The Timor Leste beef cattle industry[1]

Highlights

Farmers in Timor Leste have traditionally kept buffalo for rice puddling and ceremonial purposes. Beef cattle were only recently introduced by the Indonesians, with a small herd today of about 160,000 head. But cattle are now held by about 23% of households in TL. Cattle are kept predominantly in low input – low output grazing systems for ceremonial purposes, but more importantly, as a source of "savings". As one of the few sources of cash income for TL farmers, cattle play an important livelihoods role in many areas.

Well-established cattle marketing systems have emerged to service urban markets in Dili, the informal border trade to Indonesia, and to local and ceremonial markets. Beef consumption levels are low (perhaps 1kg per person per year), but consumption could be expected to increase with population growth and urbanisation. Addressing rural incomes and under-nutrition are priorities in a country with some of the lowest development indicators in the region.

After independence in 2002, the GoTL and donors had to rebuild institutions from the ground up. This provided major challenges but also some scope for experimentation, especially in private sector development. On the upstream side of the chain, there were measures to build market-based animal health and extension systems but effectiveness proved highly variable. "Traditional" cattle management and production practices are resistant to change.

Much of the attention in recent years has been in the downstream sectors, where government – led or supported by donors – have supported private sector development in the larger scale slaughter sector and more "modern" beef retail sector. Health and hygiene standards to expedite the process have been issued but not enforced yet. This effectively represents an attempt to skip industry development paths of other Southeast Asian countries, where centralised service slaughter plants are predominant, complemented by other channels. It will be interesting to track the progress and outcomes of this industry development strategy.

[1] Scott Waldron (UQ), Vicente de Paulo Correia (UNTL), Adelino de Rego (UNTL) and Calisto da Costa Varela (MAFF) (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.

1. National industry

1.1. Macro drivers of the industry change and development indicators

TL has a turbulent modern history interspersed with foreign rule, war, independence in 2002 and periods of political instability. The country has sustained growth rates of between 8% and 14% since 2007 (World Bank development indicators, accessed 2015), but is amongst the most oil-dependent country in the world. Non-oil per capita GDP was $610 in 2010 (RDTL, 2010) and is a low-middle income country, ranked 128 (of 187) in the World Bank Human Development Index. Half of the population falls below the national poverty line of $1.25 per day. Following three years of double-digit inflation, commodity price rises eased in 2014 (Asian Development Bank, 2014).

The national population of TL in 2010 was 1.07 million. This represents an annual average increase of 2.41% over 2004, the highest in the Asia-Pacific region and the highest fertility rates in the region. At these rates the population will double by 2039. TL has an urban population of just 27%, one of the lowest in the world. However 43% of the urban population is located in the three districts of Dili, Emera and Baucau, and Dili has a population growth rate of 4.8% (NSD and UNFPA, 2011).

The main crops in TL are corn, rice and cassava and, in semi-subsistence systems, more than two-thirds are self-consumed by farmers that grow the crops. About half of all fruits and vegetables and virtually all coffee is sold off-farm. However, the majority of agricultural *cash* income in rural areas is derived from livestock – in order of importance pigs, cattle, buffalo and chickens. Revenue from livestock in rural areas is higher than from non-agricultural activities (off-farm labour) or transfers (e.g. pensions and welfare) (NSD, 2011). Livestock play an important role in cultural and traditional activities (weddings, funerals, dowry, sacrifices).

In 2010, 80% of households in TL raised livestock and 23% (or 43,000 of 185,000 households) raised cattle, but this can be as high as 30% in western areas of the country. 19,000 households – or 10% of all households – raise buffalo (NSD, 2011). Both poor and non-poor households raise cattle, and sell about the same proportions of their cattle, but the average size of the cattle holdings for poor households (1.1 head) was half that of non-poor households (2 head) (NSD, 2008).

1.2. Statistics

Beef cattle production indicators are presented in Figure 1. With a history dominated by buffaloes, Timor Leste has a short history in beef cattle production, based on the introduction of Bali cattle from Indonesia from the late 1970s. The withdrawal of Indonesia in 1999 saw a very large scale killing of cattle by the Indonesian army.

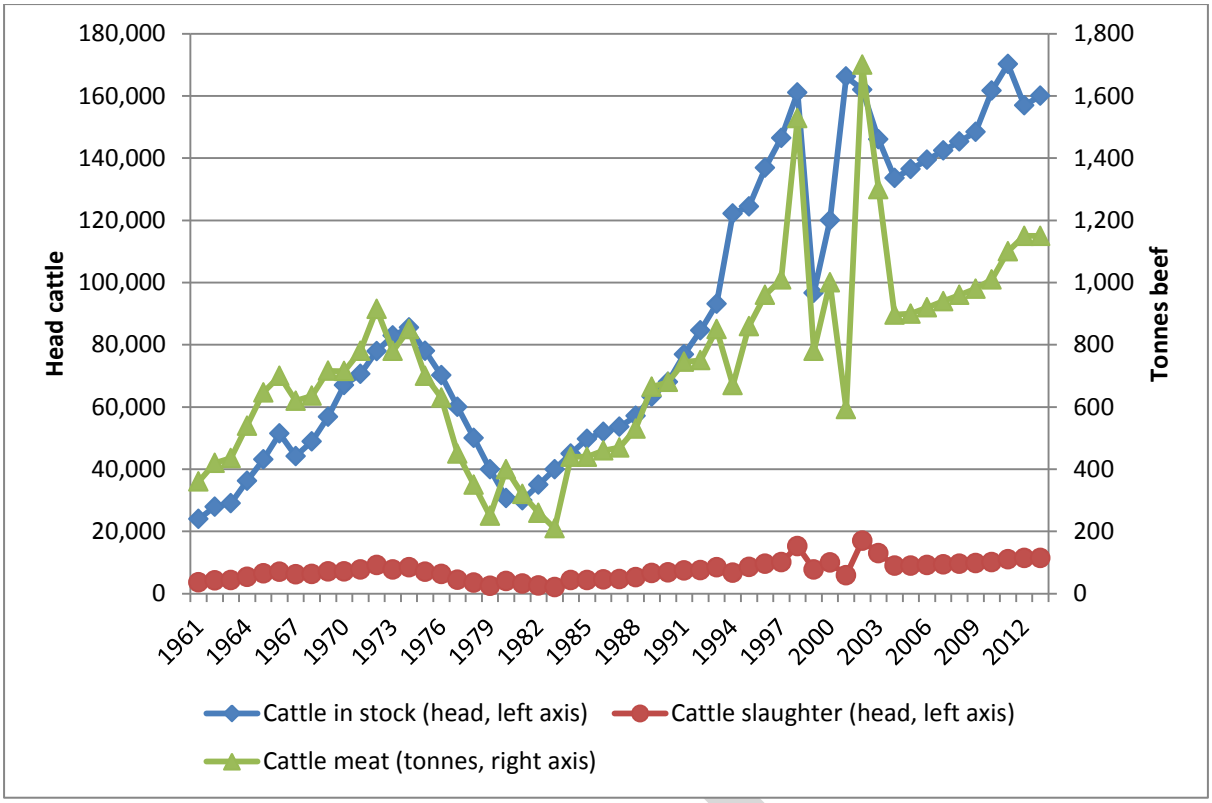


Figure 1. Cattle and beef production indicators.

Source: FAOSTAT

Statistical reporting was erratic until 2004 when the first national census was conducted. Cattle numbers are reported to have reached 160,000 head in 2013, 11,500 of which may have been slaughtered producing 1,150 tonnes of beef (at 100kgs carcass weight). This indicates a very low slaughter rate (per 100 head of cattle) of around 7.3%. However, estimates in Section 3 below suggest that turnoff numbers may be higher – taking into account slaughter in Dili and for live export - of around 22,000 head indicating a turnoff rate of 13.5%.

