

**ACIAR Project**

**LPS-2009-036 Enhancing smallholder beef production in Timor Leste**

**Report for Markets and Policy component**

# **Sub-sector analysis of the Timor Leste Beef Industry<sup>1</sup>**

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## List of abbreviations and terms

aldeia	Village / hamlet
APS	Agente Pecuaria de Suco, see also Village Livestock Workers
ARP III	The Third Agriculture Rehabilitation Project, funded by the World Bank
BNCTL	Banco Nacional De Comercio De Timor Leste
BOSS	Business Opportunities and Support Services, project of ILO
Butcher shop	Refers to “modern” butcheries in Dili, different to “slaughtermen”
CCT	Cooperativa Café Timor
Central abattoir	Refers to large, mechanised abattoir in Dili (Tibar)
DGLVS	Directorate General Livestock and Veterinary Services
District	Second-level administrative unit in TL. Recently changed to municipality, but term district used in this report
DLS	Directorate of Livestock Services
DNPV	Direcção Nacional da Pecuária e Veterinária, Portugese term for DGLAHS
GoTL	Government of Timor Leste
HRI	Hotels, restaurants and institutions
IADE	Institute of Business Support, Ministry of Economy and Development
ILO	International Labour Organization
MAF	Ministry of Agriculture and Fisheries, or Ministerio Agricultura e Pescas (MAP) in Portugese. The acronym MAFF (below) is used in this report
MAFF	Ministry of Agriculture, Forestry and Fisheries (replaced MAF). For ease of reference, the acronym MAFF is used throughout the report
NBCA	National Cooperative Business Association
PUSKUD	Pusat Koperasi Unit Desa
RI	Republic of Indonesia
RDP	Rural Development Program, funded by the European Union
Slaughterman	The term matadoro used in TL to refer to small slaughter unit, contrasts with larger abattoir
SPVD	Serviços Pecuária e Veterinária Distrito, District Livestock and Veterinary Services.
suco	Township
TL	Timor Leste
VLW	Village Livestock Workers, see also APS

# 1. Introduction

## 1.1. Summary

This report presents data and analysis from the “Markets and Policy” component of ACIAR Project LPS-2009-036 “Enhancing smallholder beef production in East Timor” (20012-15). The report aims to provide a rigorous, up-to-date and comprehensive account of structures and development issues in the TL beef industry for industry stakeholders, including policy-makers, development agencies, researchers and members of LPS-2009-036.

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. However, cattle are now held by about 23% of households in Timor Leste. Cattle are kept predominantly in low input – low output grazing systems, partly for ceremonial purposes, but more importantly as a source of “savings”. Cattle provide one of the few sources of cash income for TL farmers, and therefore play an important role in many areas. Cattle production is small-scale but commercialised in the west and the converse in the east. Addressing rural incomes and under-nutrition are priorities in a country with some of the lowest (non-oil) development indicators in the region.

Official (census) statistics record an annual turnoff of about 12,000 cattle, but calculations in this report suggest a turnoff of about **21,000** in 2013 and 2014 (similar numbers in both years). Cattle marketing systems have emerged to service the ceremony market (**5,000** cattle), slaughtermen in the 13 districts (**5,000**), slaughtermen in Dili (**5,000**), and other higher value markets in Dili (**1,000** animals to the Tibar abattoir, butchers, and CCT for Dili ceremonies). Also in this higher value market, in 2014 Timor Leste imported 160 tonnes of beef for the Dili supermarket and restaurant trade (equivalent of approximately **1,000** cattle), while another **5,000** cattle are traded live across the border to Indonesia (although trade was disrupted from 2014 to present). Based on these figures, bovine consumption levels are low at 2kg per person per year (1.66kg beef and 0.30kg carabeef) but perhaps double this in Dili. Previous, widely-used consumption figures are highly overstated. Consumption could be expected to increase with population growth and urbanisation, which bodes well for the industry.

After independence in 2002, the government of Timor Leste and donors have endeavoured 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, but research in ACIAR project LPS-2009-036 identified high potential to increase productivity through improved feed and cattle management systems and support for more progressive farmers, including in the fattening sector.

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. This is valuable in kick-starting the diversification of supply chains, but stakeholders face challenges in expansion, increasing low capacity utilisation of the (subsidised) Tibar plant, and replacing imports in the supermarket and restaurant sector. Health

and hygiene standards to expedite the process have been issued but are not yet enforced, which will be very challenging in Dili let alone the districts. The policy settings effectively represent an attempt to skip industry development paths of other Southeast Asian countries (where centralised service slaughter plants predominate). While these “modern” structures are at fledgling stage, government is committed to this industry policy into the foreseeable future, but should also retain the flexibility to assess and revise the strategy where necessary.

“Traditional” chains – where product flows through a hierarchy of spotters, traders and slaughtermen – are low cost, functional, and likely to predominate into the future. There is some scope to improve marketing systems (through measures such as cattle aggregation, transport and measurement) but gains will be incremental and vary from area to area. The “modern” chains contribute an additional sales channel for higher value product that could potentially flow back to producers if more direct linkages are established (weight-price premiums and over-the-scales selling).

The informal export of live cattle to Indonesia is very important to the cattle industry and livelihoods in the west and Oecussi. Disruption to the informal trade in 2014-5 provide a reason to restore formal trade and the measures required do not seem insurmountable, especially because of the mutual benefits and dialogue between the Timor Leste and Indonesian governments on the issue. Restoring formal trade agreements will, however, require considerable investment and organisation on the Timorese side to issue health certificates compliant with the WTO-SPS Agreement, and the integration with domestic animal health and vaccination programs. A detailed assessment of the costs, benefits and feasibility of meeting international protocols would be useful.

## **1.2. Objectives of report**

This report presents data and analysis from the “Markets and Policy” component of ACIAR Project LPS-2009-036 “Enhancing smallholder beef production in East Timor” (20012-15).

From around 2007-08, the GoTL and international agencies have implemented several value chain and policy initiatives in the beef industry, backed by research cited in this report. This report provides an opportunity to collate and update this research in the light of structures that have changed substantially in recent years. Despite this previous research, understanding of the TL beef industry is highly incomplete, numerous aspects of the industry have not been documented or pieced together, and inaccurate calculations and statements about the industry have been made and used in policy formulation.

This report aims to provide a rigorous, up-to-date and comprehensive account of the TL beef industry, and thereby provide a reference for use by a range of industry stakeholders, including policy-makers, development agencies and companies. It also aims to provide an understanding of the environment in which LPS-2009-036 and successive projects operate, and improve the design and targeting of production, marketing and communications activities. It is expected that this report will form a “working document” to be updated and expanded in subsequent years. The scope of the report will be expanded to include forthcoming data and to become more prescriptive.

## **1.3. Methods**

The report takes a “whole-of-industry”, sub-sector approach. Rather than being treated separately, socio-cultural, institutional, governance and policy dimensions are incorporated into the sectoral

analysis. Analysis is predominantly qualitative in nature, which is required to understand the complex relationships in the industry given the paucity of reliable quantitative data available. Analysis is set mainly at macro- and meso-levels.

The analysis draws on a range of sources, including statistics, reported surveys and interview material. Cross-verification of the multiple sources aims to provide a robust account of the industry. The extensive literature review includes a limited number of published articles and larger number of unpublished reports. The report aims to draw these reports together, and provide a critical review and update. This is complemented with primary research, especially in the form of fieldwork and workshops. At all project sites, interviews were conducted with the full range of stakeholders, including farmers, traders and spotters, slaughterhouses, butchers and retailers in Dili, government officials at central, district and sub-district levels, suco level chiefs, extension agents, and vets.

In subsequent stages of the project, this study will be supplemented with forthcoming micro-level and more quantitative analysis from project surveys (“situation analysis” and household surveys), site monitoring and the budgeting of households and agribusiness actors.

The report should also be read in parallel with other project reports on: the “situation analysis” in project sites (van de Fliert *et al.*, 2016); forage production research (Dalgliesh *et al.*, 2016); cattle production (Quigley *et al.*, 2016); and the Final Report for LPS-2009-036.

Fieldwork periods were conducted during the following times:

- Workshops and field visits (June 3-11, 2012; November 6-7, 2012; Nov 14-15, 2013; March 24-25 2015)
- Fieldwork November 11-30, 2013 – Dili, Lautem, Liquica
- Fieldwork August 11-29, 2014 – Dili, Manufahi, Bobanaro, Liquica, Oecussi, West Timor
- Dili – October 2015
- Fieldwork (UNTL) 2014 – Cova Lima and West Timor
- The report draws on expert opinion, especially partners in LPS-2009-036.

Data and analysis from these sources are presented in this report as follows:

- Section 2 overviews the TL beef industry and policy themes – that cut across sectors
- Sections 3 to 9 provide a sectoral analysis of the industry disaggregated from upstream to downstream sectors of inputs, cattle production, cattle marketing (domestic and exports to Indonesia), slaughter and consumption/retail.
- Section 10 concludes the report with implications for ACIAR and LPS-2009-036.

This report is subject to several limitations, including the following:

- Fieldwork was conducted in seven districts (plus West Timor), but focussed mainly on project sites, and excluded six districts. Analysis, therefore, cannot be regarded as national or comprehensive in nature.
- Project resources prohibited surveys on consumption, while economic analysis is forthcoming
- Reliable and disaggregated statistics in TL were lacking
- Embedded, long term, cross-sectoral problems that impact on the beef industry – including land tenure and infrastructure – were outside of scope of the research and not addressed

## 2. The TL beef industry

Before proceeding to more detailed sectoral analyses, this section aims to provide an overview of industry structures and development issues at a national level.

### 2.1. The TL livestock sector

To put the beef industry into perspective, the number of households that raise livestock and animal numbers are shown in Table 1. Livestock are raised by a very high 80% of TL's 185,000 households. Between 2004 and 2010, household numbers reduced for chickens, pigs, sheep and buffalo, but livestock numbers increased or were maintained, which increased average animal numbers. Household numbers and animal numbers both increased for cattle and goats, while both decreased for horses, which may reflect their suitability to changing resource, economic and social conditions.

**Table 1. Household and animal numbers in the TL livestock sector.**

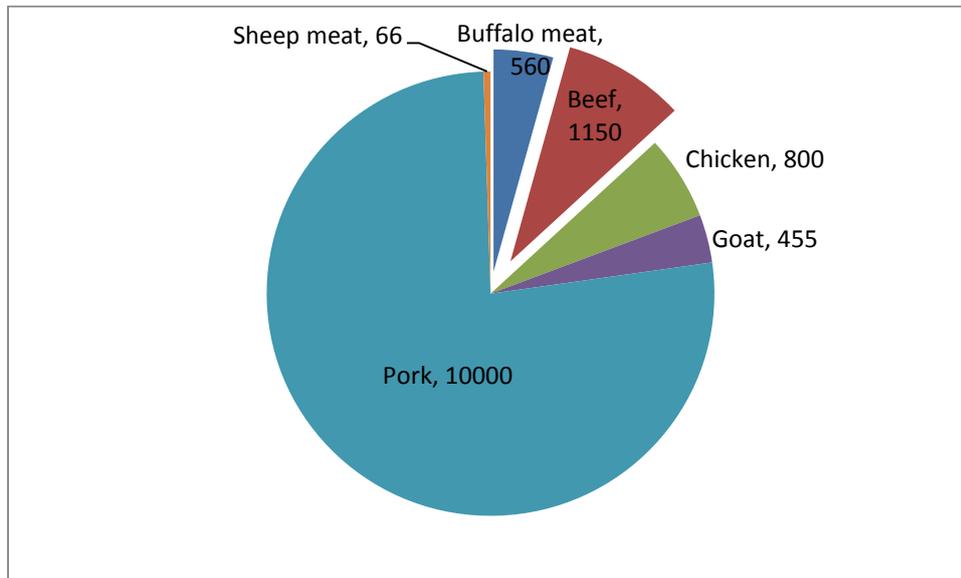
Source: Agricultural census 2004 and 2010

		2004	2010	% increase
Chickens	Households	141,343	124,658	-12%
	Animal numbers	659,066	702,474	7%
	Av animals / household (head)	5	5.64	21%
Pigs	Households	140,683	123,862	-12%
	Animals numbers	331,895	330,435	0%
	Av animals / household (head)	2	2.67	13%
Sheep	Households	7,895	6,957	-12%
	Animal numbers	38,965	41,854	7%
	Av animals / household (head)	5	6.02	22%
Goats	Households	41,899	45,781	9%
	Animal numbers	126,977	152,360	20%
	Av animals / household (head)	3	3.33	10%
Horses	Households	34,312	27,691	-19%
	Animal numbers	63,234	57,819	-9%
	Av animals / household (head)	2	2.09	13%
Cattle	Households	39,711	43,028	8%
	Animal numbers	133,577	161,654	21%
	Av animals / household	3	3.76	12%
Buffaloes	Households	22,127	19,119	-14%
	Animal numbers	95,921	96,484	1%
	Av animals / household (head)	4	5.05	16%

Livestock are raised throughout Timor Leste, with some interesting spatial patterns. Based on 2010 census data, Seeds of Life (unpublished manuscript) conducted a cluster analysis to establish the dominant ownership of livestock numbers at suco level (see Figure 12; manuscript in preparation). Goats appear to be best suited to the dry northern coastal area and Oecussi, sheep around Bacau, a combination of animals in the northwest around Bobanaro, while livestock ownership is low in the

central highlands. Cattle and buffalo are widely held throughout eastern, western and southern TL, and Oecussi, as elaborated in Section 4.2.

To put beef and buffalo meat production into perspective, Figure 1 provides an estimate of output of major meats in TL based on FAO (and 2010 census) statistics. The figures suggest that pigs account for 77% of meat output and are raised by 67% of households in TL; beef and buffalo meat make up 9% and 4% respectively, although as discussed in Section 2.4, this is likely to be understated.



