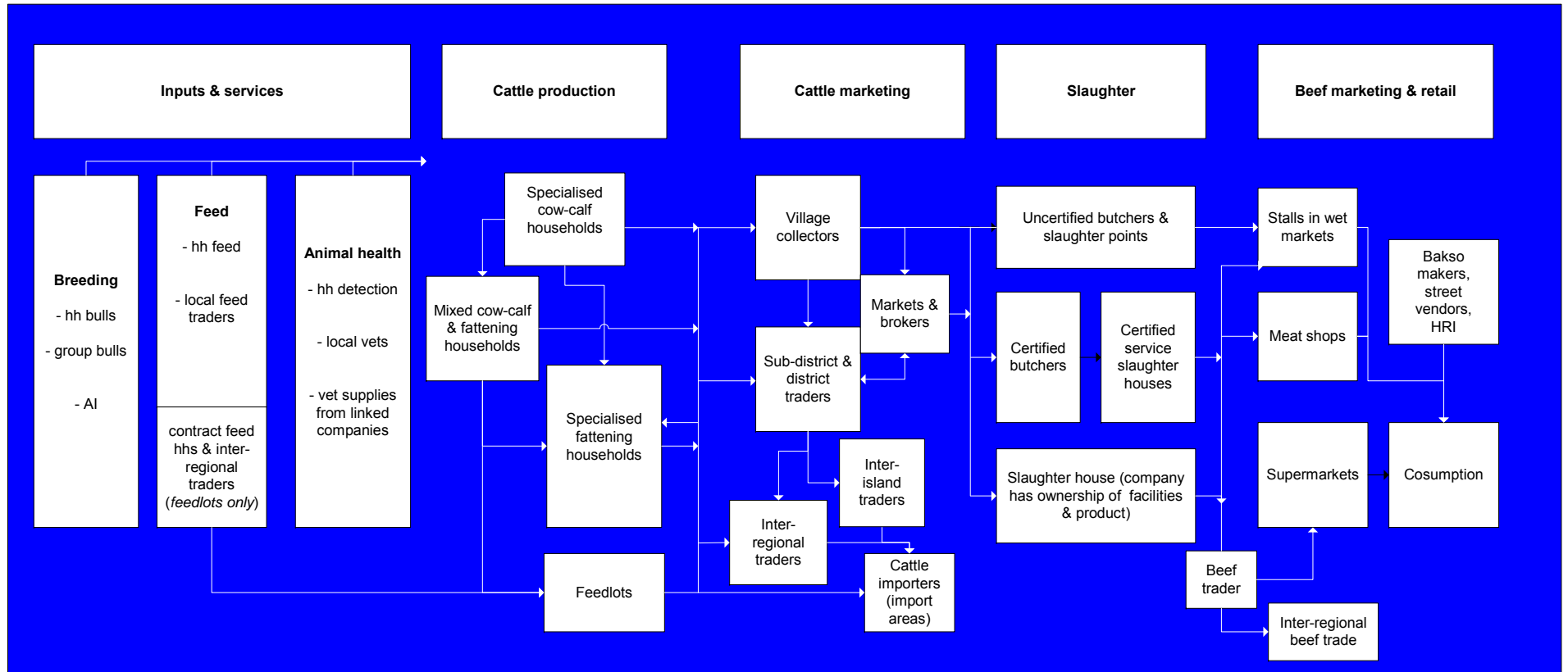


Figure 4. Stylised cattle and beef value chain for Indonesia

Source: authors

5. Inputs sector

5.1. Feed

Feed inputs for cattle production in Indonesia are diverse. They range from: cut and carry of crop residues and grasses (e.g. Java); the open grazing of cattle in grass and shrub land in Eastern Indonesia; to tree forages in both intensive and extensive systems; and residues from plantation crops in Sumatra and Kalimantan.

Intensive cropping areas like East Java produce one to three crops of rice per year, combined with a large number of other crops. It is estimated that East Java produces about 19 million tonnes of rice straw that is the main feed base for 4.7 million cattle (the number claimed in official statistics). One study (from Gaja Mada University) claimed that the province has a carrying capacity of 7 million head but other studies (e.g. Syamsu *et al.* 2003) found that East Java may already be over-stocked. In intensive cropping systems, farmers collect straw and grasses from their own land. But because of the small land sizes and reluctance to store feed, also collect from

In intensive cropping areas, a large proportion of feed is sourced on-farm from crop residues and from the grasses or forages grown on bunds and perimeters. However, small land sizes (relative to cattle numbers) and the difficulties of feed storage, mean that farmers source a significant part of their feed from outside their own farm through: cut and carry on communal areas; by assisting with the harvest of other households in return for straw; or by pooling resources to rent trucks to pick up larger quantities of rice straw from areas in a staggered harvest season. In these systems, the price of the straw lies the labour and transport costs of collecting it. However, in areas such lowland East Java with a large specialised household fattening sector, a feed market and trading industry is developing, even for even low grade and low value feed such as rice straw.

The Indonesian government regards grassland areas as a major “unused” resource that can be utilised to increase cattle numbers. There are numerous plans to build cattle “ranches” in remote areas of NTB and NTT. Based on estimates of land and carrying capacity, the NTB government estimates that cattle numbers can be increased by 50% (The Government of NTB, 2009) and NTT policy-makers estimate they can increase cattle numbers by 38%. Several studies (eg. Mulik, 2012) question the technical basis for these claims. Many grassland areas have been invaded by weeds (*Chromolaena*), with significant grassland degradation in common grazing systems. Over-stocking means that limited available feed has to be apportioned over more cattle that lowers productivity and degrades the resource base (grasslands) leading to lower grass growth and higher weed growth.