Buffalo have traditionally had a strong role in agricultural and cultural systems in TL, can compete with cattle for some farm resources (feed, draught, ceremonies) and the meat can be a direct substitute for beef in generic markets. High numbers in the 1960 plummeted throughout the 1970s when they stabilised at the end of the 1990s, coinciding with Indonesian rule. Despite reports that buffalo play a declining role in farm systems, statistics suggest that numbers have not declined over the past decade. Of the 112,000 buffaloes in TL, 5,600 are estimated to be slaughtered per year (indicating a turnoff rate of only 5.1%) in very uncommercialised systems. Buffalo meat production of 560 tonnes is based on 100kg of carcass weight (CW) per head. Census data (2010) shows that the number of households in TL that raise buffalo decreased from 22,000 in 2004 to 19,000 in 2010. Buffaloes are prevalent in eastern parts of TL.

2. Regional distribution

Figure 2 shows the distribution of cattle and buffalo over the country. Cattle are most densely populated over the western border areas, especially in Bobonaro (in sub-districts such as Maliana) and Cova Lima (Suai). They are also high in the north-western dry zone (east Bobanaro and Liquica). Cattle numbers increase again in the more extensive grasslands of the east (Viqueque, Lautem, southern parts of Baucau) and the south (Same). Cattle are distributed relatively densely and evenly in Oecussi. Cattle densities are lowest in the mountainous central zone of the country (Aileu, Ainaro, Manatuto, parts of Manufahi).

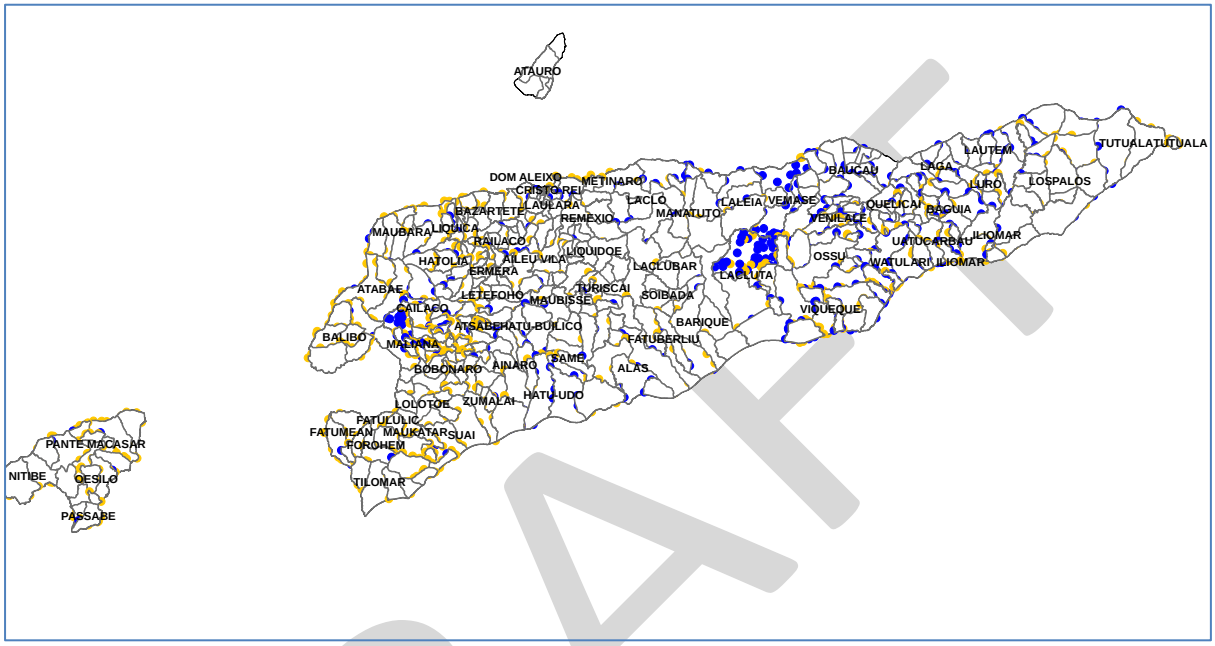


Figure 2. Cattle and buffalo distribution in Timor Leste.

Source: Data from NSD (2011). Map generated by authors. I dot represents 1,000 head, distributed randomly within suco boundaries

Cattle numbers combined with data on the numbers of households that raise cattle allows for calculation of average scale of cattle production by suco (

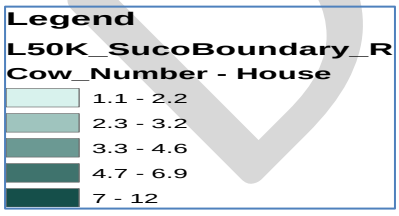
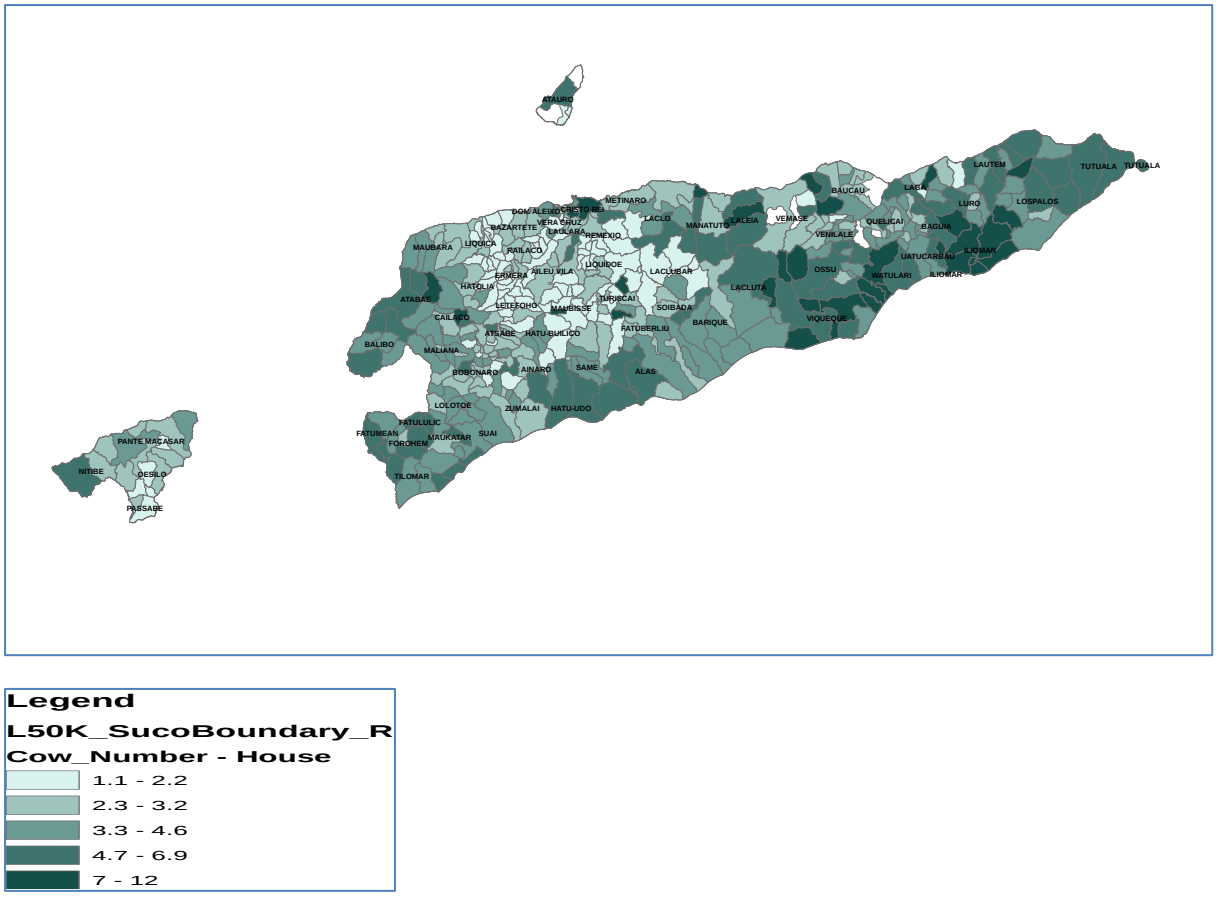