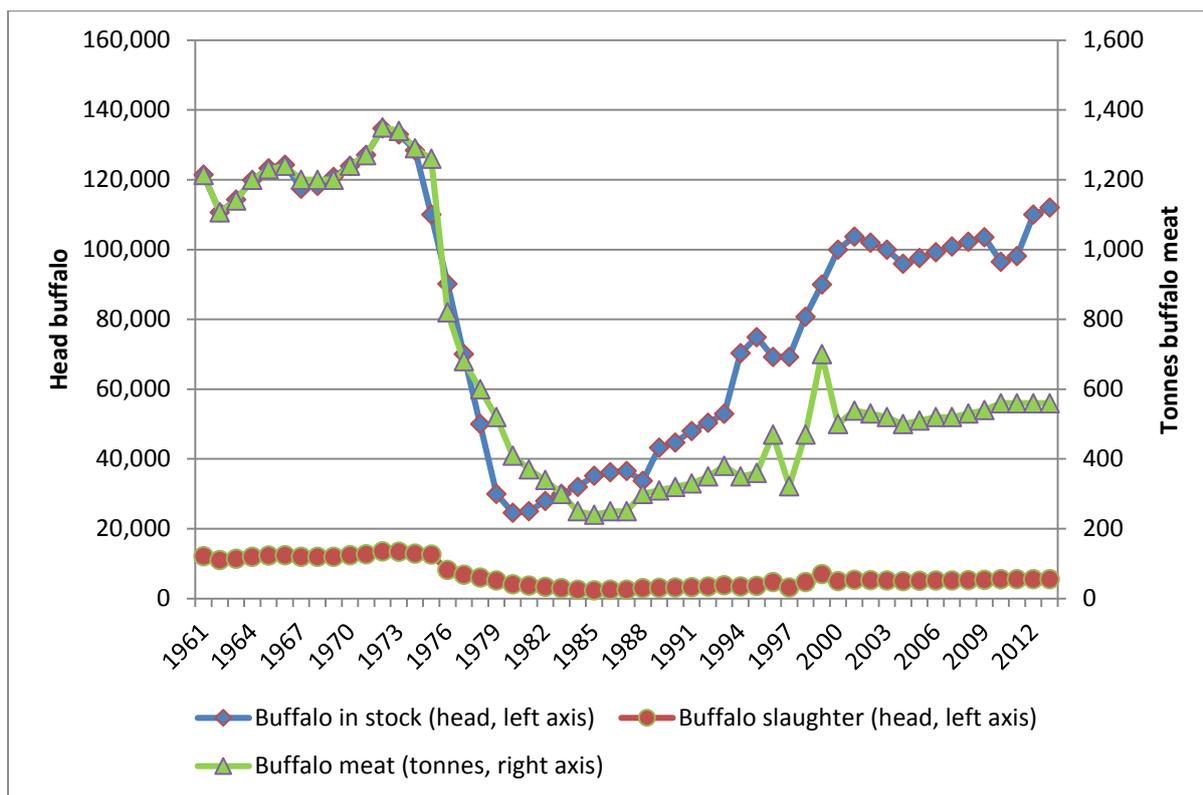
**Figure 1. Meat output in TL 2013 (tonnes).**

Source: FAOStat

## 2.2. Production-side industry statistics

Statistics for cattle and beef production are incomplete and have limitations (see Box 1) but nevertheless provide important indicators of industry structures and trends.

Figure 2 shows long term national cattle and beef statistics for TL. Buffalo have traditionally had a strong role in agricultural and cultural systems in TL; they can compete with cattle for some farm resources (feed, draught, ceremonies) and the meat can be a direct substitute for beef in generic markets.

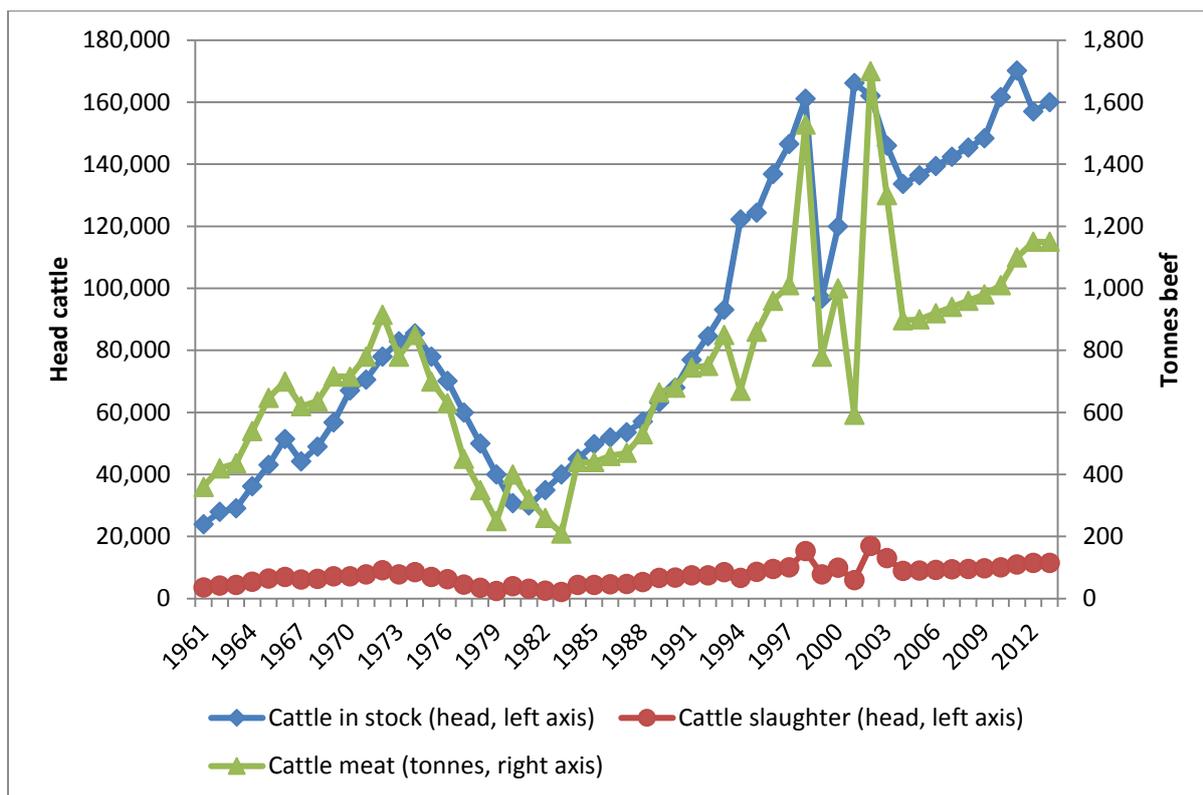


**Figure 2. Buffalo and buffalo meat production indicators.**

Source: FAOSTAT

High buffalo numbers in the 1960s plummeted throughout the 1970s, but have since increased gradually. Buffalo are widely thought to play a diminishing role in farm systems, but statistics suggest otherwise. 2010 census data indicates that about 2,000 households stopped raising buffaloes between 2004 and 2010, leaving about 19,000 households, while stock numbers plateaued at 96,000 head. Year-on-year (not census) statistics report that numbers increased to 112,000 in 2013, 5,600 are estimated to be slaughtered per year, meaning a turnoff rate of only 5.1%. Buffalo meat production of 560 tonnes is based on 100kg CW per head. The main production districts are Viqueque (where numbers declined by an annual average of 0.3% between 2004 and 2010), Baucau (decline of 2.4%) and Lautem (where numbers were stable). This was offset by herd increases in smaller buffalo producing districts.

Beef cattle production indicators are presented in Figure 3. TL has a short history in beef cattle production, based on the introduction of Bali cattle from Indonesia from the late 1970s. The withdrawal of Indonesian occupation in 1999 saw a very large scale killing of cattle by the Indonesian army.



**Figure 3. 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 would mean a slaughter rate (per 100 head of cattle) of around 7.3%.<sup>2</sup> As a proxy indicator of commercialisation, this compares with Indonesia (13%), SE Asia (14%) and the world (21%).

MAFF commodity briefs have in the past estimated the value of the cattle and beef industry by multiplying reported slaughter numbers by an average price per head. At an assumed average price of \$400, the value of the beef industry may be \$4.6 million in 2013 and \$2.24 million for buffalo.

Other indicators derived from census data to district level are shown in Table 2. These data show that 23% of all households (43,000 households) in TL in 2010 raised cattle, totalling 161,654 head. In

<sup>2</sup> However, derived estimates in Section 2.4 suggest that about 6,600 cattle may enter Dili per year, and another 10,000 are traded within the 13 districts. Estimates in 6.3.4 suggest that another 5,000 head are traded into Indonesia. A total of 21,778 head turnoff and stock numbers of 161,654 head (as reported in the 2010 census), means a turnoff rate of 13.47%, comparable to Indonesia.

### Box 1. Statistical issues for cattle and beef production in TL

Indonesian top-down statistical methods used in the pre-independence era certainly contained inaccuracies but statistical reporting in TL collapsed at the end of the 1990s. TL does not have a year-on-year bottom-up agricultural statistics collection and reporting system. Rather, data is extrapolated from previous years based on formula (the same as that used in Indonesia) on herd growth (reproduction, mortalities, slaughter age), slaughter rates (to derive slaughter numbers) and average carcass weights (to derive beef production). The statistics are reset based on cattle numbers collected in the national census of 2004 and 2010. There is a consensus that cattle numbers are under-stated in the census data because farmers under-report their cattle numbers. This is partly a vestige of the tax collection system in the Portugese era, and partly for social reasons or because it is not always easy to reconcile numbers if cattle that people owe or are owed are taken into account. When asked how many cattle a farmer has, he might raise 4 fingers which might mean 4 or 40 head. Some sucos (e.g. Guico) ask households to register cattle with mixed success. As an indication of the inaccuracies, a district (Oecussi) ordered vaccinations based on reported livestock numbers and found a large shortfall. In Passabe sub-district in Oecussi for example, DGLS vaccinated 2,245 cattle, which compares to the 2010 census of 1,593 head. MAFF have considered conducting a dedicated livestock or and cattle census. Despite the inaccuracies, the data is the most comprehensive available. If levels of under-reporting is consistent over time then observed trends will be valid, and if consistent over area, then comparisons will also be broadly valid.

more extensive production areas of Bobonaro, Cova Lima and Oecussi, over 40% of households raised cattle. Annual compounded cattle numbers have increased in virtually all districts since 2004, with increases above 7% per year in Ainaro, Cova Lima, the special case of Dili and Lautem.

**Table 2. District cattle and household indicators in the cattle sector, 2010**

Source: NSD and UNFPA (2011)

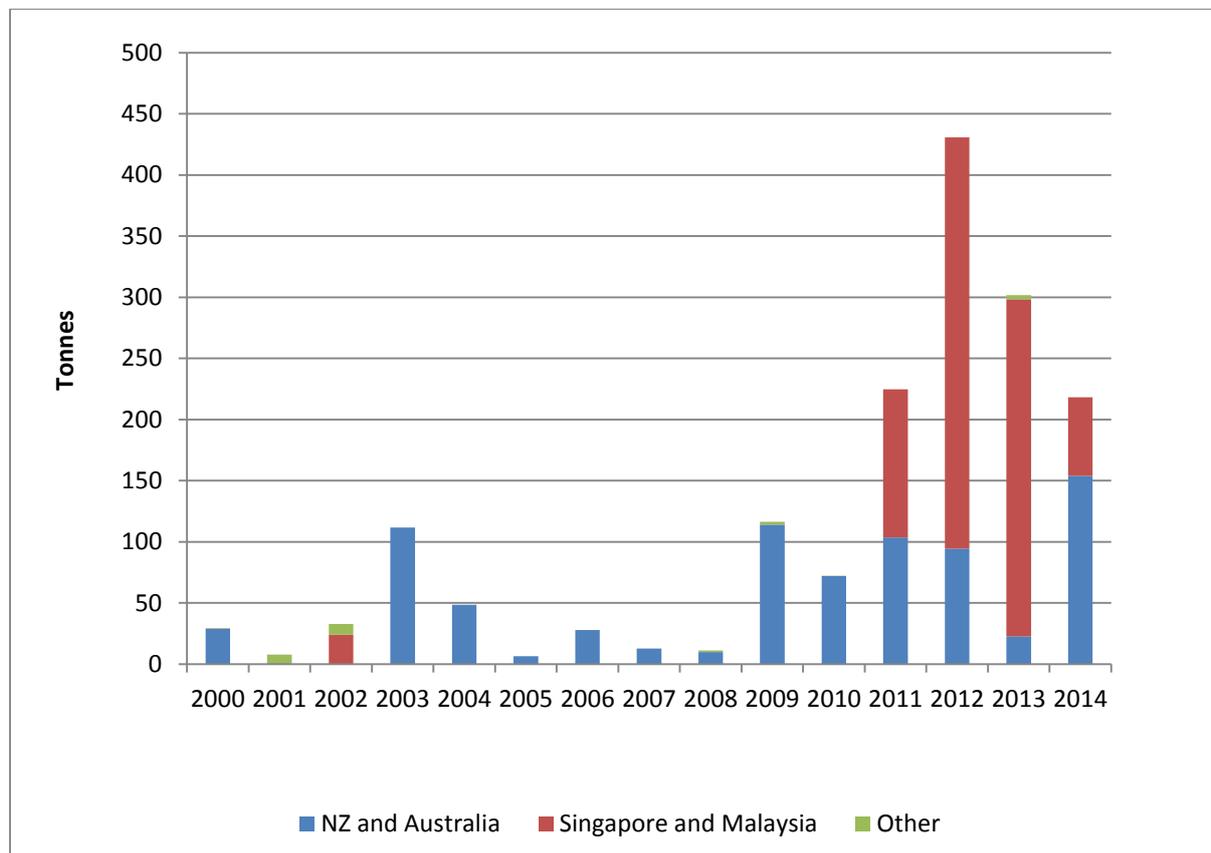
	Households with cattle 2010	Annual average increase since 2004 (compounded)	% of households with cattle 2010	Cattle numbers 2010 (head)	annual average increase since 2004 (compounded)	Av herd size 2010 (head / household)
TIMOR-LESTE	43,028	1%	23%	161,654	3%	3.8
AINARO	1,688	1%	17%	6,435	7%	3.8
AILEU	2,139	1%	31%	4,697	5%	2.2
BAUCAU	1,511	-2%	7%	6,165	-1%	4.1
BOBONARO	7,313	1%	43%	29,235	3%	4
COVALIMA	5,472	4%	49%	22,378	8%	4.1
DILI	779	1%	2%	3,597	8%	4.6
ERMERA	4,755	2%	25%	11,255	4%	2.4
LIQUIÇA	3,276	4%	32%	8,018	5%	2.4
LAUTEM	2,853	2%	25%	16,874	7%	5.9
MANUFAHI	2,039	2%	26%	7,559	5%	3.7
MANATUTO	1,590	1%	23%	6,204	6%	3.9
OECUSSI	6,178		44%	16,562		2.7
VIQUEQUE	3,435	-1%	25%	22,675	3%	6.6

## 2.3. The trade sector

### 2.3.1. Beef imports

While TL produces enough beef to be self-sufficient, lack of capacity to meet the supermarket and high-end hotel, restaurant and institution (HRI) trade means that TL imports some beef, the vast

majority of which 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. 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, September 2015). The average value of imported beef, \$6.70/kg, was higher than domestic prices. Very little fresh beef was imported before 2014, when 10 tonnes was imported from Singapore (average value \$7/kg). The volume of beef imported would (at a carcass weight of 150kgs) be the equivalent of about 1,000 cattle.