There have been long-standing efforts in Indonesia to grow forages to improve the nutritional value of feed, either as supplements or for prolonged periods of the year. In wetter areas, forages that can be integrated into cropping systems include improved grasses (e.g. king grass and elephant grass) and sesbania planted on bunds and in small plots of land. Another tree forage (leucaena) can be planted in strips or perimeters and, once established, and can yield a consistent supply of good nutrition (protein) even in dry season. There has been an increase in leucaena planted in in Eastern Indonesia for cattle feed, including for/by

specialised fattening households. Plantation systems are a source of feed in Sumatra and Kalimantan, through residues (palm, pineapple, cassava) and also grazing under plantations (in various plantation – household models). While most cattle are produced in small-holder systems, there are large feedlots throughout Sumatra that utilise feeds from plantation estates.

5.2. Breeds and breed improvement

The regional distribution of the main breeds are shown in Table 2. Bali cattle, Ongole and “other” breeds (Euro crosses in Java, Brahmans in Sumatra) make up roughly 30% each of the cattle in Indonesia, with Madura cattle making up the rest. There are three main breeding systems for small-holders in Indonesia: natural breeding where households use their own bulls; natural breeding using group bulls; and artificial insemination.

Bali cattle in Eastern Indonesia are small with limits on growth potential, but are well adapted to their harsh environment of low or variable nutrition, reflected in generally good body condition and high inherent fertility (Lindsay and Entwistle, 2003). The vast majority of Bali cattle are bred through natural mating by bulls owned by the household, and cycle leading into the beginning of wet season. However, in more intensive systems, cattle are sometimes held in communal pens and cows can be serviced by a bull owned by the group (managed under various arrangements). Bali cattle remain the genetic base of provinces like NTT and NTB, and have been exported in breeding programs in outlying provinces. However, policy-makers have experimented with cross-breeding programs through natural breeding and small AI programs.

Most of the cattle in Java are Ongole (derived from Brahman cattle) and Madura. In provinces like East Java, 90% of cattle are artificially inseminated, and farmers have expressed preferences for larger European breeds (Charolais, Limousin). Semen and straws for AI originates from breeding centres (there are three national centres in Indonesia), straws are disseminated through the AI network, requiring close coordination in transport and liquid nitrogen infrastructure, and there are many dozens of AI technicians at district level that work for or are certified by the Livestock Department. The high proportion of crossbred cattle in this region reflects the greater focus on fattening.

Like many other areas of SE Asia, policy makers are very interested in breed improvement especially through AI. While cross-breeding programs can increase genetic potential for growth, this requires that requisite feed and management systems are in place. In low-productivity systems that are the norm in much of Indonesia, genetic “improvement” exacerbates inefficiencies because (limited) feed is increasingly used for maintenance and less for production (reproduction and liveweight gain). The effective delivery of artificial insemination services is also organisationally and technically demanding. AI services must be delivered in a timely manner, requiring that farmers to detect oestrus and that AI agents deliver services within the oestrus period before it is missed for another cycle (average of 21 days). Semen must also be live and healthy (motility), which is a function of collection, storage and distribution systems for straws and liquid nitrogen). Any problems in this chain result in delays of successful insemination and inter-calving intervals. Natural breeding can circumvent many of the potential downfalls associated with AI discussed above, and is recommended by many researchers especially in more extensive production systems.

5.3. Disease and veterinary service

Veterinary services are provided by the Animal Health Division that forms a separate line agency within the DGLAHS down to local levels. The Division oversees Animal health centres (puskesmas) down to sub-district level staffed by veterinarians or lower level “animal paramedics”. The veterinarians perform duties including: animal disease control and prevention (surveillance of diseases such as brucellosis, anthrax and septicaemia epizootica, vaccinations, training); public health and sanitation surveillance (slaughterhouses, markets, butchers); and issue animal health certificates for inter-island trade (quarantine); and lab analysis. Farmers, traders or butchers pay for the services of government veterinarians for a fee, but vaccine and vet products are usually supplied by government at subsidised rates.

Animal health problems in Indonesia include (ACIAR, 2013):

- Diseases such as brucellosis, vibriosis, leptospirosis and pestivirus that reduce reproductive performance and constrain trade flows
- External parasites (ticks and flies) can cause production losses and internal parasites (especially liver fluke) can have prevalence of 25% to 90% in wet parts of Indonesia
- Respiratory disease and diarrhoea cause reduce growth rate and can cause mortality in calves
- and Foot and Mouth Disease has been eradicated in Indonesia, which is formative in Indonesia’s international trade policy.

6. Cattle production systems

The vast majority of cattle in Indonesia are held by small-holders in integrated crop-livestock systems. In some areas there is specialisation (cow-calf or fattening) but “mixed” systems predominate, where breeders produce calves that are grown out to slaughter weight. Few animals are now kept for draught value. Crops residues are a source of feed in all areas but the relative importance in the diet varies by agro-climatic conditions.

At the most extensive end of the continuum are areas in Eastern Indonesia like Sumba, where rainfall is low and concentrated in a short wet season. Farmers plant one crop of corn per year, and the silage and stubble is used for cattle feed but only as an occasional supplement to grazing on open savannah grasslands.

In semi-intensive systems in areas like West Timor and Sumbawa, farmers can plant one to two crops per year. Cattle spend much of the year grazing on grasses and shrubs on unused land and roadsides and on stubble on fallow fields. However cattle are confined to pens at night or parts of the year where grazing provides inadequate nutrition or when grazing damages crops.

The pressures on land are most intense for East Java, where 74% of land is already used for agriculture and where the poor have small land areas that can be suited to intensive cattle production. East Java has by far the largest and most densely populated cattle herd in Indonesia with 102 head per sq. km. Cattle production in EJ is intensified, commercialised, and mechanised (Priyanti *et al.* 2012).