Figure 3). While most cattle are raised in western areas, these are raised by large numbers of households (nearly 13,000 in Bobonaro and Cova Lima.) As a result, households in this western area raise a mid-range number of cattle (generally from 2.3 to 6.9 head). The central mountainous area have a low scale of production, but herd sizes are relatively high (4.7 to 6.9) in the south. With more extensive land areas, the scale of production increases into the eastern districts of Viqueque and Lautem, where households in several sucos have average herd sizes of 7 to 12 head.



Legend

L50K_SucoBoundary_R

Cow_Number - House

- 1.1 - 2.2
- 2.3 - 3.2
- 3.3 - 4.6
- 4.7 - 6.9
- 7 - 12

Figure 3. Average number of cattle per cattle-holding household by suco.

Source: NSD, 2011. Map generated by authors

It is important to note, however, that scale of production is not necessarily an indicator of commercialisation. This is indicated in NSD (2008) data reported in Williams (forthcoming) that records household cattle sales and income in sub-districts throughout TL. Cattle sales were low throughout TL as households in all sub districts sell less than 1 cow per year, but cattle sales are highest in western areas due to more intensive systems (including cropping) and proximity to border and access to Dili markets. Conversely in more remote eastern areas like Lautem, cattle are raised in larger household herds in more extensive systems for long indefinite periods with low turnoff rates. There are corresponding patterns for income from cattle sales. That is, on a regional level, there is an inverse relationship between scale of production (household herd size) and levels of commercialisation (sales).

3. Cattle and beef value chains

Figure 4 provides a stylised diagram of the TL beef industry with some notable features. First, there are few commercial inputs into the cattle production sector. Almost all investment, breed services and feed is derived from within the household systems. Farmers also manage most animal health problems independently, but the state and development agencies have paid considerable attention to building public and private systems (although these can be hard to see on the ground). The vast majority of cattle are produced in “mixed” cow-calf – feeding households, in various production systems (from extensive grazing to cut and carry). There are only a small number of specialised fattening households (that buy in

feeders) the majority of which are contracted to CCT (in Oecussi) are integrated (as holding areas) into trading operations.

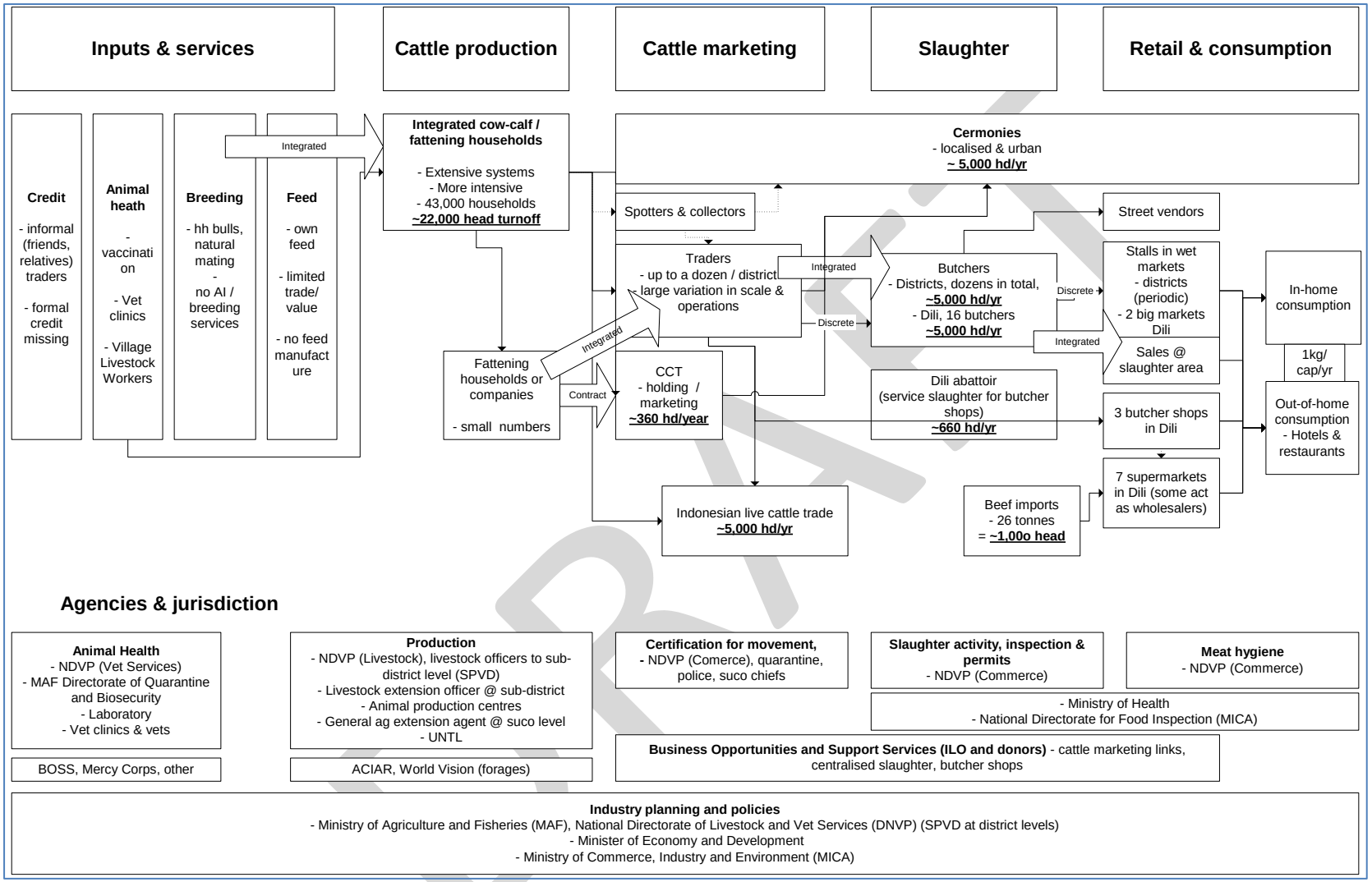


Figure 4. supply chains in the Timor Leste beef industry

Source: authors

From this common supply base, there are various inter-linked supply chains.

- At the top of the diagram, about **5,000 cattle** (or 25% of national turnoff) are slaughtered for ceremonies. These can be supplied from the household and family networks, from traders, or even CCT in Dili.
- The majority of cattle are marketed through spot marketing systems in a hierarchy of collectors, smaller traders (that buy cattle) and larger traders (with the working capital to buy in larger quantities). Many traders slaughter their own cattle (in yards or at market) i.e. as slaughtermen. Perhaps **5,000 cattle** are sold through spot markets in Dili (25%) and another **5,000** in the 13 districts.
- Another **5,000 cattle** or so are traded live across the border to Indonesia, although this informal trade has been disrupted in recent years.
- This leaves about **1,000** cattle that are sold outside spot markets, approximately 360 through CCT and 660 that are (service) slaughtered through the central abattoir in Dili and to three private butcher shops. These can be regarded as "higher value" supply chains.
- The centralised abattoir and butcher shops have not yet developed the capacity to replace imports, which is high-value but small trade (equivalent of **1,000** head).