**Figure 4. Frozen beef imports TL.** Source: UNComtrade accessed October, 2015

From 2011 to 2013, statistics show larger imports of frozen “beef” mainly from Malaysia but also Singapore of 278 tonnes in 2013, although this dropped back to 64 tonnes in 2014. Inquiry failed to reveal the details of this trade, but it is almost certainly re-exported carabeef from India. The price of the product from Malaysia was just \$5.25 in 2015, lower than domestic prices. Trade statistics register this as imported beef, but may be re-exported to other countries (significant amounts of carabeef enters Indonesia through grey channels). Alternatively, the product could be absorbed into domestic consumption, possibly for institutions (army). Frozen meat is unlikely to be sold in wet markets where beef is sold fresh, and the difference is easily discernible by consumers.

### 2.3.2. 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 and the sector has been targeted under several policy and development programs. Export numbers when the trade was

legal and formal are reported in Table 3. The formal trade was banned in 2010 and replaced with an informal trade of roughly the same scale (see Section 6).

MAFF also reported on the export of cattle and buffalo hides in this period, which amounted to nearly 5,000 hides in 2009 (Table 3). 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, trade data does not appear in trade databases.<sup>3</sup>

**Table 3. Formal cattle and beef exports 2005-10.**

	Cattle (head)	Buffalo (head)	Hides (pieces)
2005	2,913	99	
2006	2,473	151	
2007	2,022	410	
2008	1,201	260	400
2009	910	76	4,872

Source MAFF, 2010

## 2.4. Bovine meat supply – demand structures

This section attempts to reconcile the supply, demand and trade of cattle and beef at a national level. It draws on the net supply method to derive per capita consumption of bovine meat. Data is summarised in Figure 5.

Rows under **1** represent domestic production.

**Row 1A** draws on FAO statistics on cattle and buffalo numbers, multiplied by indicators (slaughter rate and carcass weight) to derive cattle and buffalo meat production. As is widely known, these reported production figures are significantly understated, confirmed in this analysis by comparison with alternative methods of estimating production.

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<sup>3</sup> Anderson (2008) reports that there were two hide exporters in Dili, but that by 2007, there was just one (“Timor Flower”, based in eastern Dili). The exporter received about 15 hides per day from butchers in Dili and irregularly from the districts. Hides were scraped (for fat) and sun-dried, and folded (not salted). Damage from brands and slaughter were said to be common especially for cattle. The exporter exported about one container of hides per month to Surabaya. Enquiries suggested that the largest butchers in Dili (Cipiano, Amaro) were the exporters in 2013/4.

	Cattle in stock	Cattle slaughter	Cattle meat (t)	Buffalo stock	Buffalo slaughter	Buffalo meat (t)	Bovine slaughter	Bovine meat (t)	Source/assumptions								
<b>1. Domestic production</b>																	
<b>1A. Reported - census and FAO</b>																	
	161654	11801	1180.07	96484	4,921	492.07	16721.4	1,672	2010 census data and FAOstat 2012 coefficients cattle 7.3% turnoff rate & 100kg CW, buffalo 5.1% turnoff rate & 100kg CW								
<b>1B. Derived - from trade/slaughter</b>																	
<b>Dili</b>																	
Dili butchers		5,183	653		2,117	267	7,300	730	20 head cattle and buffalo per day MAF estimate 2012, checkpoint data 29% buffalo, CW 126kg								
Tibar abattoir		660	99				660	99	55 cattle per month, 150kg CW								
CCT		360	54						30 cattle per month, 150 kgs CW								
<b>Districts</b>		10,140	801		676	53	10,816	854	15 cattle, 5 buffalo per week for 13 district seats, 79kg CW								
<b>1B. Sub-total</b>		16,343	<b>1,607</b>		2,793	320	18,776	1,683									
<b>2. International trade</b>																	
<b>2A. Meat imports</b>																	
Imports frozen HRI trade			163					163	Frozen bovine meat from NZ, Aust - assumed to be beef for supermarkt & HRI trade								
Other unknown						278		278	Frozen bovine meat carabeef from Malaysia and Singapore. Assumed to be re-exported, not used in balances								
<b>2B. Live exports</b>		5,000	750		500	75	5,500	825	From project investigation, 150kg CW								
<b>2. Sub-total</b>			<b>-587</b>			<b>-75</b>		<b>-662</b>									
<b>3. Domestic supply of beef for consumption</b>																	
<b>3A. Aggregate domestic supply for consumption (tonnes)</b>																	
Census stats			593			417		1,010									
Derived			1,770			320		2,090									
<b>3B. Per capita domestic supply for consumption (kg/capita/year)</b>																	
Based on 2010 census population of 1,066,582																	
Census stats			0.56			0.39		0.95									
Derived data			1.66			0.30		1.96									

Figure 5. Aggregate supply, trade and consumption of cattle and buffalo meat. Source: FAOstat, MAFF and author calculations

To cross-check and disaggregate these figures, **Rows under 1B** estimate domestic production through disaggregation of slaughter and consumption channels.

- Based on checkpoint data, MAFF estimate that 20 cattle enter Dili per day for slaughtermen with an average bone-in carcass weight of 126 kgs. An additional 3 animals are slaughtered per day through Tibar abattoir (150kgs) and 30 animals per week through CCT (150kgs).
- MAFF estimate that 15 cattle and 5 buffalo per week are slaughtered in the districts, in both urban areas and for ceremonies. This is roughly in line with survey data reported in Valera (2014). This average applies in urban areas where fieldwork was conducted (Maliana and Oecussi) but may be more in other areas (Bacau) or less in other areas.

The two methods were used to estimate domestic supply, with the derived supply found to be more than double than that suggested by official statistics.

Rows below **2. International trade** are divided into:

- **2A. Meat imports**, which is based on UNComtrade data on bovine meat (Figure 4). Mainly frozen bovine meat from New Zealand and Australia distributed in supermarkets and the HRI trade in Dili (163 tonnes). As mentioned, large volumes (278 tonnes) of bovine meat (almost certainly carabeef from India) was imported from Malaysia and Singapore, but this reduced to 64 tonnes. Because the origins and end uses of this beef is not known, these imports are not considered in balance calculations
- **2B live cattle exports** are estimates from Section 6.

The estimates suggest that Dili is a major consumption area (806 tonnes) followed closely by the live export markets (750 tonnes equivalent). It is likely that about the same volume of beef is consumed in the districts (district slaughter and ceremonies) (801 tonnes), where 73% of the TL population live.

Rows under **3. Domestic supply of beef for consumption** calculates the amount of beef available domestically for consumption. **3A Aggregate supply** is calculated by adding “**1. Domestic production**” and “**2A beef imports**”. (2B live exports are not available for local consumption so not included in calculations). The large differences (of more than 100%) in reported domestic production (1A) and derived domestic production (1B), is carried over into net supply (**3A**). Dividing net supply by the TL population reported in the 2010 census generates net per capita domestic supply for consumption (**3B**), which varies from 0.56kg/person/year using reported statistics to 1.66kgs using derived data. This is broadly in line with FAO estimates on per capita supply, and shows that widely-used estimates of beef consumption in TL (of 9.2 kg per capita; Soares, 2010) are grossly over-stated.

## 2.5. Beef value chains in TL

Calculations above are presented in value chain form in Figure 6, which also provides a framework for sectoral analysis in the rest of the report.

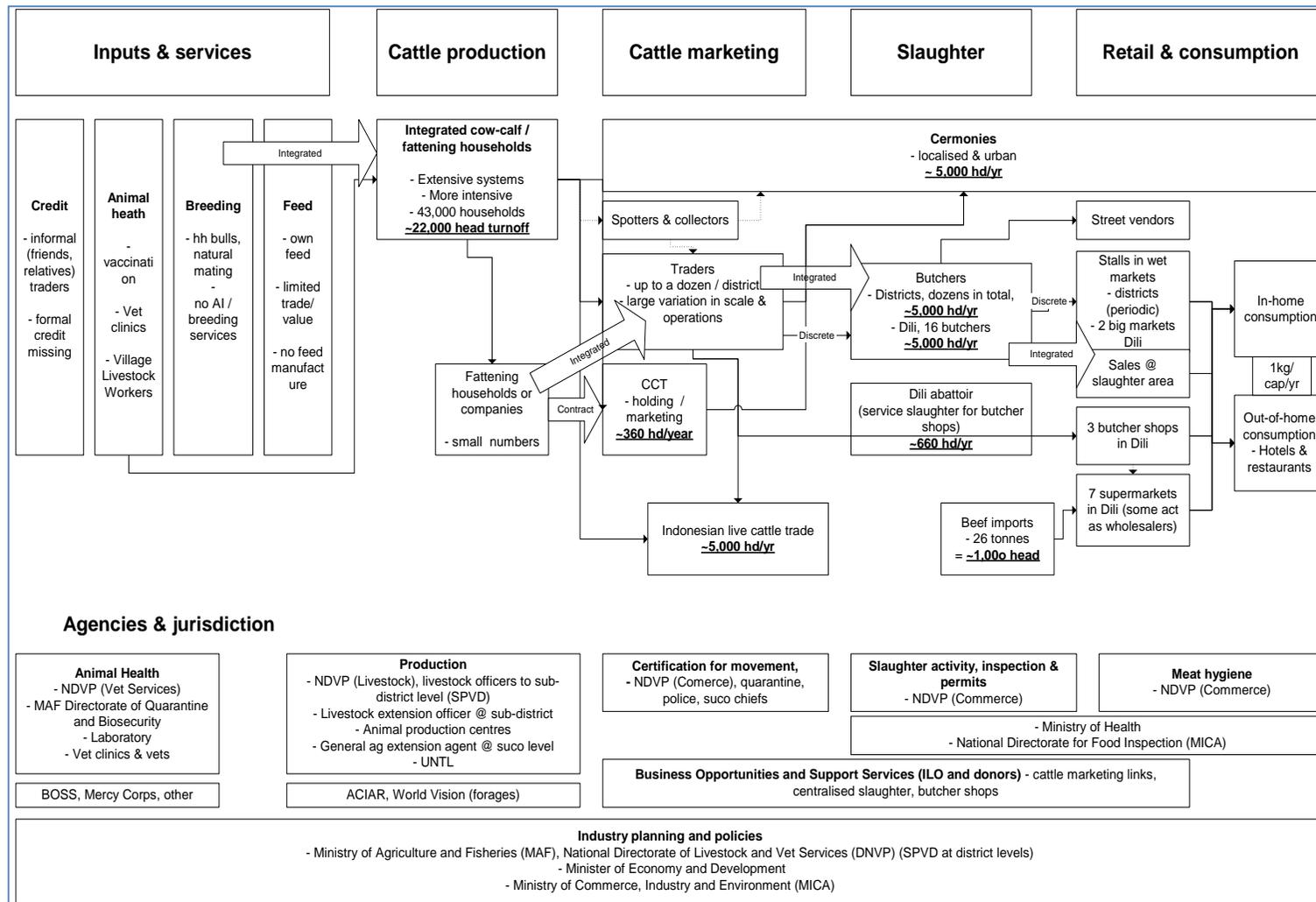


Figure 6. Supply chains and agencies in the TL beef industry

While the detail of Figure 6 is discussed in sections 3 to 8, it contains 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 and feeding households, in production systems dominated by grazing, supplemented by crop residues and forages in some areas. 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.

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 turnover) 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<sup>4</sup> in Dili (25%) and another **5,000** in the 13 districts.
- In additional **1,000** cattle per year flow into Dili independently of the traditional slaughterhouses. Approximately 360 are marketed through CCT and 660 head are service slaughtered through the central abattoir in Dili and two 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 significant at the equivalent of about **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.
- Another **5,000 cattle** (approximately) are traded live across the border to Indonesia. This number is likely to have reduced in 2015 with the disruption to the southern trade route from Suai.

A number of agencies that oversee and deliver services into the industry are shown in Figure 6. However, it is important to note that actual activity by the agencies can be low. MAFF and in particular DGLVS have wide-ranging powers across all aspects of the industry. Development agencies, especially the BOSS project, also have a large impact on multiple sectors.<sup>5</sup>

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<sup>4</sup> Spot markets occur through private treaty, usually through traders or at market places, with cash paid at the time of the transaction (on the spot). This differs to transactions conducted through contracts, futures exchanges or auctions.

<sup>5</sup> The Business Opportunities and Support Services (BOSS) Project takes a public-private partnership (PPP) approach, facilitated by the International Labour Organisation (ILO), in cooperation with the Secretary of State for the Support and Promotion of the Private Sector and MAFF (DGLVS), with private sector investment (EDS), and funding from Irish Aid and NZ Aid.

## 2.6. The role of cattle in rural development

TL had a GDP of \$1.165 billion in 2013, which notionally classes the country as a low-middle income country, and has sustained growth rates of between 8% and 14% since 2007 (World Bank development indicators, accessed 2015). However, TL is amongst the most oil-dependent countries in the world, with non-oil per capita GDP of \$610 in 2010 (RDTL, 2010). TL is ranked 128 (of 187) in the UNDP Human Development Index with 49.9% of the population falling below the national poverty line (\$1.25 per day). Following three years of double-digit inflation, commodity price rises eased in 2014 (Asian Development Bank, 2014).

Beef is of significant interest as a development activity for the TL government, donors and researchers. In principle, cattle appear to be an attractive development activity. Cattle are raised by a large number of households, have an established production position in TL farming systems, and make up a significant proportion of household income. There are established cattle and beef markets, both domestic and export, and beef makes has an established place in the TL diet.