At the most intensive end of the continuum, lowland areas of East Java (similar to Bali and Central Lombok) have a long wet season and fertile, irrigated land. Farmers plant two to three crops per year of corn and rice, but high population densities result in very small cropping areas (0.4 ha). These crop residues are cut and carried to cattle tethered in pens, with only small windows of time for grazing stubble. These on-farm feed resources support just a few head of cattle per household. To limit feed demands, farmers in lowland areas like Probolinggo are increasingly specialised in cow-calf production. In recent years there has been a rapid increase in the trade of even low value rice straw by large numbers of feed traders (Priyanti *et al.*, 2012).

In the less intensive rainfed and seasonally dry upland areas of East Java like Malang, farmers only plant two crops per year, have lower yields than lowland areas and larger land areas. Farmers also hold cows that produce calves, but the vast majority are fed to slaughter weight in mixed systems.

Small-holder cattle production systems are unproductive when measured through key indicators (calving rates, growth rates, turnoff rates etc.). However, productivity has to be seen as a function of output per unit of inputs (land, feed, labour, capital). Cattle production is low input, so low output indicators can be expected. Nevertheless, numerous researchers and projects have sought to better utilise existing resources in a strategic way through simple, low cost and integrated measures. These include the supplementary feeding of cows, better detection of oestrus, early weaning and calf management, improved feed management and improved pens/sanitation and water.

Budgeting by Waldron *et al.* (2013) suggests that in “low productivity systems” gross profits from cattle production are positive, but net profits become marginal if the capital costs of the cattle inventory are valued, and negative if family labour is valued. In the “improved productivity systems” gross and net profits are both positive, even if family labour is valued. The budgeting also finds that there are higher returns to cattle “owner-keepers” than “keepers” in either low or higher productivity systems, suggesting that measures to increase cattle ownership is an important way of increasing rural incomes and the uptake of improved production practices.

Indonesia has the longest established feedlot sector in the region, especially in the north of the country (Sumatra) with access to plantation residues. For Indonesia as a whole, feedlots contributed up to 570,000 head of cattle or approximately 5% of the total inventory in 2008 (DGLAHS, 2010, cited in Deblitz *et al.* 2011). However, there has been substantial investment in the sector in recent years and is said (by the manager of a large feedlot group) to have a turnoff capacity of one million head per year. Import restrictions have a large impact on capacity utilisation in the sector (although feedlot capacity exceeds even peak cattle import levels). Feedlots vary from joint ventures with a capacity of tens of thousands of imported steers from Australia, to small feedlots with a few hundred head in East Java, to small-holder households contracted or linked to feedlots, feed companies or cattle importers.

7. Cattle marketing

Like most of Southeast Asia, the vast majority of cattle in Indonesia are sold through an ‘open’ / spot marketing system, comprised of a plethora of actors including a hierarchy of

traders, butchers and inter-regional traders (Figure 4). Farmers rarely sell cattle themselves at market or to butchers, but rather sell through brokers/collectors or local traders (see for example Mahendri *et al.* 2012). The cattle can then change hands several times to be aggregated in larger lots (for inter-island traders or feedlots) or for regular buyers (especially butchers).

A significant proportion of this trade occurs at periodic cattle market places. To reduce transaction costs, butchers source a large proportion of their cattle from markets. Markets are most common and concentrated in intensive production systems (East Java, Lombok, Kupang), rare in semi-intensive systems, and almost non-existent in extensive production areas.

Like other parts of Asia, there are widely-held perceptions (amongst farmers, government and even researchers) that cattle traders pay below the “real” value of the cattle to make windfall profits. To support this observation, there are some oligopolistic structures in some markets (especially for inter-island cattle trading). Farmers do not deal directly with downstream buyers (or even at markets) for social reasons. Cattle can change hands many times in the chain, sometimes on the same day, for speculative reasons or because relationships enable more liberal payment terms. This adds (albeit) minor costs to the transaction. There are little or no formal marketing systems – for example formal price reporting or the use of standards and measurement systems.

There is, however, little evidence to suggest that markets are dysfunctional. In almost all parts of Indonesia there is significant competition amongst buyers, reflected in a number of sales choices at household level. While there is limited formal information available, households have access to price information from a range of sources including local brokers, buyers and other farmers, and mobile phones are ubiquitous. Perhaps most importantly, there are few alternative marketing systems (for example, contracts, auctions, aggregation of cattle for direct sales) that would increase returns to producers, although several initiatives (e.g. weighing scales) have proved successful in certain cases.

8. The processing sector

In 2002, less than 10 plants slaughtered more than 100 head per day, and only 35 slaughtered 50-100 head (Hadi, 2002). In 2009, Indonesia had about 693 certified slaughterhouses that slaughtered a recorded 935,700 cattle, which would mean an average of 1,350 head per year, or 3.7 head per day. About 50% of the plants were located in Java. About 12 of the larger municipal abattoirs were built in the late 1990s when the government, with support from Japanese aid, built service slaughter plants throughout Indonesia. In recent years, government at central down to municipal levels has increased investment in abattoirs, both in refurbishment and new plants.

The bulk of the sector consists of service kill slaughterhouses, where local government (or state-owned companies) provide slaughter facilities and inspection services, and where butchers conduct slaughter and retain ownership of product (cattle, beef, by-products). In large service slaughterhouses there can be 100 butchers registered to use the plant, but there may only be one or two in small regional slaughter points. Butchers run “crews” of workers (four to five people) and have very little equipment or overhead costs of their own (‘a

knife'). Butchers have high levels of integration in up- and down-stream sectors of the cattle and beef industry. They are major cattle buyers both inside and outside of cattle market places, which is a major aspect of the operations of butchers, to the point that they are often known as (beef and cattle) traders. They are closely integrated into the beef retailing sector through networks with stallholders in wet markets.