Government, development agencies and larger agribusiness actors aim to increase the relative importance of the higher value sector (especially centralised slaughter and butcher shops) and reduce the relative importance of other chains, including ceremonies.

4. Policy

As could be expected in a newly-independent, low-income country with a beef industry with a short history, the industry is at an early stage of development marked by low input–low production systems, rudimentary marketing and processing systems, significant animal disease and food safety issues, and low product "quality". The GoTL have sought to develop the beef industry with, as also could be expected, assistance from external development programs.

One key policy document (DGLVS, 2013) presents a broad, comprehensive policy framework for development of the sector consisting of three broad over-arching strategies: increased cattle production and productivity; an increase in public goods (especially animal health); and import replacement and export promotion.[2]

On the production side, several practice changes in forage and cattle management appear adaptable to Timor Leste to increase productivity. However, uptake of these changes in small-holder systems means changes in deeply embedded practices and outlooks that is a long term process. Few resources or programs focus on cattle production and, as is the case throughout the region, extension activity highly variable. Improvement in animal health sector has especially been done through training and recruiting "village health workers" on an

[2] More specific programs undertaken by GoTL are outlined by the Secretariat of State for Livestock (2010). Stated goals of the program are to: provide a source of protein; contribute to income generation for small farmers and livestock owners in rural areas; creation of jobs for people in rural areas and preventing urbanization; contribute to poverty reduction and better life mainly in rural areas; and contribute to achieve and secure food security in the country.

incentive or user-pays basis with mixed results. Import replacement (153 tonnes of beef in 2014), let alone exports is not a realistic goal yet.

Much of the policy attention in recent years has been on downstream sectors of the chain (cattle marketing, slaughter and retail) through funding from government and development agencies and – necessarily in parallel – regulation.[3] The aim is to promote a shift from small-scale slaughter and retailing structures to more centralised and corporatised structures in order to improve food safety and product quality that will generate margins that can be passed back to farmers in the form of higher prices (*if* based on weights over-the-scales). This is effectively an attempt to "leap frog" other intermediate models of development dominated by spot markets, service slaughter plants integrated closely with wet markets (seen throughout Southeast Asia, see other country profiles).[4] Time will tell if this strategy can be implemented and enforced and will prove successful.

5. Inputs sector

5.1.1. Feed

The overwhelming majority of cattle feed is sourced through grazing, crop residues and forages on-farm or in nearby areas, with few external suppliers of concentrate or mixed feeds and minerals (except salt). There is however a fledgling market in forages in some areas (Oecussi) especially where there are concentrations of fattening and trading households. MAF is interested in promoting a feed market (including forages and nurseries) to increase the supply of feed and so that farmers will "understand" the value of feeding better.

5.1.2. Breeds and breed improvement

Virtually all cattle in TL are Bali breed, bred through natural mating by bulls owned by the household. Peak calving tends to be in the middle of dry season, when feed resources for the cow is diminishing. However, as is the case in eastern Indonesia, Bali cattle 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 low mature size (cow mature weight is about 275 kg) of these cattle is an advantage because it infers low maintenance, but does not reduce production efficiency is enhanced by their adaptation to the situation. There have been limited imports of other breeds into TL (Brahmans), but there does not appear to be a serious policy measures to. A shift to larger breeds would be a retrograde step because the (limited) feed available is increasingly used for maintenance and less for production (reproduction and live weight gain) (Poppi et al., 2011).

[3] Four major regulations were passed by parliament, namely: "Animal identification, registration and circulation regime"; "Animal movement restriction inside urban areas"; "Hygiene and sanitary conditions in the preparation, transportation and sale of meat and meat products", and; "The Slaughterhouse permit regime". The regulations were developed with specialist input (based heavily on overseas experience) and are now being "socialised" with stakeholders, in preparation for implementation.

[4] There are parallels with municipal regulations in China to regulate household slaughter to increase food safety and enable mechanised abattoirs to capture cattle supply and beef sales channels.

5.1.3. Disease and veterinary service

Animal health problems that effect cattle and buffalo in TL include internal and external parasites, brucellosis and haemorrhagic septicaemia. Government and external agencies pay significant attention to animal health through vaccination[5], disease surveillance and treatment, the development of the national laboratory, the development of Animal Health Centres, the training of vets and various regulations. Animal health is seen as a public service, but the GoTL is seeking to develop private sector delivery systems.

As could be expected in a fledgling country, there are major challenges in building an effective animal health and veterinary system. There are, for example, difficulties in buying, importing, distributing and applying vaccines (especially with poor cattle handling facilities). Donor-designed systems of fostering market-based animal health services – including training of "Village Livestock Workers" provide services for a fee, and outlets for basic veterinary products – have not been successful. While farmers are clearly concerned about animal diseases and the associated mortalities and low performance, they are generally not willing to pay for these services. It is likely that many animal health problems are symptomatic of poor basic animal husbandry practices including under-nutrition, lack of water and poor pen hygiene.

5.1.4. Extension systems.

TL had an extensive extension network under Indonesian rule. After independence, resource limits and World Bank advice meant that TL did not seek to establish a public extension system, which was to be filled by the private sector and NGOs. This proved inadequate, and in the 2000s, government and development agencies embarked on the daunting task of building an agricultural extension program with international support. A Policy for Agricultural Extension was drafted in 2008 with a system designed to provide publically funded services free of charge to farmers by the Ministry of Agriculture and Fisheries. There are specialist livestock officers down to (65) sub-districts, and agricultural generalists down to (442) townships. It was envisioned that the extension agents would complement the Village Livestock Workers (see Section 5.1.3 above).

As is the case throughout the region, the system on paper works very differently in practice. Resources are stretched, extension agents have diverse and multiple tasks that can't all be completed, and the Village Livestock Worker system has not been sustained. Perhaps most importantly, extension agents face major challenges in changing semi-subsistence systems and the practices of farmers with expectations of handouts, mistrust and often low education levels.

6. Cattle production systems

TL has a short history in beef cattle production but grew under Indonesian rule and has spread rapidly throughout the country. Households in virtually all areas of TL raise cattle using whatever resources are available. Production systems vary around the country due to

[5] The GoTL (with donors) has begun a vaccination program free to farmers for pigs (cholera or classical swine fever), chickens (Newcastle Disease) and cattle (Haemorrhagic Septicaemia). There are mixed reports of vaccination coverage rates for cattle from 60-80% (Valera, 2014) to 30-40% (Ministry of Economy and Development) to 35% (SPVD Oecussi, personal communication) but aim to reach 80%. The state does training on brucellosis detection and treatment, but do not vaccinate against it.

a mix of factors including climate and resources, infrastructure and access to markets, and culture, but bear some common characteristics.

The country has a monsoonal climate with wet and dry seasons that vary by area. In general rainfall is lower in the north and higher in the south. Distinct dry seasons result in feed gaps and insufficient water supply for livestock. The vast majority of cattle are grazed for all or most of the year on grasslands, scrubland or scavenging around the village. Cattle can be penned at night, seasonally, or in some cases not at all. There is however often integration into the cropping sector. Corn is grown throughout TL and rice is grown in wet season or on irrigated areas and cattle commonly graze on stubble after harvest. Seasonal access to cropland and grasslands is governed by local rules. There have been long-standing efforts (especially from missionaries) to introduce cut and carry for crop residues, which happens in many areas, but it is widely acknowledged that crop residues and storage are under-utilised, as are tree forages (gliricidia and leucaena) except in some areas (e.g. Oecussi). There have also been programs to introduce forages – either by utilising existing tree forages or planting new tree and herbaceous legumes and grasses – but is confined. Sago palm is commonly fed in dry season through much of TL.