Census data of 2010 shows that livestock is clearly an important economic activity in TL. 80% of households in TL raise Livestock – 88.3% in rural areas and 56.1% in urban areas. Of this, data presented in Table 2 suggests that 23% of all households in TL raise cattle (43,028 households). Regional variation is shown in Figure 7. Only in the urbanised areas of Dili and Bacau (as well as Ainaro), do less than 20% of households raise cattle. Conversely, household numbers per sub-district in the West are small, but a significant proportion of these – more than 30% – raise cattle. The proportions are lower in the east where households are engaged in other activities. 10% of all households in Timor Leste (19,119) raise buffalo.

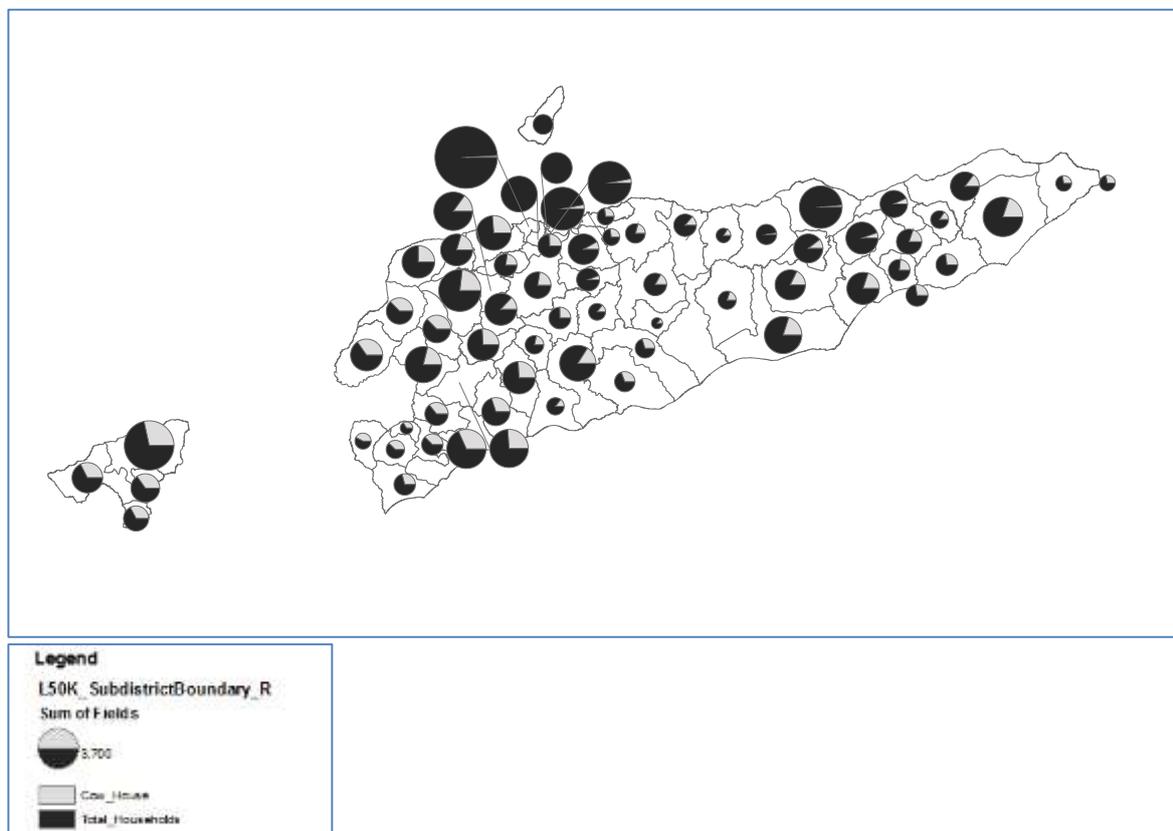


Figure 7. Number of households per sub-districts (size of circle) and proportion of households that raise cattle (grey slice). Source 2010 census.

Other studies provide insights to the relative importance of beef as a development activity. The Timor-Leste Household Income and Expenditure Survey 2011 (NSD, 2011) was conducted over a year, with 4,800 households or 2.5% of the population throughout the country. Amongst other data, the survey collected household income data and found a mean monthly household income of \$378 (urban \$634, rural \$292). Breakdowns by farm and off-farm activities are presented in Table 4.

The table confirms that livestock is a major rural activity in TL, and that cattle make up a significant component of rural incomes for TL as a whole. Importantly, income from livestock – and cattle in particular – is derived almost totally (99%) from sales, rather than own-consumption or as gifts (although the survey appears to exclude the role of commodities in ceremonies).

The table also summarises non-agricultural income (business, off-farm work and remittances) and other incomes and money transfers (social benefits and gifts). While the amounts are significant, they mask inter-regional and inter-household variation and demographic access to off-farm work. On-farm agricultural activities account for the majority (65%) of total incomes, suggesting that opportunity costs of off-farm labour are low.

**Table 4. Mean monthly income for surveyed households, 2010.**

Activity	Urban		Rural	
	Income	Sales	Income	Sales
Rice	\$4.52	54%	\$7.70	29%
Maize	\$1.29	38%	\$4.43	28%
Cassava	\$1.25	23%	\$4.51	35%
Fruits and vegetables	\$16.23	63%	\$22.21	54%
Coffee	\$10.27	93%	\$30.88	92%
All crops	\$37.02	66%	\$84.90	67%
Chicken	\$3.00	66%	\$8.03	78%
Pigs	\$17.99	79%	\$27.22	92%
Cattle	\$4.63	93%	\$19.87	99%
Buffalo	\$8.41	98%	\$15.83	95%
Other livestock	\$0.89	29%	\$1.37	74%
Total livestock	\$34.92	83%	\$72.32	93%
Fishing	\$1.69	24%	\$2.42	85%
Forestry	\$1.54	40%	\$5.09	33%
Total non-agricultural business and incidental work	\$183.92		\$44.95	
Total other income and money transfers	\$168.37		\$41.83	

Source: NSD, 2011.

The relationships between income categories and cattle activities were investigated in the 2007 Timor-Leste Survey of Living Standards (NSD, 2008). The survey distinguished between poor and non-poor households based on a poverty line in 2007 of US\$0.88 per day per person.

The survey shows that households own cattle at similar numbers regardless if they are non-poor (33%) or poor (29%). However, the average number of cattle per households was higher for non-poor households (2.01 head) compared to poor households (1.1 head). The survey also found that only 13% of non-poor households and 16% of poor households sold cattle over the survey year.

Sales and income disaggregated by sub-district in 2007 are shown in Figure 17 and Figure 18.

## 2.7. Industry development policies

Given industry settings and the place of the industry in the TL economy, the GoTL and other agencies have sought to develop the industry through a range of policies and programs. These government policies have been influenced by development programs (ARP, RDP, BOSS). This section briefly reviews policy settings and themes. The way these are played out and match with industry activity / structures is examined more closely in the sectoral analysis from Sections 3 to 8 of the report.

One recent policy document that provides a concise summary of reoccurring goals and programs for the industry is shown in Table 5. Three broad over-arching strategies are listed: increased production and productivity; import replacement and export promotion; and an increase in public goods (especially animal health). Underpinning the approach is that constraints to industry development are on the supply rather than the demand side, but that key sectors of the chain (e.g. slaughter) require strengthening and modernisation.

**Table 5. Government goals and measures for beef industry development 2013-2030**

2013 – 2017	2018 - 2022	2023 – 2030
<b>Goals</b>		
<ol style="list-style-type: none"> <li>20% increase in Bali cattle numbers over 5 years</li> <li>200 tons of imported meat ("beef") per year replaced by domestic product</li> <li>5,000 cattle exported annually</li> <li>80 cattle slaughtered every day in slaughterhouses for domestic consumption</li> </ol>	<ol style="list-style-type: none"> <li>30% increase in Bali cattle production</li> <li>200 tons of meat exported per year</li> <li>10% of milk consumed in school meals is produced locally</li> <li>Industrialization of livestock products</li> </ol>	<ol style="list-style-type: none"> <li>50% increase in Bali cattle production</li> <li>Livestock products processing and industrialisation developed and sustainable</li> <li>Export of meat and livestock products contribute 40% of non-oil GDP</li> </ol>
<b>Programs</b>		
<ol style="list-style-type: none"> <li>Location of potential areas for intensification of Bali cattle production (Oecusse, Maliana, Suai, Viqueque and Los Palos)</li> <li>Beef cattle census (Bali Cattle)</li> <li>Improving the conditions of pens and vaccination</li> <li>Preservation of native pastures, development of fodder crops and forage conservation in main production areas</li> <li>Breeder selection and bull castration</li> <li>Animal Health Centers for Bali cattle</li> <li>Formation of new groups of Bali cattle farmers in main production areas</li> <li>Disease treatment and vaccines throughout country</li> </ol>	<ol style="list-style-type: none"> <li>Establishment of an Animal Production Research Center</li> <li>Genetic improvement of cattle breed (Bali cattle).</li> <li>Improvement of grazing animals and nutrition</li> <li>Animal Health Centers Establishment in all Districts and clinics in all Sub-Districts</li> <li>Establishment of a slaughterhouse and a meat packing center for export</li> </ol>	<ol style="list-style-type: none"> <li>Establishment of a system of management and control of animal diseases throughout the territory</li> <li>Establishment of certified abattoirs and butchers in all districts and sub-districts</li> <li>Promote partnerships with financial centers and attracting investment (private sector) in cattle production area and industrial processing of livestock products</li> </ol>

Source: DGLVS (2013)

More specific programs undertaken by GoTL are outlined by the Secretariat of State for Livestock (2010) based on Anderson (2009).

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
- Contribute to achieving and securing food security in the country

The program consists of three levels: strategic, technical and supplementary.

Strategic programs include:

- Prioritising zones for livestock development
- Partnership development (donors, stakeholders, private sector)
- Capacity development (of all stakeholders)
- Policy and regulations (for intensification of livestock production)
- Data collection (for planning and intensification)
- Rural credit development (with credit unions and banks for intensification)

Details of the “technical” and “supplementary” programs are summarised in Table 6.

**Table 6. MAFF technical programs 2010-2014**

PROGRAM	Years 1-2	Years 3-5
<b>Technical</b>		
Animal Health and facilities	<ul style="list-style-type: none"> <li>• Free vaccination</li> <li>• Disease surveillance &amp; treatment</li> <li>• Upgrade the existing mini lab</li> <li>• Construct Animal Clinic</li> <li>• Join OIE</li> <li>• Support Village Livestock Workers</li> <li>• Train Pharmaceuticals and Vets</li> <li>• Legislation on pharmaceuticals for animals, “compulsory cooling” &amp; remuneration for animals seized/killed in epidemic zone</li> </ul>	<ul style="list-style-type: none"> <li>• Continue free vaccination</li> <li>• Disease surveillance &amp; treatment</li> <li>• Upgrade mini Lab into a Central Livestock Lab, train Lab analysts</li> <li>• Use of Animal Clinic</li> <li>• Train vets rapid disease identification and response</li> <li>• Improve reporting system at District and Central levels</li> <li>• legislation on registration of people licensed to treat animals, livestock identification &amp; control of livestock movement</li> </ul>
Animal Nutrition	<ul style="list-style-type: none"> <li>• Prioritised zones for improved grazing</li> <li>• Introduce improved feeding practices for survival and intensive production</li> <li>• Cultivation of selected forages</li> <li>• Organise training of trainers to 10 staff of MAF, 10 livestock owners and 5 others (areas above)</li> </ul>	<ul style="list-style-type: none"> <li>• Pilot projects in prioritised zones for improved grazing</li> <li>• Projects for improved feeding practices</li> <li>• Collaborate with farmers to cultivate forages</li> <li>• Legislation to regulate the grazing system throughout Timor-Leste</li> </ul>
Reproduction and breeding	<ul style="list-style-type: none"> <li>• Upgrade breeding facilities at the Breeding Centre</li> <li>• Train MAFF staff</li> <li>• Select and stock breeding animals</li> <li>• Comparative Study(ies) on breeding technologies</li> </ul>	<ul style="list-style-type: none"> <li>• Conduct breeding activities at the Breeding Centre</li> <li>• Cooperate with private sector</li> <li>• Establish formal links with International Breeding Centres</li> <li>• Keep selected stock for breeding</li> </ul>

	<ul style="list-style-type: none"> <li>• Intensify production for international market</li> <li>• Develop and promote the production of pigs, goats and chicken for local market</li> </ul>	<ul style="list-style-type: none"> <li>• Train MAFF staff and private sector</li> </ul>
Market and Agro-processing	<ul style="list-style-type: none"> <li>• Renovate all slaughterhouses in Dili and districts to meet standards</li> <li>• Socialise the need for retailers to sell fresh meat and stop selling in inappropriate places around Dili and districts</li> <li>• Prepare a regulation to control meat processing and sales of fresh meat in local markets</li> <li>• Develop and promote the production of chicken, pigs, goats for local market</li> </ul>	<ul style="list-style-type: none"> <li>• Construct new slaughterhouses in remaining districts</li> <li>• Construct 2 meat-retailers in Dili and one in each district</li> <li>• Construct one Animal Health Centre in Oecusse, Suai and Bobonaro to provide health certificates to animals prior to export</li> <li>• Cooperate with the Ministry of Foreign Affairs to promote the export of live cattle to Indonesia and other ASEAN countries</li> </ul>
<b>Supplementary</b>		
Quarantine	<ul style="list-style-type: none"> <li>• Continue to develop regulations</li> <li>• Prepare Quarantine Agreement with Indonesia and Australia</li> <li>• Staff capacity development of staff in inspection services</li> <li>• Train staff in data collection and reporting</li> <li>• Establish in-site mini-Lab at the border zones (each in Oecusse, Suai and Bobonaro) for quick diagnosis</li> <li>• Participate in the Disease Surveillance System</li> <li>• Socialization of Quarantine regulations</li> </ul>	<ul style="list-style-type: none"> <li>• Continue participation in the Disease Surveillance System</li> <li>• Share Quarantine information with Indonesian and Australian Quarantine offices</li> <li>• Development of border market activities</li> <li>• Upgrade the technical capacity of Quarantine staff</li> <li>• Together with NDLV prepare a legislation to control animal movement</li> </ul>
Research and Adaptive learning	<ul style="list-style-type: none"> <li>• Identify, determine and conduct field research or adaptive trials</li> <li>• Establish official links with Agro-research Institutes (in TL, Indonesia, ACIAR)</li> <li>• Train MAFF staff</li> </ul>	<ul style="list-style-type: none"> <li>• Continue cooperation with national and international agro-research institutes</li> <li>• Establish a mini-library</li> <li>• Seminars to explain research and trial results</li> <li>• Participate in the regional and international seminars on livestock development</li> </ul>

Source: Amended from the Secretariat of State for Livestock (2010)

A preview of these policy summaries suggest that TL has developed a broad, comprehensive policy framework for development of the sector. Interviews with MAFF district officers suggest that broad national directives are indeed incorporated into planning at district levels and below, but that implementation is highly variable.