There has historically been a limited number of abattoirs in Indonesia purchase cattle outright for slaughter and then market their own beef (Santori, Elders). However, there appears to have been an increase in investment in abattoirs that take ownership in product, certainly throughout Eastern Indonesia. Importantly, this provides incentives and opportunity for more direct marketing relationships with producers. However, the viability of the plants – and therefore the marketing arrangements – depend on numerous factors, including management, markets, access to cattle supplies. Most fundamentally, modern plants with higher cost structures are not cost-competitive with butchers in generic markets.

9. Beef markets and consumption

Consumption data is drawn from the Household Food Expenditure and Consumption Surveys reported in national socio-economic household survey (SUSENAS) conducted by the Bureau of Statistics (BPS). BPS conduct surveys of large numbers of households nationwide (75,000 in 2011) and reports on household expenditures and quantities both in and out of home on a weekly basis.

Household total protein intake increased with national economic recovery from 1999 to 2002 (Figure 5). Intake from fish and eggs/milk increased over the 2000s while intake from cereals decreased. Protein intake from beef also grew from 1999 to 2002, but stagnated thereafter, including in 2012. This appears to be due to increases in the price of beef (see Figure 7). As a reflection of this, expenditures on meat increased from Rp7,100 per month per capita in 2008 to Rp10,370 in 2010, Rp11,000 in 2011 and Rp13,100 in 2012 (DGLAHS, various years).

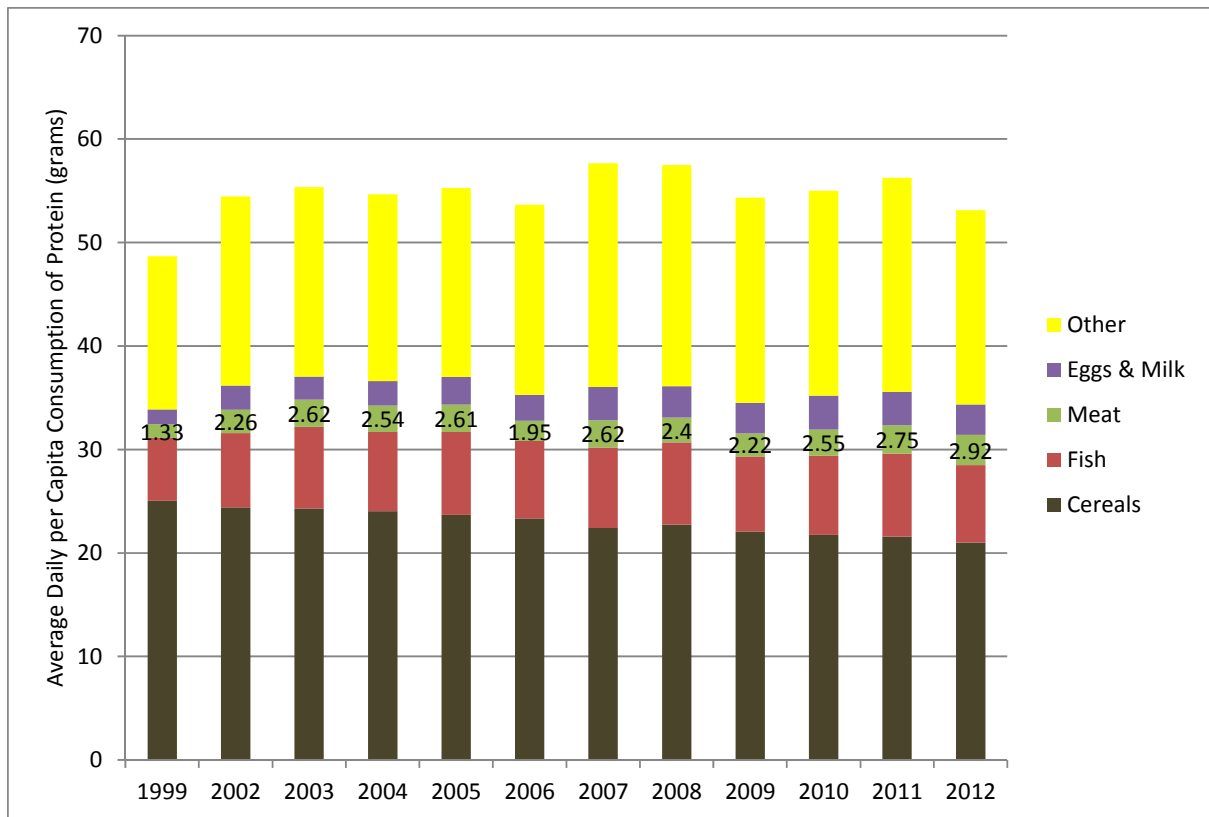


Figure 5. Household protein intake by selected food groups in Indonesia, 1999 and 2002-2012

Source: SUSENAS, BPS reported in DGLAHS (various years)

Figure 6 breaks down the composition of the meat group through a snapshot of meat consumption in 2012. The data disaggregates between four major meat types: “preserved meat”; “offal and bone”; “meats”; and “fresh meat”. The data also further disaggregates within these meat types.