TL researchers commonly differentiate between extensive, semi-intensive and intensive systems, although definitions can be blurry and data on the relative importance is limited (Soares, 2010). Cattle are produced predominantly in “unspecialised systems” where the vast majority of farmers own cows to produce calves that are fed to slaughter weight. That is, there is little specialisation in production where particular areas or producers focus on particular activities (e.g. cow-calf production or fattening) based for example on resource endowments and market access.

Thus, cattle in TL are raised in low input – low output systems. With low inputs (feed, labour, capital), outputs are also low (live weight production) as are intermediate performance indicators (calving rates, growth rates, mortality rates, turnoff rates). These production systems are not necessarily inefficient *per se*, especially as costs are low. However, cattle production systems in TL can be seen as inefficient insofar as existing resources are under-utilised or not used in a strategic way to meet key constraints. There is substantial opportunity to increase production and production efficiency.

For the purposes of discussion, five beef cattle zones in TL can be identified: the east and southern grassland zone; the western border zone; the northern dry zone; Oecussi; and the central-west mountain zone. Broad characteristics of the “beef zones” include:

- **Eastern and southern grassland zone** (Lautem, Viceque, Manufahi). This zone is characterised by relatively high rainfall and long(er) wet season, and open savannah grasslands. Buffalo are prevalent in these areas and cattle are kept in relatively large herd herds (average of 6 head in Lautem), but in uncommercialised, low input – low output systems. People in the east attach a high “cultural value” to buffalo and cattle and are known as “staunch”. Improvements in these areas can be made through pasture and grazing management.
- **Western zone** (Bobonaro and Cova Lima)**.** Rainfall grades from low in the north (like the northern dry zone) to wet grasslands in the south. This diverse region supports a large number of cropping and livestock activities, including small-scale but relatively densely populated and “commercialised” cattle production systems. Partly for cultural reasons

and also because of proximity to the Indonesian border and live cattle markets, people in the west are known as more commercialised. There are large amounts of crop residues that could be better utilised, in addition to tree forages and herbaceous legumes.

- **Northern dry zone** (Liquica, Dili, Bacau)**.** Low rainfall limits agricultural options and seasons in the north of TL. The northwest has traditionally been a significant cattle production area due to proximity to both the Dili and Indonesian markets (although better roads from other areas are said to be diminishing this comparative advantage). Because of the harsh conditions and limited alternative feeds, there appear to be gains in disseminated tree forages.
- **Oecussi.** The climate and terrain of Oecussi incorporates many of the characteristics of the dry northern zone. Limited agricultural options, proximity to Indonesian markets, and a history in cattle production and tree forages, mean that cattle production systems are relatively well-established in Oecussi.
- **Central-west mountain zone.** Steep terrain, poor roads, alternative agricultural activities (cash crops, horticulture and coffee) and lack of feed mean that cattle systems are sparse and uncommercialised in this area, and less suited to development projects or programs.

7. Cattle marketing

The vast majority of cattle are traded through **spot markets**, populated by a familiar hierarchy of actors. Slaughtermen and traders have extensive purchase networks, and can buy direct from farmers, or through local level collectors and spotters (for a small fee). Most end-buyers (slaughtermen) require only small lots (e.g. to slaughter 3-7 head per week), and traders try to aggregate a full truck (7-9 head depending on size) to reduce transport costs, especially where there are significant distances and poor roads. Road infrastructure is generally poor and many secondary roads impassable in wet season, but infrastructure is improving with major new roads to the west and south. Even with few specifications, it can take some time (a week in some cases) to aggregate a truckload of cattle, which incurs search, holding and trucking costs. The need to aggregate a truckload of cattle in a timely way meant that virtually all types of cattle (large, small, age) are bought. Most slaughtermen and traders also dealt with buffaloes too.

Cattle are mostly purchased through visual assessment, where buyers estimate the carcass weight / yield of the animals and costs (aggregation, holding, transport) to establish a price. Farmers have a strong preference for immediate cash payment, but various payment arrangements can be negotiated where there is trust and established relationships.

Because of the low density of cattle numbers and turnoff, there is very limited development of live animal markets, and cattle are aggregated near points of slaughter (wet markets, slaughter sites and near the refurbished abattoir in Dili.

There is also a large and vibrant trade in cattle, buffaloes and other animals for **ceremonies** (funerals, weddings, graduations etc.). The chains can be short, for example a farmer slaughters their own animals, or draws on reciprocal obligations and debts from families and kinship groups. However, ceremonies can require very large numbers of animals, so often have to be bought in through collectors or traders, markets or agencies (including CCT in Dili). In establishing the value of animals for ceremonies, attributes of horn size and age can

be important (which can distort farmer expectations in other markets where carcass weight is the overwhelming consideration).

Like other countries, farmers and other stakeholders hold a widespread a perception that cattle prices are “too low” or “not fair” and that traders and slaughtermen make “too much money”. There certainly appears to be areas where the system could be improved, but the dominant “spot” cattle marketing system is not dysfunctional. For example, while traders inevitably know market prices and the end-value of animals better than farmers (information asymmetries), most farmers have access to price information and can select between multiple sales channels (through word of mouth and mobile phones). While slaughtermen and traders no doubt have trading territories and alliances (collusion), there is still competition for cattle at local levels, and don’t appear to making windfall margins, given the costs and risks (including non-payment) involved.

Modern butchers have sought to buy cattle over-the-scales on a per kilogram basis using a price schedule. This is encouraged by government and development agencies, but the butchers (unusually) also prefer to buy over-the-scales to increase business certainty and avoid over-estimating meat yields. When first establishing this new purchasing arrangement, attempts were made to weigh cattle on-farm, but proved difficult to extend with farmers unfamiliar with the practice or who mistrust scales (commonly manipulated in TL) and there are logistical challenges (carrying and setting up scales in purchasing areas).

Thus, cattle are weighed at the scales set up permanently at Tibar abattoir in Dili. There are examples where a group of farmers aggregated a line of cattle and trucked them to Tibar for weighing and payment. However, this is demanding of resources, including local leadership, coordination, the costs of the truck and feed, and the risks of hold-up in Dili. The other option might be that transporters (or the modern butchers) could truck cattle to the abattoir, weigh at Tibar, and then pay the farmers (or pay a deposit, and the balance after weighing). However, few farmers accept delayed payment because of the risk of not getting paid (or not paid in full, or at a discounted weight).

Thus, the dominant practice is that traders buy cattle on a negotiated subjective basis (by eye, per animal) with immediate payment to farmers, then transport to Tibar where traders sell the cattle to butchers over-the-scales. Differences in the purchase and sales price are accumulated by the traders. This was said in some cases to be significant, suggesting that farmers receive less than the “real” value of their cattle. However, in competitive markets, the trader margins should diminish and be passed back to farmers.

The per kg live weight price schedule of the modern butchers for cattle *landed at Tibar* in the second half of 2014 and first half of 2015 was: >250kgs - $2.70; 200-250kgs - $2.50; <200kgs - $2.00. Prices dropped about 10 cents in the latter half of 2015. Prices for the heaviest animals were $2.30 in 2013. After taking into account the weights of the cattle and transport and other costs, these prices appear to be similar or competitive with the prices paid by other traders and slaughtermen.

In sum, there do not appear to be major windfall gains to be made in wholesale reforms to the marketing system. However, incremental gains may be possible in particular cases that have to be assessed on an individual area, group and household basis.