Policy-makers have taken a staged approach to the development of regulations. For example, four major regulations were passed by parliament and promulgated in May 2014. These are:

- 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
- Slaughterhouse permit regime

The regulations were developed with specialist input (based heavily on overseas experience (Portugal) and drafted for consideration and consultation. The drafts were before parliament for an extended period, partly due to concerns on how well adapted they are to TL conditions, but were passed in 2014. The regulations are now being “socialised” with stakeholders, in preparation for implementation.

While this report seeks to describe rather than critique or recommend alternative approaches and settings, fundamental questions arise about policy settings in any context (country or industry), including whether the policy goals are appropriate and achievable. In this regard questions arise about the following issues:

- The emphasis on increased cattle numbers rather than production (e.g. slaughter or beef output) or returns to cattle production and farm incomes.
- If goals (including for animal health and food safety) are appropriate given the stage of development of the TL beef industry.
- If goals and activities are achievable in the time frames indicated (including centralisation of slaughter and markets, import replacement, animal health and quarantine)
- And if the resources are available to bring about policy outcomes (capacity, institutions and funding).<sup>6</sup>

That is, the policies and regulations are designed to forge industry development and to meet what government (and other stakeholders including NGOs) perceive to be social objectives. However, in doing so, policy-makers face deeply embedded traditional institutions (amongst households and slaughtermen for example) that are resistant to change, and that a young and under-resourced state will struggle to implement and enforce. Issues of policy scope and sequencing arise.

These issues can be sector-specific and require context, so are discussed in more detail in the sectoral analysis below.

## 2.8. Agencies

A number of government agencies have a role in the industry, including the Ministry of Development and Environment; the Ministry of Industry, Commerce and the Environment; the Ministry of Health; and the national Police Force.

By far the most important agency overseeing the cattle and beef sector is MAF, which is briefly overviewed here.

Table 7 shows the proposed structure of MAFF in 2015. Livestock and Veterinary are now divided as Directorates, but report to the same Directorate General. The structures are collapsed at local levels (Figure 8). Extension services fall under the DG of Agriculture, but coordinate for livestock extension services. District offices report up to central levels through three regional directors.

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<sup>6</sup> In 2009, agriculture contributed 30% of GDP but received only 5% of government budget expenditures. MAFF staff resources in the districts are clearly stretched (Anderson, 2009). In 2011, MAFF applied for a budget of \$90 million but only \$16 million was approved, a significant proportion of which is allocated to suco extension agents.

Table 7. Draft MAFF structure, 2015

Minister: Estanislau Alexio da Silva			
			Minister's secretary: Abrao Saldanha
Vice Minister: Marcos da Cruz			
		Secretary General	
		Advisory Board	
		Director	Administration and Finance
		Director	Human Resources
		Director	Research, Statistics, Information and Geography
		Director	Procurement
		Director	Agricultural Training
		Director	Cooperation and Food Security
		Director	Policy, Planning, Monitoring and Legal Affairs
		Director	Agribusiness
		Director	Quarantine and Biosecurity
		Director General	Agriculture
		Director	Agriculture, Horticulture and Extension
		Director	Irrigation and Water Utilisation
		Director General	Livestock and Veterinary Services
		Director	Livestock
		Heads	3 Departments (to be cut back from 5: Admin & Finance; Ruminant Livestock; Non-ruminant Livestock; Abattoirs & Industry; Animal Production Centres)
		Director	Veterinary Services
		Heads	3 Departments (to be cut down from 4: Admin & Finance; Laboratory; Medicine Control; Animal Health & Welfare)
		Director General	Forestry, Coffee and Plantation Industries
		Director	Nature Conservation
		Director	Forestry and Catchment Management
		Director	Coffee and Plantation Industries
		Director General	Fisheries
		Director	Fisheries Resource Management
		Director	Aquaculture
		Director	Fisheries Inspection
		Regional Director	Bacau
		Head	Bacau
		Head	Manatuto
		Head	Lautem
		Head	Viqueque
		Regional Director	Ainaro
		Head	Manufahi
		Head	Ainaro
		Head	Covalima
		Regional Director	Ermera
		Head	Dili

				Head	Alieu
				Head	Bobonaro
				Head	Ermera
				Head	Liquica
Inspector of financial management and auditing					

Figure 8 provides a schema of MAFF structures in one district (Liquica), although the 2015 restructuring will also change MAFF structures at local levels. There are implications for activity in the industry sectors below, and in the design of project activities.

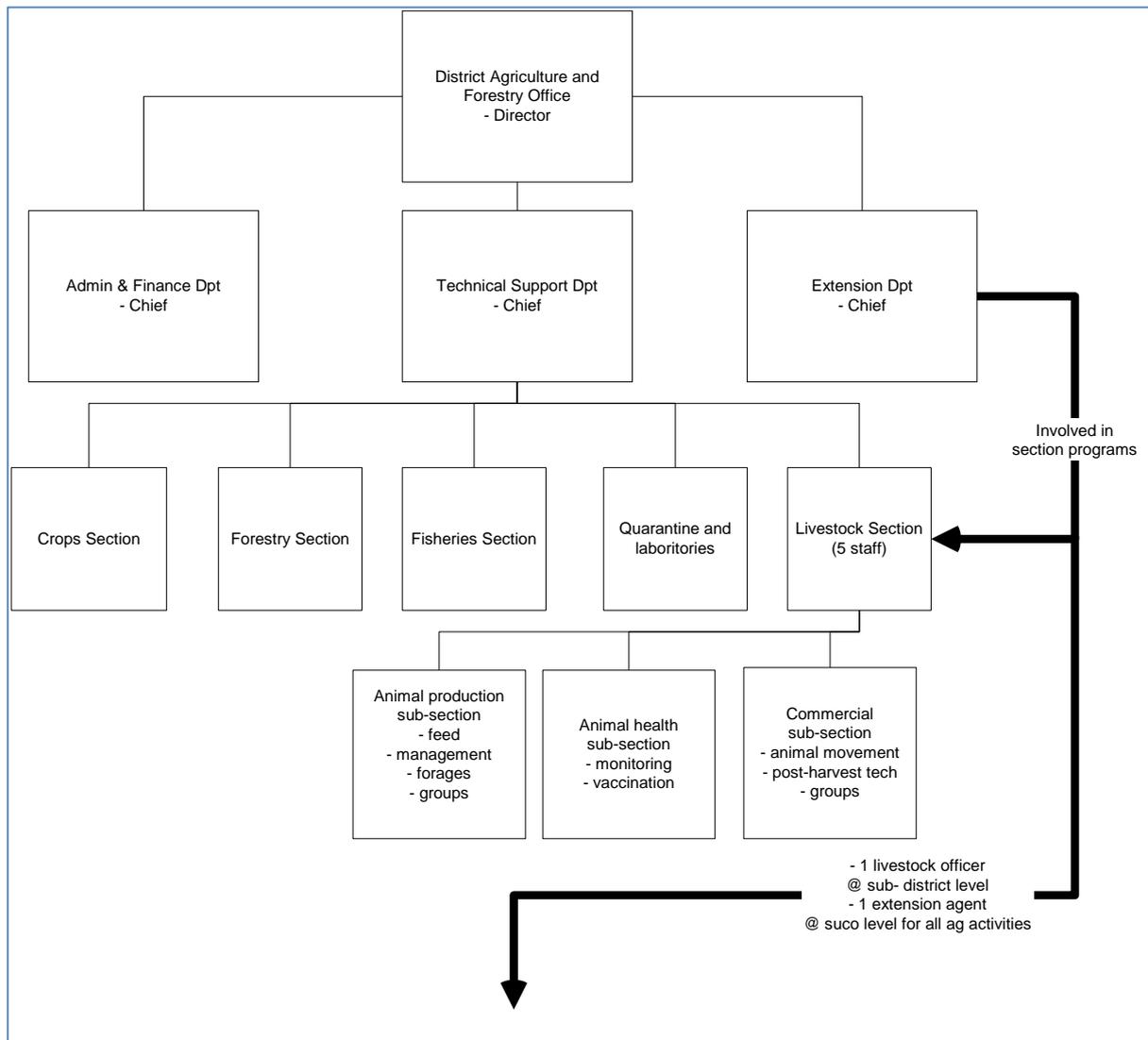


Figure 8. Liquica District SPVD structure, 2013 (before 2015 reform)

## 3. Inputs sector

### 3.1. Extension system

TL had an extensive extension network under Indonesian rule with 700 PPL extension agents down to aldeia level (MAF, 2008). After independence, resource limits and World Bank advice meant that TL did not seek to establish a public 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.<sup>7</sup> A draft Policy for Agricultural Extension was developed in 2008. The system developed was to provide publically funded services free of charge to farmers, with the following structure:

- A Directorate of Agriculture, Horticulture and Extension in MAF
- An agricultural Extension Department at District level, of which there are 13
- A senior extension officer at sub-district level, of which there are 65
- A generalist extension officer at suco level, of which there are 442

The extension system is housed within MAFF offices, including the SPVD at district and sub-district levels. Thus, there can or should be coordination between SPVD livestock officers and veterinarians that can provide specialist advice. Extension staff are provided a salary but can do after hours work and provide services for fees (or can use own vet products).

The system on paper works very differently in practice. Resources are stretched, suco extension agents have diverse and multiple tasks that can't all be completed, and face major challenges in changing semi-subsistence systems and the practices of farmers with expectations of handouts, mistrust and often low education levels. In a survey of 1,800 households in 11 districts, MAFF and SoL (2012) found that 51% of farmers interviewed had no education and 78% have only primary school education. The survey also found that most households have communications tools that could be used for extension and information purposes including mobile phone (49%), radio (22%) and TV (10%).

In addition to the extension system, there are other structures relevant to training and demonstration:

- There are three centres for livestock training and demonstration (CDTP) in Dotik and Los Palos (managed by NVPD) and Oecussi (run locally).
- Loes station, with numerous crop and forage trials, and a cattle feeding trial
- There is an agricultural senior high School run by the Catholic church called Dom Bosco in Lospalos.
- UNTL run and contribute to numerous extension, demonstration and training programs

### 3.2. Animal health

Targeted animal health problems that affect cattle and buffalo in TL include internal and external parasites such as flies and liver fluke, brucellosis and haemorrhagic septicaemia. There are likely to be other diseases of economic importance caused by infectious agents such as BVDV, but because such diseases can be quite insidious, they are difficult to recognise, to develop an understanding of

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<sup>7</sup> With the assistance of MAF, SoL, ARP, RDp and Oxfam.

their impact, and to manage. A primary health issue is under-nutrition of livestock which precipitates other diseases, eg. causes diseases when the infectious agent would otherwise have no impact. A typical example is poor condition of cows causing failure of calves to receive colostrum immediately after birth, resulting in almost certain death of the calf in the first few weeks of life; this is often incorrectly diagnosed as diarrhoea caused by infectious agents.

Government and external agencies have focussed attention on the animal health sector, including free vaccination, disease surveillance & treatment, development of the national laboratory, the development of Animal Health Centres, training of vets in disease identification and response, improved reporting systems, and the regulations issued in 2014 (registration of people licensed to treat animals, livestock identification & control of livestock movement). Animal health is seen as a public service, but is seeking to develop private sector delivery systems.

Several programs have sought to improve **biosecurity** for pigs and poultry through measures including laboratories, disease surveillance, legislation and research. The programs are run by MAFF with agencies including FAO, AusAID and USAID. The programs have led to increased monitoring on the movement of livestock stock (see Section 5.2) and consideration of legislation on compulsory acquisition and compensation (Anderson, 2008).

**Animal Health Clinics** at district level (under SDVPs) (and reportedly at some sub-districts with “high potential for livestock development”) are designed to be a resource for disease surveillance and parasitological investigations, to act as a cool chain for vaccine and medicine and samples, and as a resource for village Livestock Workers (APs) (Anderson, 2009).

A well-equipped laboratory for diagnosis of infectious animal disease (serology, bacteriology, virology, pathology) has been constructed in Dili, primarily with FAO funds. The laboratory has competent staff trained primarily by the NT government. The laboratory is often under-utilised because of the high cost of veterinary pathology and the limited funds available for this.

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). NVDP have delivered some training for brucellosis detection and treatment, but do not vaccinate against it. There are mixed reports of vaccination coverage rates for cattle from 60-80% (Valera, 2014) to 30-40% (Ministry of Economy and Development, year not reported) and 35% (SPVD Oecussi, personal communication) but aim to reach 80%. Vaccine is imported by MAFF and distributed to district offices, which then distribute them to APs and SPVD staff contracted to do the vaccinations. Constraints include financing purchases of vaccines, knowing how much vaccine to order when cattle numbers are unknown, distribution and storage (fridges), and the availability of personnel to vaccinate. It can be difficult to source vaccines in some areas. Some APs source vaccine over the border in Indonesia. Vaccination can be difficult with wild cattle as there are few yards and virtually no veterinary crushes.

For personnel, there were 11 qualified veterinarians in TL in 2008, most of whom were employed at MAFF and others at UNTL (Anderson, 2008). By 2015, this number had increased to 15, 13 at national level and another two in Bobonaro and Lautem. MAFF has a dedicated Directorate of Veterinary Services that oversee Veterinary Sub-sections at a District level. These can be collapsed with the Animal Production and Quarantine units at local levels, so effectively overseen by livestock officers in SPVDs.

At suco levels, some generalist extension agents can provide some basic animal health services, including supplying and applying animal medicines.