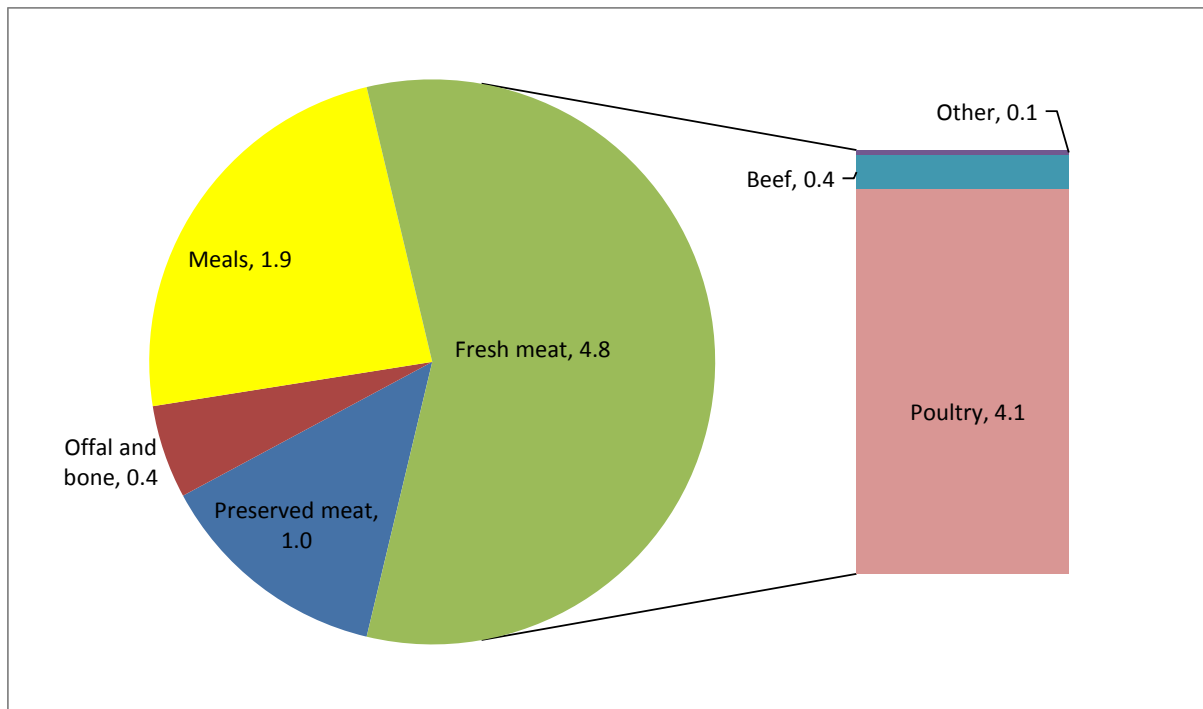


Figure 6. Annual per capita consumption of meat products in Indonesia, 2012 (kgs)

Source: SUSENAS, BPS reported in DGLAHS (2013)

The greatest proportion of meat purchased by households is called “fresh” (which actually means meat that is fresh, chilled or frozen, but not transformed) and cooked at home. Poultry is by far the most consumed meat, followed by beef at a distant second. Fresh beef accounts for just 0.4kg per capita per year and levels declined from 0.57kg in 2002 and 0.42kg in 2007.

Reported figures of fresh meat consumption do not represent absolute beef consumption in Indonesia for several reasons. First, SUSENAS surveys may under-estimate consumption for methodological reasons (respondent recall and knowledge) (Subakti, 1995). Second, a large proportion of beef is consumed in the form of meals and falls into the meat “meals” category (e.g. soups, soto, gule, rawon, sate, tonseng, goreng, bakso). If beef accounts for (say) one half of the meat used in meat “meals” (Figure 6), then meat consumption increases to 1.3kg/person/year. This figure resembles the “per capita availability” of beef of 1.4kg in 2010 that is calculated by DGLAHS annually (based on FAO Food Balance methods).

With this background in mind, questions arise about the determinants of beef demand into the future. Consumption studies provide some insights, including Hutasuht *et al.* (2001) that draw on SUSENAS data. Drivers of beef demand include:

- Population growth of 1% per year, though based on figures above this would increase beef consumption by just 3,500 tonnes per year.
- An urbanisation rate of 1.7% per year, which is significant given findings of Hutasuht *et al.* (2001) that expenditure elasticities for beef are higher in urban areas than in rural areas.
- Growth in per capita incomes, which is significant given findings of Hutasuht *et al.* (2001) that expenditure elasticities for beef are positive (but lower than chicken).

- The high price of beef in Indonesia constrains consumption. Hutasuht *et al.* (2001) find that own-price elasticities for beef are negative (but inelastic compared to chicken, suggesting that beef has fewer close substitutes).
- Positive cross-price elasticities suggest that chicken is a substitute for beef (i.e. if the price of the chicken increases the quantity of beef demanded will increase).

There are three major types of retail channels: wet markets, supermarkets and butcher shops. While the outlets retail and purchase beef differently, there are not always implications for upstream demand and actors, especially back to cattle production level. Wet markets account for the vast bulk of beef sales.

Stallholders in wet markets are specialised in selling beef, and often different types of beef products. Stallholders get supply from butchers, through close working relationships and often family and community relationships. Of the beef buyers at wet markets, perhaps 60% are household consumers, 30% are meatball and soup stallholders/peddlers (in Java where meatballs are popular) and 10% are restaurants and supermarkets (Hadi *et al.*, 2002). For a recent account of retail and slaughter structures in EJ see Mahendri *et al.* (2012).

Beef sold through “modern” channels accounts for small proportion of overall beef sales (3% for Indonesia as a whole in the early 2000s, Hadi, 2002). Supermarkets are thought to be increasing their market share (Sullivan and Diwyanto, 2007; Morey, 2011) but little data is available to quantify volumes. The Modern Retailer Association (APRINDO, cited in Morey, 2010) estimates that ‘modern’ retailers sell just 12,700 tonnes of beef per year, of which hypermarkets and supermarkets account for about 50% each. Volumes are much lower in EI, as supermarkets are only prevalent in big developed cities.