8. The processing sector

Like the retail sector (markets), the slaughter sector is dominated by rudimentary, low-cost structures (slaughtermen) but is also comprised of traditional structures (ceremonies) and more "modern" structures (a refurbished abattoir). Also like the retail sector, the GoTL is seeking to move the relative importance of these structures toward more modern structures through regulation, inspection and centralisation of structures. Implementation will also be difficult, and could be expected to increase costs and prices.

Slaughtermen kill the vast majority of cattle in TL and have several structural features. They operate in rudimentary, individual facilities, different to Indonesia, where (legal) butchers (jagal) operate in certified service slaughter facilities (public – city and suburban). Second, like "jagal" in Indonesia, slaughtermen operate integrated operations – upstream (so are also cattle traders) and downstream (so can be beef wholesalers and retailers). Because slaughtermen take ownership of cattle and beef, they are powerful actors in the industry. This provides opportunities to develop agribusiness especially though links between slaughtermen and producers. At the same time, however, the slaughtermen are relatively small and speculative. Unlike abattoirs in some countries (like China) that take ownership of product, they don't enter into long-term contracts or provide inputs and services to secure supply.

Varela (2014) conducted a study of 35 slaughtermen across TL, which represents most of the slaughtermen in the country. 60% of the slaughterhouses kill one head per day, most slaughter daily overnight or in the morning. Half buy directly from farmers, and the other half both from farmers and traders. Most of the slaughter areas did not have walls, and 40% no rooves (open air). Worker numbers ranged from 2 to 13 people, with the biggest category employing four people, with most wages of $5 / day. Cattle killed were very light (40kg to 100 kgcarcass weight. All of the slaughtermen sell beef to markets and consumers, with 74% to restaurants as well.

Because of low hygiene and food safety standards of the slaughtermen, the State has sought to regulate the slaughter sector through the development of a new regulation titled the "Slaughterhouse Permit Regime", introduced to complement stricter meat marketing regulations (see below). The regulations aim to force slaughtering in Dili into a **centralised abattoir** (Tibar) refurbished through funding from government and donors and opened in 2012.[6] The abattoir consists of a large slaughter area with basic but appropriate slaughter facilities, including a race, killing box and unmechanised slaughter line. There are no cold storage facilities but these, together with improved water facilities will be installed (by government).

The model is that the company with the operating licence of the plant (Ebai) will provide slaughtering services for the large number of slaughtermen for a fee ($30 per head). The operator then pays passes on a proportion of this ($7.50) to government as part payment for government costs, including the plant, water, power costs and inspection costs. The plant

[6] The Tibar abattoir facility is located in Tibar suco (Liquica district), about 10 kilometers west of Dili. The facility was one of about 10 plants built by JICA (Japanese aid agency) in Indonesia in 1996/7.

has a capacity of perhaps 50 head per day and can operate Monday to Saturday. However, at present (2015) the plant kills 45-53 head per month, an average of 4 days a week, and 2-4 head per day. All of these cattle are for the two "modern butchers" (see section 9 below), one of which is owned by the company with the operating licence for the abattoir, and the other by a relative.

Like the meat marketing regulations, slaughter regulations will be difficult to apply because of resistance from small butchers, and the employment and possibly price effects. The abattoir is also located about 10 kms from Dili wet markets, so pose some cold storage and transport logistic difficulties and costs. The regulations and rollout of the more "modern" slaughter system is planned in four districts too (with priority in Maliana and Bacau) but these plans have been delayed, given the challenges even in Dili.

This policy approach could eventuate in several ways. One is that private butcher shops increase in number and volume, all slaughter is channelled through the centralised plant, and the abattoir becomes viable. In this case, there may be opportunity for the development of higher value beef markets and import replacement in the longer term. The other eventuality is that regulatory measures to centralise downstream sectors are not implemented, the plant is used only for a small market in "modern butcher shops" and that the state are forced to subsidise the slaughter facilities indefinitely. Or there may be other permutations, or continuation of systems operating side-by-side in segmented chains.

9. Beef markets and consumption

Consumption levels. According to one survey (Directorate of National Statistics and World Bank, 2008) per capita meat consumption levels in TL are low at 3.3 kg/year, egg consumption at 2 kg and milk consumption at 0.2 kg. These levels are considerably lower than WHO standards of 10.1 kg, 3.5 kg and 6.4 kg respectively. Given the lack of reliable data on beef consumption, net per capita supply (summarised in Figure 4) can be used a proxy for per capita consumption.[7] This varies depending on the domestic production estimation method used. Based on the census data, average annual per capita bovine meat consumption in TL may be 0.95kg (0.56 kg beef and 0.39 kg carabeef). Based on trade/slaughter data, bovine meat consumption may be 1.19kg (0.96kg beef and 0.23kg carabeef).[8] These bovine meat consumption levels are significantly lower than the average for least developed countries (4.8 kg), lower than Indonesia (2.5 kg) and indeed lower than all Asian countries with the exception of North Korea.

There are several **drivers** of beef consumption. Beef consumption is clearly constrained by low incomes, with mean per capita incomes per month of $62 (urban $93, rural $50; NDS, 2011). Beef consumption could be expected to increase with sustained income growth (a function of developments in the oil sector, political stability, public servant wages and pensions). Another driver of consumption is population growth of 2.41% per year which, if continued, will double the population by 2039. Because of urban migration, annual

[7] Subtracting net trade from domestic production and divided by the TL population in the 2010 census provides an estimate of per capita supply.

[8] Note however, that trim, offal, blood and skin can all be consumed and are nutritious,

population growth in Dili is 4.8%, where net per capita supply of bovine meat is estimated at 3.94 kg, three times higher than the national average.

Within the context of aggregate beef consumption levels, consumption differs significantly by retail and distribution channels including wet markets, supermarket, hotels/restaurants, butcher shops and ceremonies (Figure 4). For an idea of the relative importance of these, in a survey of 271 urban consumers predominantly in Dili, Serrão *et al.* (2007) found that 43% buy from local markets, 26% from street sellers, 9% purchased in supermarkets and 23% from other (unspecified but may be presents or ceremonies). They also found that 96% of the beef purchased was fresh.

TL has a hierarchy of **markets** consisting of: two major markets in Dili (Manlewana and Taibesi); two regional hubs (Bacau and Maliana that trade seven days a week); periodic markets in district centres (1-2 days per wk); and small markets in sub-districts. Most agricultural product are moved down the hierarchy, but there is also upward movement. In Dili, there are at least seven markets that sell beef, and numerous street vendors. Hygiene levels are generally low, adulteration is common, and scales are commonly inaccurate. After many years of development, the GoTL enacted a regulation to effectively ban the selling of meat in small markets that cannot comply, and aimed to effectively concentrate meat sales in the two big markets. The GoTL will clearly have difficulties in implementing and enforcing the regulations in Dili let alone nationally. Centralisation of markets entails increased travel from suppliers and customers, there are high levels of employment amongst slaughtermen and stallholders, and will increase costs.

Supermarkets are a significant channel for beef retail in Dili where there are seven major supermarkets. The vast majority of beef stocked is imported, frozen, pre-packaged product. Customers include the growing Timorese middle class, and expatriates, and the higher-end Hotel, Restaurant and Institution (HRI) trade. Prices are 20-30% higher than market prices for fresh domestic generic product. Three major supermarkets (and an importer) have the cold storage facilities to import, wholesale and distribute frozen beef. Only one or two supermarkets stock domestic beef due to concerns about food safety and supermarkets have not yet developed beef butchering, packing and presentation skills. However, there are prospects that these conditions may be able to be met through the centralised abattoir and the “modern” butcher shops (see above). This chain would however require considerable development, most importantly in the capacity to consistently supply large volumes of safety- and quality-assured beef. If import data on frozen beef is a guide, this is not a large channel, but is has potentially higher value.