The major means of delivering vet services and vaccinations on the ground was envisioned to be through Village Livestock Workers (Agente Pecuaria de Suco, **APS**). More than 400 APSs (one for each suco) were trained by MAFF and under ARP projects between 2002 and 2008 (Dieleman, 2010). The APSs did not receive a salary but were paid some costs (transport, per diem), contract fees for vaccination programs, and had freedom to charge farmers on a commercial basis for other services<sup>8</sup>. It is widely acknowledged that most APSs couldn't make a living on this basis, that there was confusion amongst farmers about why some services (vaccination and extension) was free while vet services were not, that they couldn't access sufficient medicines, and that training was basic or had lapsed. Farmers are widely reported not to see the value in fees of vet services and many have a tradition of barter or reciprocal help. Thus, APSs continue in some areas, have lapsed in others, or have been absorbed into SPVD offices (as "assistant livestock technicians") or as suco extension agents.

Some projects (ILO / BOSS working with UNTL) is seeking to revitalise the APS system in some areas through training of APSs (27 in 4 districts, in veterinary and nutrition topics) who then train farmers. There have been measures (supported by SoL and Mercy Corps) to stimulate the inputs sector, including through the development of agriculture shops (loja agrikultura). These shops can include animal medicines sourced from private suppliers in Dili.

### 3.3. Feed

As discussed (Section 4), feed is sourced through grazing, crop residues and forages on-farm or 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. MAFF 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. Several projects have sought to promote forages amongst farmers, including the Don Bosco Fuiloro school in Lospalos, Dotik, World Vision (WASH) and ACIAR projects. For other comments on feed see Section 4.2.

### 3.4. Breeding

Bali cattle (*Bos javanicus*) are a highly-fertile, tropically-adapted cattle species. They have a small mature size, with mature females in moderate condition being about 275 kg. The small mature size of these cattle confers low maintenance requirements, which is a major advantage in smallholder situations, especially when hand-fed. Transport of small-mature-size cattle to slaughter is also much easier and safer than large cattle. Bali cattle are preferred by live cattle traders in Indonesia, a long-term export market. Therefore, this species of cattle is vastly superior for smallholder farming systems in Timor Leste in comparison to large exotic species, such as Brahman from northern Australia.

### 3.5. Finance

Access to finance can increase opportunities and incentives to increase productivity on both the loans and savings sides. Loans can help farmers fund purchases including cattle (especially for

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<sup>8</sup> There are parallels with the Indonesian system of animal paramedics.

fattening), fencing material, seeds for forages or vet products. Perhaps more importantly, cattle are commonly kept for long indefinite periods for cultural purposes or as a source of savings, but often beyond their optimal sale period. Depending on settings and efficiencies, it can be profitable to produce cattle in more productive systems over shorter periods, and to save money in the form of cash. This however requires that households can hold earnings in an accessible and reliable bank.

The Timorese finance system and all access points were dismantled on independence, and now consists of an array of institutions.<sup>9</sup> In 2009, 38% of the population could access a bank or microfinance institution at sub-district level, with a national financial inclusion rate of 13%. With development of the financial sector and infrastructure, the potential market size may be between 275,000 and 400,000 clients (Banking with the Poor report, 2010; Ministry of Economy and Development, year not reported).

No farmers encountered in projects or on fieldwork took out loans or held savings accounts. Some of the constraints cited on fieldwork included the following:

- The BNCTL is the development bank, but doesn't loan to small-holders (but see discussion below).
- Some providers, such as Moris Rasik, offer short-term credit (at up to 20% interest rates) but are reluctant to extend credit for cattle production, even fattening, because the production cycle is too long.
- Farmers lack collateral to enter into loans, including land certificates
- Households don't save money in formal institutions

Several measures were recommended by Anderson (2009), including:

- Providing training in business management and loan applications for entrepreneurs, local associations, and groups seeking to obtain investment capital
- Supporting APSs to facilitate credit for intensive livestock production, health services, breeding and marketing
- Providing investment capital or grants on a competitive basis for programs or projects approved by DNPV.

Other initiatives include a new law on "moveable collateral" – to overcome problems with using insecure tenure as collateral.

Interviews with BNCTL suggested that constraints to increased finance are not insurmountable. One district branch alone provided loans for 244 farmers in 12 "centres" (groups) for various commodities depending on production cycle – e.g. coffee (9 months), rice (3 months) and vegetables. The loans are not attached to projects. BNCTL has not investigated livestock, but will consider it subject to steps and criteria. Criteria include the following:

- An established group (usually 4-8 farmers,) that the bank can visit and assess. Each farmer completes an application, but the bank can deal with one person (e.g. group head)

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<sup>9</sup> There are three foreign-owned banks, one state bank (BNCTL) bank, two microfinance institutions (Tuba Rai Metin and Moris Rasik), approximately 25 credit unions of varying degrees of development, Western Union, and an array of pawn shops offering retail financial services.

- Need cash flow projections defining the period (but not necessarily important to have a formal “business plan”). IADE can provide business services.
- If a loan amount exceeds \$300, the bank needs collateral (e.g. land certificate, car, or civil servant as a guarantor. Cattle do not qualify as collateral).
- The bank loans at commercial rates – 14% in 2014 – and an additional 2% bank fee.
- Any loan account is attached to a savings account. The interest rate on a savings account is only 0.5%, and not offset against the loan
- The bank can pick up repayments on farm, or farmers can pay at a branch
- The bank requires documentation on application.<sup>10</sup>

## 4. Production sector

In context of the macro level production indicators presented in Section 2.2, this section explores characteristics of the production sector in more depth.

### 4.1. Agricultural and cattle production systems in Timor Leste

TL has four main types of farming systems: dryland farming (maize, rice, cassava, taro, sweet potato, legumes); irrigated rice; plantation cash crops (coffee, coconut, rubber, candle nut); and hunting, fishing and foraging (game, fish, seaweed, honey, medicinal plants, construction materials) (Batterbury, 2015). 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.

TL has a short history in beef cattle production, which grew under Indonesian rule and has spread rapidly throughout the country.<sup>11</sup> Households in virtually all areas of TL raise cattle based in whatever resources are available. Production systems vary around the country due to a mix of factors, including climate and resources, infrastructure and access to markets, and culture (see Section 2.2), but bear some common characteristics.

The vast majority of cattle are grazed for all or most of the year on grasslands, scrubland or scavenging around the aldeia. 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 the wet season or on irrigated areas<sup>12</sup> 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 protein-rich 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

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<sup>10</sup> Document required includes: passport photo; copy of electoral registration of application and wife; details of savings account and credit application; account history; list of participants in a group and coordinator; land value; cash flow projections; additional collateral; and the business location. At disbursement stage, the bank requires a brief explanation of credit transactions; guarantee to pay debts; binding collateral; group statement; and a loan repayment schedule.

<sup>11</sup> For a historical account of the industry see Bettencourt et al (2013).

<sup>12</sup> MAFF and SoL (2012) found that out of every 100 farmers in Timor-Leste: 84 grow cassava; 83 grown corn; 54 grow sweet potato; 38 grow rice; and 23 grow peanut

planting new trees and herbaceous legumes and grasses – but its utilisation is confined. Sago palm (rich in starch) 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 et al., 2010).<sup>13</sup> Cattle are produced predominantly in “unspecialised systems” where the vast majority of farmers own cows that produce calves, which 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, turnoff and mortality 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. Relevant indicators include the following:

- Copland *et al.* (2003) report that important constraints to large ruminant production include low reproduction rate, low milk production, high calf mortality, slow growth rate, low meat quality, diseases such as brucellosis and haemorrhagic septicaemia, and poor quality of forages.
- Modelling of initial (situation analysis) data of LPS/09/036 indicates an annual average live weight production per beef animal of 35-40 kg, with a live weight production ratio (LWPR) of ~0.15. LWPR is a measure of efficiency and is calculated as net live weight produced / live weight of cattle that produced it, the denominator being a measure of feed intake. The low prevailing LWPR in TL compares to an achievable level of at least 0.35 based on experience in northern Australia. Low LWPR appears primarily due to low quantity and quality of feed resulting in a high proportion being used for maintenance rather than production and high calf mortality which appears primarily due to poor nutrition of cows that are unable to produce sufficient milk to keep the calf alive.
- The slaughter rate provides a proxy indicator of commercialisation, calculated as a proportion of the number of cattle slaughtered annually per 100 cattle. Official statistics previewed in Section 2.2 suggests that TL has a slaughter rate of around 7.3%, which compares poorly with Indonesia (13%), SE Asia (14%) and the world (21%).
- The land area of Timor-Leste is about the same size of that of west Timor (NTT), but cattle population in Timor Leste is less than 150,000 compared with more than 600,000 in West Timor (Dahlanuddin *et al.*, 2012).

Discussion below seeks to provide some context to these indicators by overviewing regional dimensions of the industry and household incentives for keeping cattle.

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<sup>13</sup> In Indonesia and other countries, it is common to differentiate between “owners” of cattle and “keepers” that enter into profit-sharing agreements with the owners in return for management services. However, there are examples of profit-sharing arrangements in TL. For example, a girl has some money and her father suggested she invests in livestock, which is raised by the brother. The sister keeps the females and the brother keeps the males.

## **4.2. Regional differences and “beef zones”**

Seeds of Life have collated and mapped extensive data on agricultural systems in TL that are presented here as important context to understanding cattle production systems. Rainfall and elevation maps of TL are shown in Figure 9 and Figure 10. Based on 2010 Census data, Seeds of Life (publication in preparation) conducted cluster analysis into groups of predominant agricultural activities (cropping, livestock, horticulture/other), which are presented in Figure 11 and Figure 12.

### **4.2.1. Beef zones**

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. Some of the characteristics of the zones are detailed in Table 8.

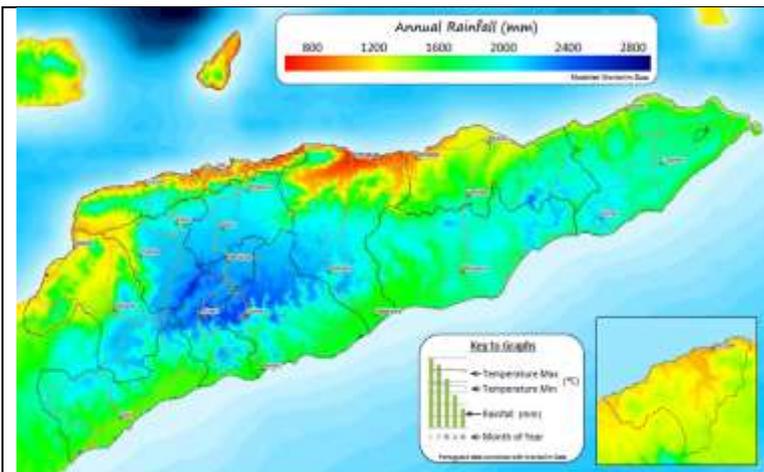


Figure 9. Average annual rainfall in Timor Leste. Source: Seeds of Life maps

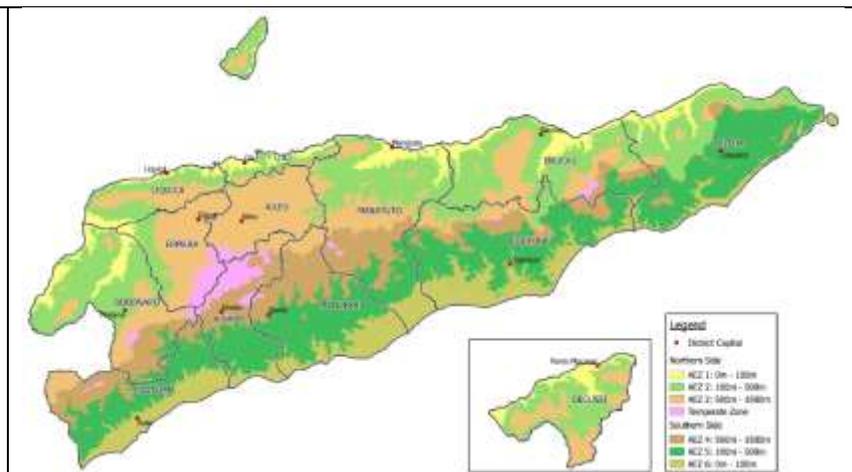


Figure 10. Elevation in Timor Leste. Source: Seeds of Life maps

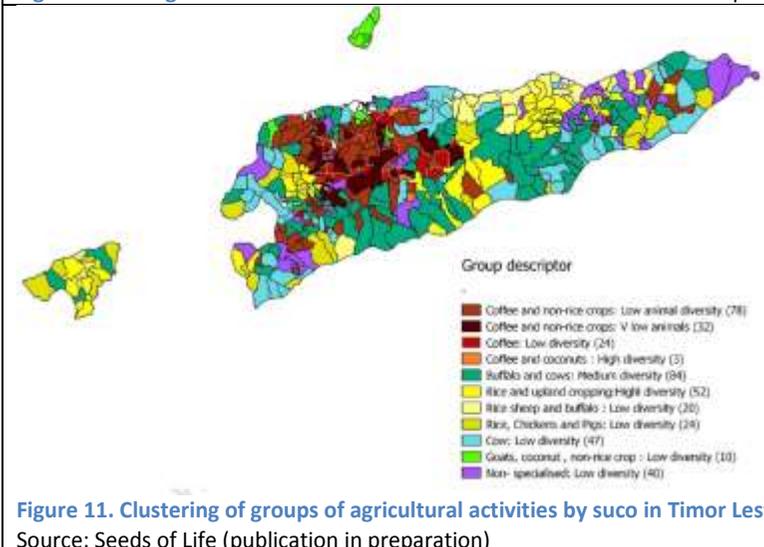


Figure 11. Clustering of groups of agricultural activities by suco in Timor Leste. Source: Seeds of Life (publication in preparation)