The impact of growth in the supermarket sector on upstream activity or actors is often and easily exaggerated. Most (not “high end”) supermarkets buy beef from wet markets, or slaughter channels that are exactly the same as beef that is supplied (by wholesalers) into wet markets and don’t apply distinct demands or standards beyond cut differentiation. Supermarkets further butcher, trim, package, label and present beef in cabinets, and can refrigerate beef, and mark up prices for the services they provide. However, as they don’t purchase through distinct channels with different price-grade structures, there are few implications for chain structure or upstream, especially back to primary production level. However, supermarkets derive beef from legal, certified slaughter houses, and sell hygienic beef. Several high-end abattoirs have established formal supply channels with supermarkets and food wholesalers, which is significant.

There are dedicated meat shops in most provincial capital cities and some district capital cities. In regional cities where there are no supermarkets, butcher shops are the outlet for more hygienic and better presented beef. The full range of beef and beef products are sold at prices similar to those at supermarkets to household customers. The share of beef sold through meat shops in a given city is small, perhaps similar to supermarkets.

10. Beef prices

Macro forces outlined above culminate in beef price levels and trends presented in this section. Figure 7 reports on weekly (2011-2012) and monthly (2013 to March 2015) beef

prices in Jakarta. Beef prices in Indonesia are high by world and regional standards and an average of three times more expensive than the most highly-consumed meat, chicken. Prices increased rapidly between 2001 and 2012 at an average of 10.6% per year in Jakarta. However this was in line with increases in chicken prices, lower than average inflation rates and lower than expected GDP and income increases, making beef no more expensive for the average consumer.

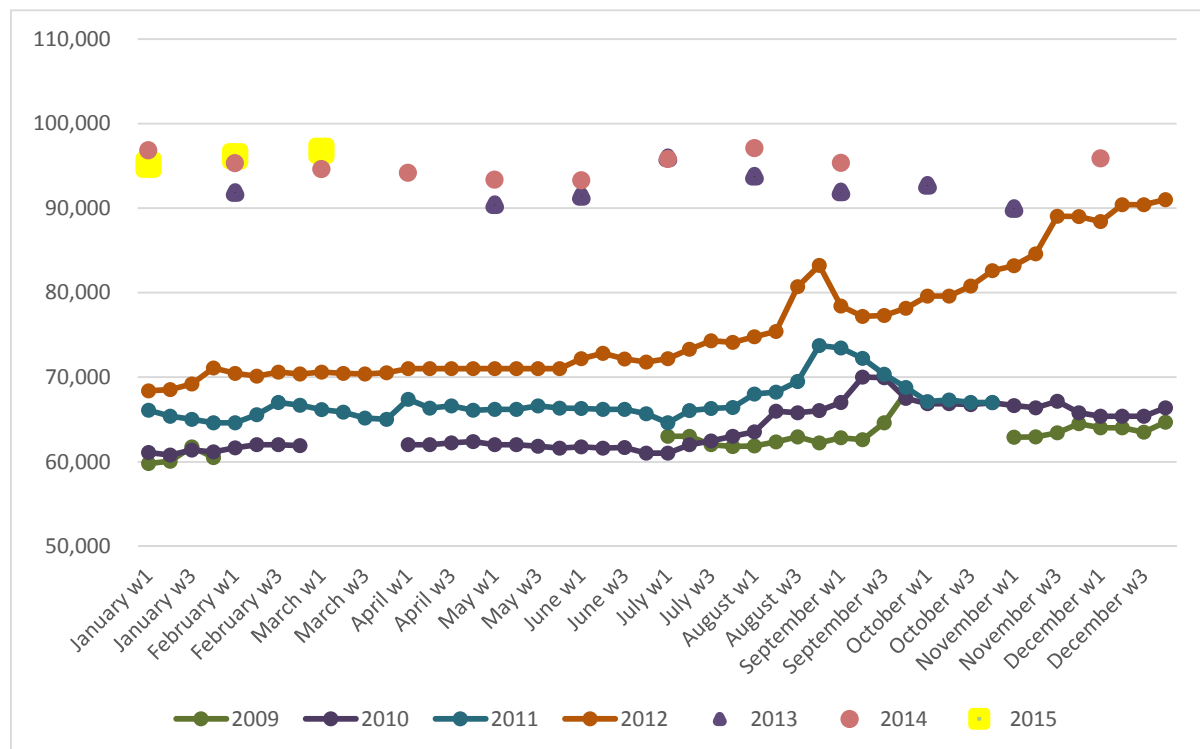


Figure 7. Weekly beef prices in Jakarta, 2009 to November 2012

Source: MoA (various years)

Jakarta beef prices were Rp74,000 in August 2012 leading into Idul Fitri that year. With high demand and constrained imports, prices leapt to Rp92,000 by February 2013 at a rate well above inflation, previous years and other meats. Perhaps because of subdued demand (price elasticities) and certainly because of increased imports in 2013 and 2014, prices stabilised and reached Rp96,000 in February 2015. It is widely reported however that prices increased to high levels (above Rp100,000) in and after Idul Fitri in July 2015.

There is also significant seasonality in beef prices, shown in Figure 7, as “waves” of price increases of around 10% leading into Idul Fitri³ although there are other events throughout the year that influence prices (other festivals, holidays, season, payment of school fees before term starts) which means that prices fluctuate significantly within the year.