Modern butcher shops. A significant development in the beef retail sector in recent years is the development of “modern” butcher shops, where the private sector actors are in the “modern” cattle marketing, slaughter and retail beef program of BOSS. There are currently two butcher shops in Dili, but these may expand into the future. The shops transport quarter carcasses from Tibar abattoir for butchering and cold storage in the shops, and butcher and sell about 20 different cuts and products presented in chilled glass cabinets. The beef is bought by more discerning customers but the butchers say that local residents buy small amounts of lower value beef or secondary cuts from the butcher shops because of the better safety standards and accurate scales.

10. Beef prices

Reliable price series of beef or cattle are not available. Section 7 provides an idea of live cattle prices (over-the-scales in Dili), while Table 1 provides a snapshot of beef prices through different retail outlets.

Table 1. Prices of beef in various retail outlets in TL, 2013-14

Retail outlet	2013	2014
Local markets (fresh local)	**Lospalos district market**. Generic beef $5/kg	
Dili markets (fresh domestic)	**Comoro market**. Generic beef $6/kg	**Manlewana market**. Generic beef $6.50/kg **Taibesi market**. Generic beef $7.50/kg on accurate scales Generic beef $5/kg on inaccurate scales
Supermarkets (frozen imported)	**KManek** Leg bone-in $9.90/kg Striploin $30.50/kg **Leader supermarket** Osso buco $9/kg (local) Sirloin $10.30/kg "Boneless beef" $9.25/kg Boneless rump $9.60/kg	
Butcher shops (fresh domestic, some vacuum-packed)	**Ebai butcher shop** Topside $9/kg Silverside $9/kg Eye round $9/kg Scotch fillet $13/kg T bone $15/kg Rump $12/kg Tenderloin $20/kg Sirloin $13/kg	**Talho Moris butcher shop** Oyster blade $9.50/kg Rendang $8.95/kg Eye round $9.50/kg Silverside $10/kg Steak $10/kg Ribs $7/kg Tenderloin $25/kg Sirloin $15/kg

The prices suggest that generic beef prices in Dili are not dissimilar to those in Kupang (MoA, various years). Prices in Kupang in 2013 averaged Rp70,313/kg and the average exchange rate was 10,404 (equivalent of **$6.80 / kg**). In 2014, the average price was Rp76,458 and the exchange rate increased to Rp11,836 (equivalent of **$6.50**). While prices of cattle sold to Indonesia are higher than those to Dili, there appears to be integration between beef markets. Table 1 also suggests significant premiums (of around 35%) for generic type cuts sold through higher value chains (supermarkets and butcher shops).

11. International trade

11.1.1. Beef imports

While TL produces enough beef to be self-sufficient in beef, it has not yet developed structures to consistently meet demands of the supermarket and high-end HRI trade, which is largely met by imports. The vast majority of the beef is in frozen form. In 2009-2012, TL imported about 100 tonnes per year from Australia and New Zealand at a value of around US$8/kg, or US$800,000 per year (Figure 5). Beef from these two countries reduced to 26 tonnes in 2013 but increased substantially to 153 tonnes in 2014 (127 tonnes from New Zealand) (UNComtrade, September2015). With an average value of $6.70/kg, this is higher than domestic prices. Very little fresh beef was imported until 2014 when 10 tonnes was imported from Singapore (average value $7/kg). The volume of beef from all sources (frozen and fresh) would (at a carcass weight of 150kgs) be the equivalent of about 1,000 cattle.

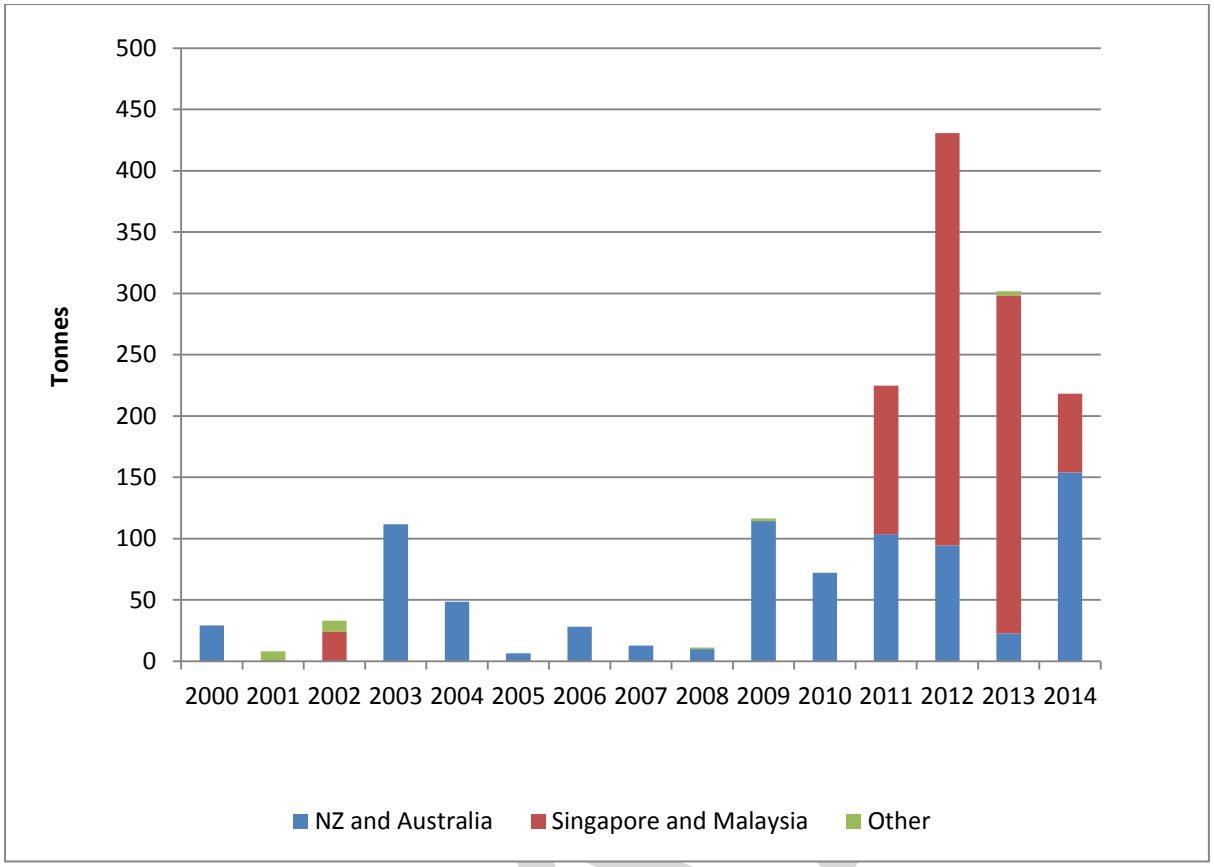


Figure 5. Frozen beef imports TL.

Source: UNComtrade accessed October, 2015

From 2011 to 2013, statistics show larger imports of frozen "beef" from mainly Malaysia but also Singapore of 278 tonnes in 2013, although this dropped back to 64 tonnes in 2014. Inquiry has failed to reveal the details of this trade, but it is almost certainly re-exported buffalo meat from India. The price of the product from Malaysia was just $5.25 in 2015, lower than domestic prices.