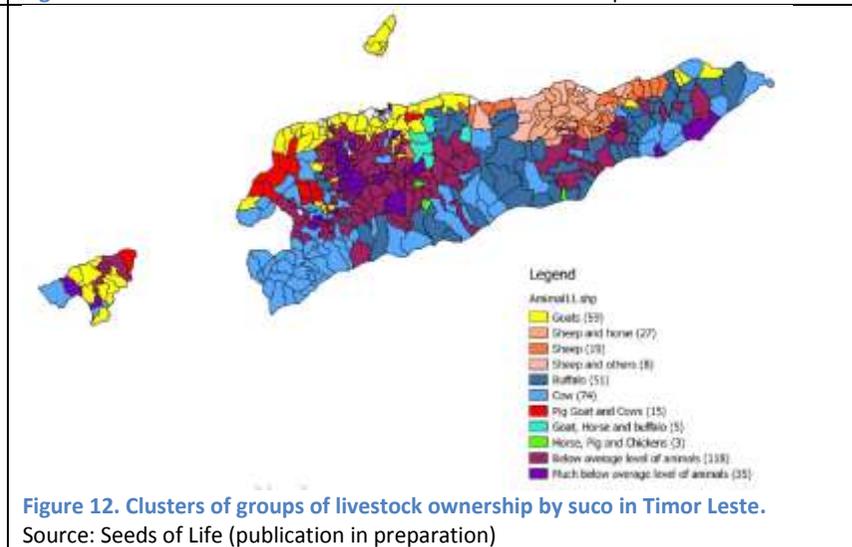


Figure 12. Clusters of groups of livestock ownership by suco in Timor Leste. Source: Seeds of Life (publication in preparation)

Table 8. Characteristics of five beef zones in Timor Leste

Cattle zone 1	Cattle zone 2	Climate / topography	Land use	Social & demographic characteristics	Markets & infrastructure	Production systems	Feed base and best bet interventions
<b>East and southern grassland zone</b>	Savanna grasslands from lowland, moderate rainfall areas across southern TL from east (Lautem) across the south of the country to parts of the west (Cova Lima), interspersed with pockets of cropping (rice & corn)						
	East (Lautem)	As above	As above, some wet and acid soil plains with limestone extrusions	Low to medium population density, attach strong cultural value to livestock	Isolated from major markets in Dili and Indonesia	Extensive grazing, a lot of buffalo, big herds, little control	Pasture improvement, use of crop residues, forage production, rotation, land and livestock control
	South (Viqueque-Manufahi)	As above. Long bimodal wet season	As above, some fertile soils and productive grasslands	Population densities increase to central-south, low incomes	Isolated from major markets, low cattle prices, but Dili butchers source cattle around Same	As above	Use of crop residues, forage production, land and livestock control
<b>Western zone</b>							
	Southwest	Moderate rainfall, elevation increasing from south to north	Patchwork of grasslands and cropping. High diversity of ag systems, rice in Ainaro. Cattle a major activity	Medium population densities, people known as "commercially oriented"	Indonesian southern border trade (but disrupted from 2014), long distances to Dili. Future oil refinery may open market	Grazing esp in hilly areas, but importance given to access stubble after harvest. Small herds, but more commercialised	Forages, herbaceous legumes, planted with crops
	Northwest (Bobanaro)	Hilly inland areas, lower rainfall than the southwest	Mixed & large areas of rice grazed after harvest, cattle and other livestock	As above	Indonesian northern border trade, and also Dili with road upgrades	As above	As above?
<b>Northern dry zone</b>							
	Northwest (Liquica)	Dry, with short wet season. Poor soils.	Agriculture mainly rice. Traditional cattle area, but growth of goats	Medium to high population densities, previously many cattle traders	Good access to markets. Used to sell cattle to Indonesia (formal, CCT) but now Dili	Grazing and penning, low feed availability	Tree forages (can be hard to establish), grasses?, feed storage

	Northeast (Baucau)	Dry, with short wet season. Coastal lowlands to uplands. Limited native pastures	Rice in wet season, sheep and goats, small cattle population	Low population densities east of Dili until the urban centre of Bacau	Good access to Dili & Bacau is a significant urban centre	Grazing in hills and on stubble after harvest	Cattle development low priority or unfeasible
<b>Oecussi</b>							
		Similarities with the Northern dry zone. Coastal lowlands to hills in the south	Small pockets of crops, mixed livestock. With few other alternatives, cattle a significant activity	High populations in the south	Direct and open access to Indonesian markets	Long history of tree forages & cattle production. Many households in south specialised forage production, fattening and trading	Tree forages
<b>Central-west mountain zone</b>		High elevation, high rainfall	Coffee & non-rice crops	Many areas high population density & food insecurity	Steep, poor roads or inaccessibility in wet weather	Low livestock and cattle numbers, highly uncommercialised	Low priority for cattle

Broad characteristics of the “beef zones” include:

- **Eastern and southern grassland zone** (Lautem, Viqueque, Manufahi). This zone is characterised by relatively high rainfall and a 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 cattle 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 to pasture management could be made through the intensification of the current small holder system including the development of better animal management infrastructure and the introduction of grass and legume species to improve the productivity of both cut and carry and grazing systems.
- **Western zone** (Bobonaro and Same). Rainfall varies 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. People in the West are known as more commercialised, partly for cultural reasons and also because of their proximity to the Indonesian border and live cattle markets. 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). The northwest has traditionally been a significant cattle production area due to its proximity to both the Dili and Indonesian markets (although better roads from other areas are said to be diminishing this comparative advantage). In general, low rainfall limits agricultural options and seasons in the north of TL. It is important to note however that there are particular pockets in the region that have favourable climate and longer wet seasons. There are areas where intensive forage production could be practiced, including both the browse legumes and grasses.
- **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. Current and future feed options revolve around tree legumes – both leucaena and sesbania.
- **Central-west mountain zone**. Steep terrain, poor roads, alternative agricultural activities (cash crops, horticulture and coffee) and lack of feed mean that cattle are sparse and uncommercialised in this area and, in general, not suited to cattle development projects.

Interventions that could improve cattle live weight production and the biological and financial efficiency of this production can be applied across all agricultural zones. Exactly how they are applied depends on the environmental conditions, available markets, cultural requirements, and the specific objectives of individual households. Interventions at a production level must achieve improved and adequate feed, water and animal control. Sources of dry matter need to be utilised and generated, e.g., crop residues. Protein-rich diet components for dry season diets need to be generated; in Timor Leste this can be provided by specific tree legumes. Control of the feed produced for cattle will enable its targeted efficient utilisation; e.g., a mix of stored maize stover, tree legumes and grasses can achieve high growth rates in cattle. Control of cattle will greatly facilitate husbandry (e.g. weaning, disease control), grazing management, and marketing. For more details on production systems, productivity, with implications for improved systems see Quigley (2016).

#### 4.2.2. Cattle distribution

2010 census data have been used to develop maps that illustrate regional patterns in the TL beef industry. Figure 13 shows the distribution of cattle throughout the country. Cattle are most densely populated over the Western border areas, especially in Bobonaro (in sub-districts such as Maliana) and Cova Lima (Same). Cattle densities are also high in the North-western dry zone (east Bobonaro and Liquica) and are lowest in the mountainous central zone of the country (Aileu, Ainaro, Manatuto, parts of Manufahi). Cattle numbers increase again in the more extensive grasslands of the east (Viqueque, Lautem, southern parts of Baucau) and the south (Viqueque). Cattle are distributed relatively densely and evenly in Oecussi.

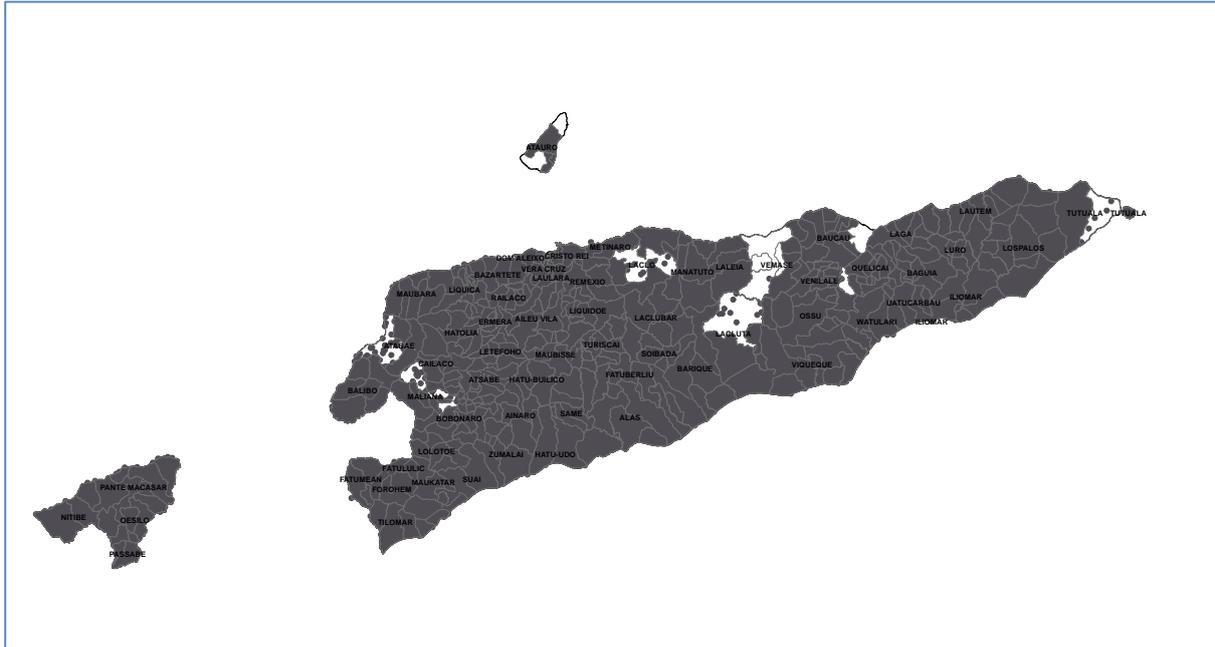


Figure 13. Cattle distribution in Timor Leste.

Source: 2010 national census. 1 dot represents 100 cattle, distributed randomly within suco boundaries.

Figure 14 presents the same data on cattle numbers (yellow) overlaid with buffalo numbers (blue). While there are buffaloes across TL, they are most densely populated in the eastern areas of Viqueque, Bacau and Lautem, with few buffaloes in the west and Oecussi.

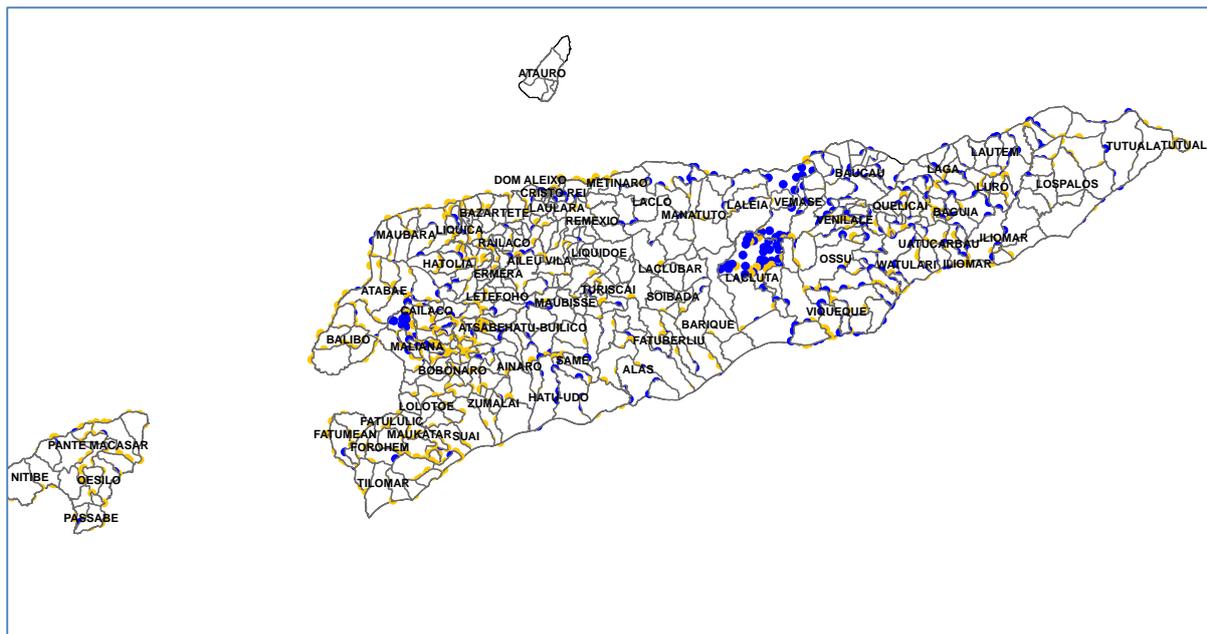


Figure 14. Cattle and buffalo distribution in Timor Leste.

Source: 2010 national census. 1 dot represents 100 animals, distributed randomly within suco boundaries

#### 4.2.3. Scale of production

Cattle numbers combined with data on the numbers of households that raise cattle (see Table 2 for district-level data) allow for the calculation of average cattle production by suco (Figure 15). While most cattle are raised in western areas, these are raised by large numbers of households (nearly 13,000 in Bobanaro and Cova Lima). As a result, households in this western area have a mid-range number of cattle (generally from 2.3 to 6.9 cattle). The central mountainous area has a low scale of production, but with relatively larger herd sizes (4.7 to 6.9) in the south (e.g. Hato Udo sub-district). 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 cattle.