Figure 8 presents weekly (2011-2012) and monthly (2013 to March 2015) beef prices in three cities (Jakarta, Surabaya, Denpasar). For comparative purposes, chicken meat prices in Jakarta and an inflation index are included.

³ Idul Fitri fell on 21/9/2009, 10/9/2010, 31/8/2011, 19/8/2012, 8/8/2013, 28/7/2014 and 17/7/2015.

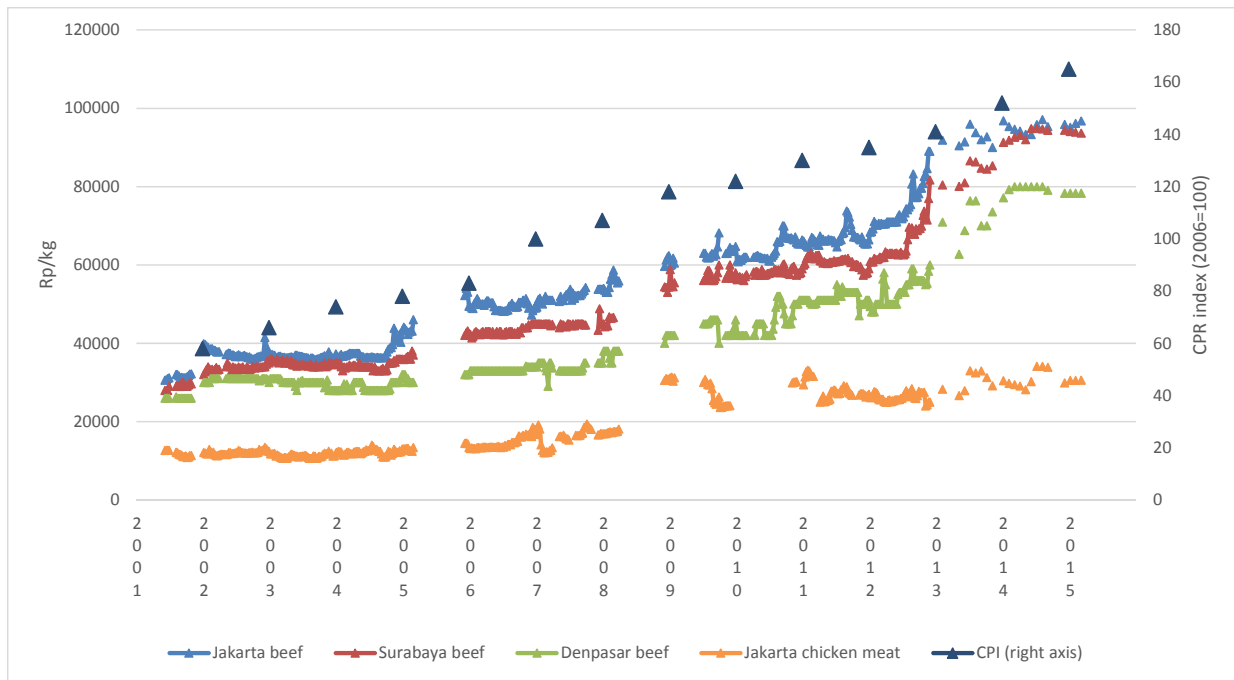


Figure 8. Inflation, beef and chicken meat prices in selected cities, 2001-2015

Source: MoA (various years)

The price of beef in Jakarta is considerably higher than in cattle production areas to the east; an average of 11% higher over the period than East Java (Surabaya), and 35% higher than Bali (Denpasar). The prices tended to move together in the short term suggesting an integrated beef market. However, integration is constrained by domestic trade policy (provincial and local quotas) and price differences can be higher than the costs of inter-regional trade.

11. International trade

The combination of production, consumption and price factors culminate to forge a dynamic trade sector for cattle, beef and offal. Indonesia has a large import sector relative to domestic production, and imports increased rapidly over the 2000s for both cattle and beef. However, the trade is strongly influenced by trade policy so is given some attention below.

Following broader liberalisation measures and accession to trade groups (including WTO in 1995), Indonesia adopted a liberal trade policy to cattle and beef. No tariff is applied to the very small number of breeders that are imported (but can require a certificate of pedigree). Feeder cattle are also imported duty free, subject to the requirement of the maximum weight of 350 kg (although this can be flexible and slaughter cattle are sometimes imported). A 5% tariff is imposed on imported beef and offal. Under the ASEAN, Australia, and New Zealand Free Trade Agreement tariffs on bovines, beef and beef offal are to be eliminated or phased out.

With the introduction of PSDSK in 2008. Indonesia's trade policy became increasingly protectionist. This was accentuated when the Australian government banned the export of live cattle to Indonesia for a month in 2011 leading into the peak consumption period of Ramadan due to animal welfare concerns. A range of policy instruments are used (stricter

enforcement of the 350kg limit, a 5% tariff was introduced for cattle in 2012) but by far the most important was restrictions in the allocation of quarterly quota and import permits. Rising beef prices particularly after 2012 (Figure 7), protests and lobbying from consumers and industry (butchers, feedlots and importers) and institutional dynamics (especially between the ministries of trade and agriculture) led to more relaxed but still uncertain trade policy settings. Indonesia announced that it would release quota based on beef prices relative to a “reference price” (which seems to have increased over recent years) and saw increased permit allocation, but also uncertainty such as when permits were withheld leading into Ramadan in 2015. Australia is lobbying for annual quota rather than quarterly allocations. Trade policy has forged live cattle and boxed imports volumes in volumes shown in Figure 9.