11.1.2. Formal cattle exports

With a narrow economic base, TL has limited non-oil exports, dominated by coffee and textiles. Cattle and buffalo exports to Indonesia were one of TLs few export commodities. Export numbers were officially reported (by MAF) when the trade was formal before 2010. Numbers declined from a peak in of 3,000 head in 2005 to 2,000 in 2007 and 900 in 2009. However these numbers are certainly under-stated as they are reported elsewhere as high as 6,000 in 2006 (MAFF Agribusiness, 2007). MAF also recorded that 76 buffalo were exported in 2009 (which is under-stated) and nearly 5,000 hides in 2009. This would account for most of the cattle and buffalo slaughtered in Dili and a proportion of bovines killed in the districts. While the hide trade remains legal, data is not available.

Pre-2010, cattle legally traded over the border was officially conducted through accompanying documents and processes.[9] In practice, processes were simplified or by-passed on both sides of the border. Indonesia was conciliatory with TL in discussion on the trade. In a special arrangement with TL, authorisations from Jakarta were not required if cattle were transported overland to West Timor. Indonesia allowed exports from TL through an Export Permit rather than a Health Certificate based on standards set out in the WTO Agreement on Sanitary and Phytosanitary Measures (WTO-SPS) for Category 1 diseases (haemorrhagic septicaemia, brucellosis, foot and mouth disease and swine fever) as well as other infectious animal diseases and ecto-parasites. In an agreement signed in Kupang in 2005, TL was given 2 years to adhere with WTO-SPS processes. When this was not forthcoming, the agreement was extended for 2 years to 2007 and then another 2 years to 2009. Indonesian and international agencies urged TL to sign the agreement, but could not fulfil all criteria (including laboratories) so the official trade was shut down at end of 2010 (Sendall and Associates, 2006).

11.1.3. Informal cattle exports

With growing demand for cattle in Indonesia, the informal trade continues at perhaps the same scale as the pre-2010 trade of about 5,000 head per year. Volumes declined, however, in 2015, especially with the devaluation of the Rupiah (of 34% against the US$ since January 2013 and 14% since January 2014) and disruptions and periodic crackdowns on the illegal trade. There are several trade routes.

In the **northern trade route**, cattle are sourced from throughout much of Bobonaro, especially the high cattle density cattle areas in the west of the district such as Maliana, Balibo and Cailico. A total of about **1,250** cattle and buffaloes might be traded through this route annually, with more in dry than wet season. Cattle from this area enter into Belu in West Timor and are sold to cattle traders in Atambua or Kupang.

The **southern trade route** is particularly important for cattle producers in Cova Lima where there are large numbers and densities of cattle, but poor roads and long distances to Dili. Much of the cattle trading is based in the district capital of Suai. Perhaps **1,250** head per year are traded through main crossing points (Wala and Fatumean) but there are large tracts of uninhabited land in the region where cattle are walked over by farmers and traders. The trade was interrupted by TL agencies in August 2014, which posed a significant problem for the cattle industry and producers in Cova Lima. There are reportedly border points where locals with a Transboundary Identity Card can trade up to five head for “basic needs” on Tuesdays and Thursdays. The cattle from Cova Lima enter into Malaka in the south of West Timor, and then transported to Atambua or Kupang.

In the enclave area of **Oecussi**, there are significant numbers of traders and/or integrated fattening operations specialised in buying, feeding and selling cattle into the Indonesian market. Most cattle are traded mainly through the south-eastern areas of Oesilo (1,200 head) and Passabe (850 head) although cattle are drawn from throughout the enclave, which may amount to as much as **2,000 head**. Cattle that enter through the TTU-Oecusi border are sold

[9] From TL this includes MAF Inspection Certificate, Quarantine export permit and customs forms, and from Indonesia includes quarantine and inspection of 7 days and customs forms.

to Kefamenanu or Atambua or Kupang, while cattle that enter through the Kupang-Oecussi border are sold to Kupang.

Movement in Indonesia. Once in West Timor, cattle can be slaughtered especially in Kupang but the majority are likely to be shipped to other islands. Trade routes are however not necessarily direct. Traders may have to move cattle around to utilize export quota from various districts in West Timor. There are weight limits (275kgs) on the cattle to be traded, so may require further fattening in West Timor. Traders then aggregate bulls with others from West Timor in holding and quarantine areas (7 days), before transfer to ships in the ports of Wini, Atapupu and Tenau (Kupang). For inter-island cattle trading, the main routes are shipping to Surabaya then trucking to Jakarta, or shipping to Kalimantan for slaughter there, or there is border trade with Malaysia.

Benefits of the trade. Significant numbers of households sell cattle into Indonesia. If they supplied an average of two head for the trade per year, then about 2,500 farmers might be involved. This is a relatively small proportion of the total households that raise cattle in the border districts (5,400 in Cova Lima, 7,300 Bobonaro and 6,200 Oecussi). However, the trade is likely to be particularly important for households in the western border areas of TL, a large proportion of which raise cattle.

If about 5,000 cattle are traded over the border, at an average live weight of 300kgs and an average price of $2.80 in 2014, then the trade may be worth $4.2 million. If TL charged an export duty of 5%, then this equates to just $210,000 in government revenue. Similarly, if fees were charged for customs and quarantine services (say, $5 per head), this would equate to $25,000 for each agency.

Prospects for formalisation of the trade. With numbers at levels similar to those of the pre-2010 era, and demand and prices in Indonesia high, it could be argued that there is no major imperative for TL to formalise the trade. Formalisation is demanding of the resources and capacities of state including the establishment of domestic testing systems, international certification, the effective operation of laboratories and infrastructure (quarantine and holding yards). Based on estimates above, these costs may not be met by taxes and fees of the formal trade. Formalisation of the trade also entails longer holding periods of larger lots in a limited number of holding areas – which increases costs for traders – and might mean that legal export channels are resisted or circumvented. Policy-makers too may question the investment in the live export market, when the domestic market is growing, is technically easier to service and the when the state has invested in downstream sectors that would benefit from increased cattle supply and lower competition from the export market. Policy has advocated the import replacement of beef and the export of beef rather than cattle.

There are, however, benefits from the formalisation of the trade. It may become harder in the future for authorities to turn a blind eye to illegal trading, especially if prices and trade increases. The illegal trade entails risk and costs for traders and farmers, such as fines or disruption (the case of Suai in 2014 and Suai and Bobanaro in 2015). Further or total bans may be imposed in the event of a major disease outbreak, Indonesian or NTT regulations, or the lobbying of domestic industry actors who stand to gain from capturing the flow of product to domestic markets (e.g. butchers and agencies with a stake in the Tibar abattoir).

Thus, GoTL is developing plans and a strategy to formalise the trade. The (former) Secretary of State for Livestock is supportive of measures to resume legal trade. The GoTL has as initiated at least three meetings with Indonesian counterparts about formalisation. In West Timor, the NTT provincial government (both provincial and in border districts) are supportive of resumption of the trade. NTT veterinary and quarantine officials state that there is no valid animal health grounds to ban trade – as they share the same island with the same diseases and cattle move over the administrative border every day. Spread of the main Category 1 disease from Timor – brucellosis – is contained by the ban on inter-island trade of female cattle. As cattle only have to be vaccinated once for brucellosis, it may be possible for females to be imported into West Timor if accompanied by an ear tag (as Timor Leste is doing especially in Oecussi as a condition of trade) or certificate.

The major obstacle is whether GoTL can issue health certificates compliant with the WTO-SPS Agreement, and the integration with domestic animal health and vaccination programs. Assessment of the costs, benefits and feasibility of meeting international protocols is required. However, if it does proceed, lessons from the pre-2011 era suggest that careful consideration has to be given to the logistics and infrastructure of the trade including: the location and design of holding and quarantine facilities; the minimum size of lots; and the time and costs required to fill quarantine and customs processes. Several interviewees raised the prospect of direct exports (through Dili / Com port, or Pante Macassar) to reduce transport and other costs.

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