Indonesia has previously only allowed imports from countries declared free by the OIE of FMD including Australia, New Zealand and Uruguay. Reportedly to diversify supply, the Indonesian parliament introduced amendments to the Animal Health law to allow imports from disease free zones, including those in Brazil and possibly India. The amendments were rejected in 2010 but reintroduced in 2014 and press reports suggest that government may be taking measures to implement introduce the trade, including the establishment of island quarantine facilities (Nason, 2015).

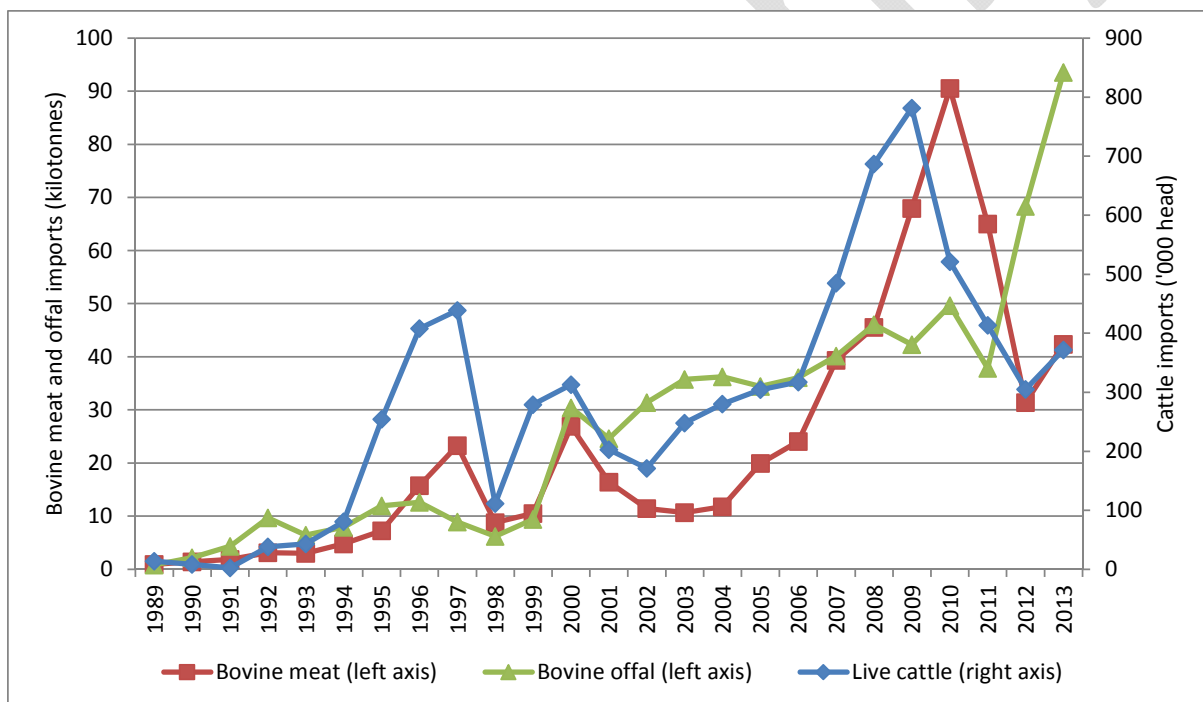


Figure 9. Indonesian imports of bovine meat, offal and cattle from world / all sources, 1989-2013

Source: UnComtrade

Live cattle imports peaked at 781,000 head in 2009, bottomed out at 305,000 in 2012 and increased again to 730,000 in 2014. Virtually all live cattle imported into Indonesia are from Australia, and virtually all of these are feeder cattle rather than breeders. The average unit value of imported feeders in 2013 was US\$918 for 351 kg animals or US\$2.62 per kg liveweight, but increased substantially in 2015.

Imported beef followed a similar pattern with a peak of 91,000 tonnes in 2010, a minimum of 34,000 tonnes in 2012 and increased to 46,000 tonnes in 2013 (and 53,000 from Australia alone in 2015). Virtually all beef imports are from Australia and New Zealand in frozen form. The average value of imported frozen beef in 2013 was US\$4.5/kg, and US\$6.9 for chilled beef.

Imports of offal increased at a slower rate than beef and cattle imports in the 2000s, but were less effected by trade restrictions and increased at a rapid rate from 2011. The value also increased from US\$2.3/kg in 2011 to US\$3/kg in 2013. The vast majority of offal has come from Australia and New Zealand, but the US became a significant supplier in 2010-11.

There is an informal cattle and beef trading sector in Indonesia but it does not appear to be as large as that in China and the Mekong. It is widely known that Indonesia imports significant amounts of carabeef from India. Because of India's FMD status, carabeef is mislabelled (as beef and without specifying country of origin) and shipped through Singapore, Malaysia or other entrepot ports. Restricted quotas and high prices have increased scope for corruption by politicians and administrators including in allocation of quota to importers and mislabelling (e.g. of fish for Australian beef).

The incentives for smuggling change with a number of variables including:

- The scarcity of quota allocation and permits (not tariffs as these are already low)
- Relatedly, the price of beef in Indonesia relative to other export destinations
- And trade policy from particular countries especially based on diseases status. E.g. informal imports of carabeef from Indonesia may reduce if the trade is formalised through FMD-free zones.

Like China, Indonesia has discussed measures to allow the import of beef and carabeef from India and Brasil.

There are also informal border trade flows for live cattle. About 5,000 head are traded from Timor Leste to West Timor which is banned largely because of the lack of capacity to meet the demands of an international protocol (see the Timor Leste report). Cattle from as far as West Timor and throughout Indonesia are increasing sent to Kalimantan – for example tens of thousands from NTT and about 13,000 from NTB in 2012. Significant volumes of cattle and beef are said to be traded over the border into Sarawak / Malaysia, where beef prices rose sharply especially in 2014.

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