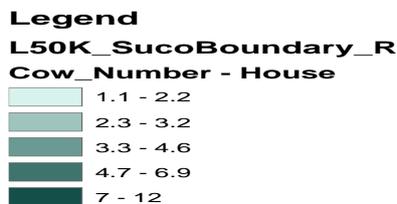
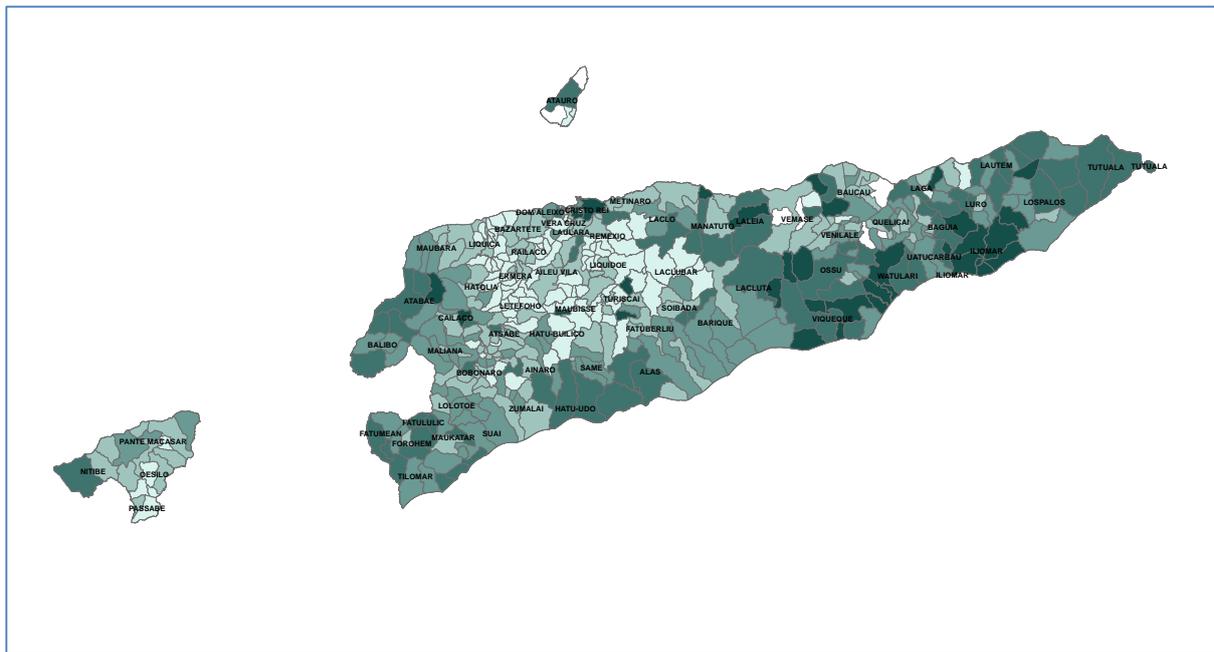


Figure 15. Average number of cattle per cattle-holding household by suco.

Source: 2010 national census.

As already shown in Table 2, average herd size in TL is only 3.8 cattle, although this is larger than many other SE Asian countries due to relatively extensive production systems. The distribution of average number of cattle per cattle-raising household over 444 sucos in TL is shown in Figure 16. Vertical lines show the scale categories (as per Figure 15), the y-axis shows the number of sucos that fall into the categories, and the dotted vertical line shows the mean number of cattle per household (3.7 with a standard deviation of 2). For regional variation see Figure 15. Of course, these figures are averages over an entire suco so do not capture inter-household differences, which can be significant, where some households can own hundreds of cattle. The data does not capture the herd profile.

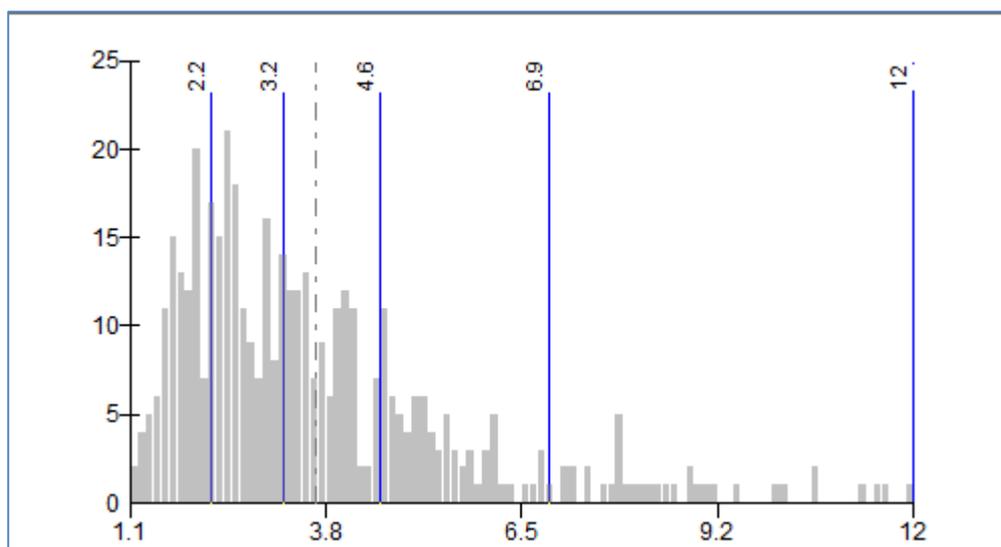


Figure 16. Distribution of household cattle herd sizes in TL.

Source: 2010 census

Against these average values, however, it should be noted that household herd sizes can be large. For example, in the project site of LPS/09/036 in Muapitino Suco (Fatucahi), one household had 70 cattle. There is reportedly another large producer in Manaforti with 500 cattle. Some cattle owners in Lospalos reportedly own up to 3,000 cattle. The average scale of production for project households monitored in LPS-2009-036 (Quigley *et al.*, 2016) was 7.9, with the lowest Liquica (6.3), and north Bobanaro (7.4), with higher numbers in Lautem (7.9), Manaforti (8.6) and Oecussi (9.1). The average herd sizes of project households are much higher than that shown in census data, and the regional differences much lower. However the differences do fall broadly in line with the macro data (with the exception of Oecussi).

#### 4.2.4. Indicators of commercialisation

Scale of production is not necessarily an indicator of commercialisation. While the scale of production in Western areas such as Maliana is low, it is widely regarded as more commercialised due to more intensive systems (including cropping), proximity to border and access to Dili markets, and people that pursue business opportunities. Conversely, in Eastern areas such as Lautem, cattle are raised in larger household herds in more extensive systems for long indefinite periods with low turnover rates and with a high “cultural value”.

Levels of “commercialisation” are indicated in (2007) data that records household cattle sales and income in sub-districts throughout TL.<sup>14</sup> Cattle sales were low throughout TL as households in all sub-districts sell less than 1 cow or bull per year, but cattle sales are highest in Western and some Southern sub-districts (Figure 17). There are corresponding patterns for income from cattle sales (Figure 18).

<sup>14</sup> The data is based on income and expenditure data from the National Income and Expenditure Survey 2007, which covered about 4,000 households in about half the sucos of TL.

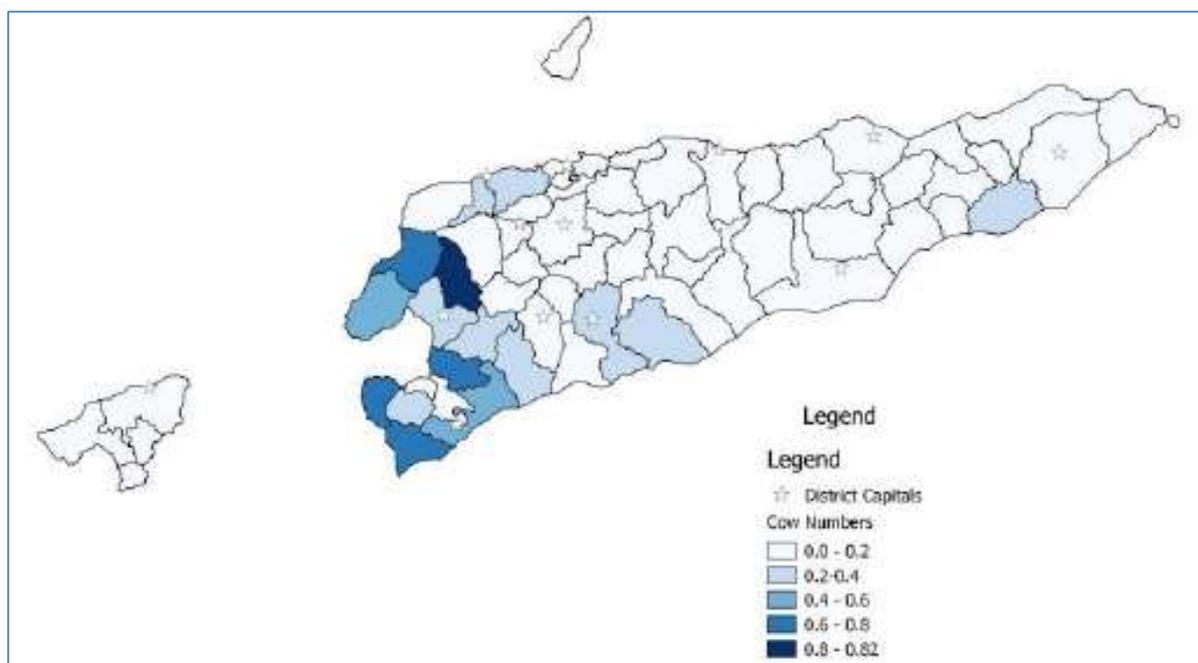


Figure 17. Average number of cattle sold per household per year by subdistrict.

Source: NDS (2007)

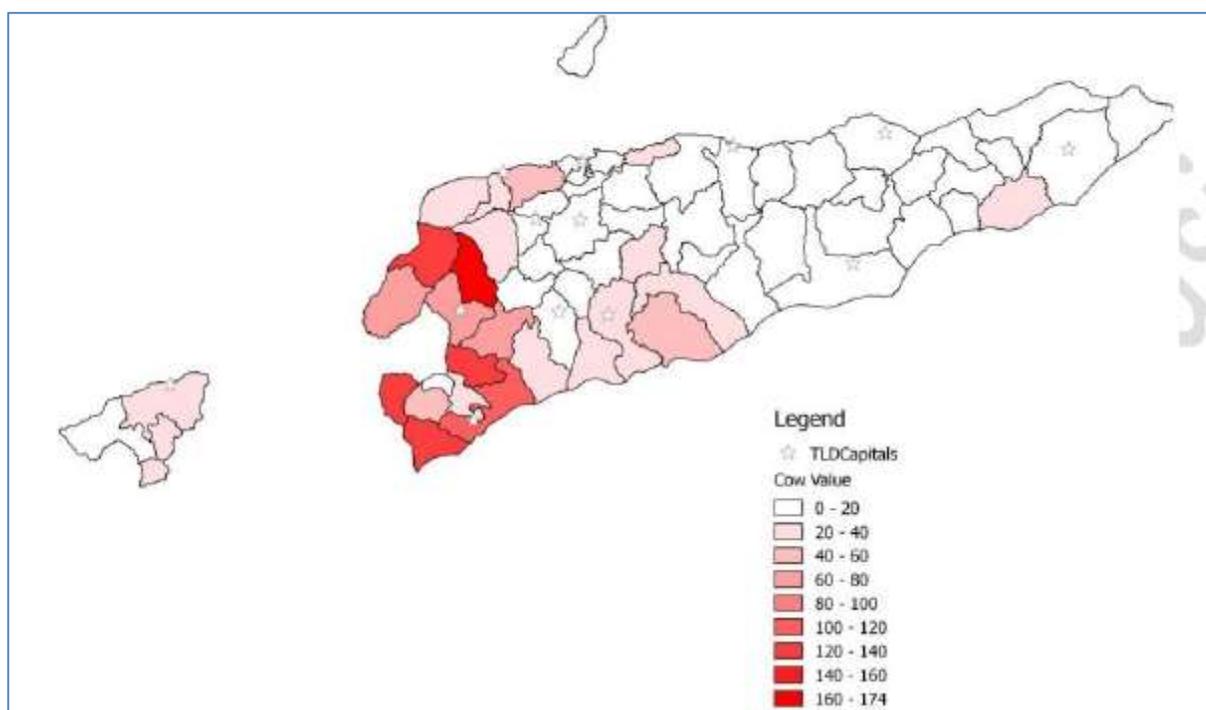


Figure 18. Average annual value (\$) of cattle sold per household by subdistrict

Source: NDS (2007)

Another indicator of commercialisation is turnoff rates (the number of cattle sold as a proportion of cattle in stock). Official year-on-year statistics record a turnoff rate for cattle in TL of 5.1%. Estimates

in Section 2.4 suggest that the turnoff rate may be much higher at 13.47%. Site monitoring reported in Quigley *et al.* (2016) suggested an average turnoff rate of 10% over the two years of 2013 and 2014. The rates were highest in the Manufahi site (18%), followed by Liquica (14%), and much lower in Lautem (7%), the north coast of Bobanaro (6%) and Oecussi (6%). This broadly follows patterns suggested by the macro data, although the particular site locations, characteristics and households influenced results (higher rates in the Fatucahi suco in Manufahi, and lower rates in Naimeco suco in Oecussi).

#### 4.2.5. Stocking rates

Given the importance of grazing in cattle production in TL, this section provides some broad indicators of stocking rates by district.

**Table 9. Indicative stocking rates on native pastures by district.**

	Cattle numbers 2010	Buffalo numbers 2010	Native pasture 2003 (ha)	Indicative stocking rate (animals / ha)
TIMOR-LESTE	161,654	96,484	206,227	1.25
AINARO	6,435	4,958	6,845	1.66
AILEU	4,697	1,782	501	12.93
BAUCAU	6,165	14,566	17,585	1.18
BOBONARO	29,235	7,559	18,061	2.04
COVALIMA	22,378	2,545	34,339	0.73
DILI	3,597	1,467	388	13.05
ERMERA	11,255	3,728	3,396	4.41
LIQUIÇA	8,018	2,355	6,575	1.58
LAUTEM	16,874	15,378	39,994	0.81
MANUFAHI	7,559	5,893	25,454	0.53
MANATUTO	6,204	8,551	13,040	1.13
OECUSSI	16,562	1,791	14,626	1.25
VIQUEQUE	22,675	25,911	25,422	1.91

Source: Cattle and buffalo numbers from 2010 Census. Grassland area from Da Cruz (2003).

Dahlanuddin *et al.* (2012) estimated grassland conditions through random sampling. Estimated annual biomass production at the time of observation was 400 to 500 kg dry matter per hectare per year in highland native pastures, and 300-400 kg per hectare per year in lowland native pastures. The conditions of pasture at the time of observation indicate that the biomass production from native pastures may be double in the peak of the wet season. Both lowland and highland pastures are encroached heavily and increasingly by weeds, especially *Chromolaena*, *Lantana* and *Jatropha*, exacerbated by over-grazing that exposes the soil to erosion and reduces the opportunity for palatable and productive species to grow and produce livestock feed (see, McFayden, 2003).

The 2010 census data for cattle, buffalo, goats (~140,000) and sheep (~42,000) indicates there is approximately 70,000 tonnes of grazing ruminants in the country requiring a minimum of 0.5 million tonnes of feed annually to achieve a low level of production, assuming an average live weight of 250 kg for large ruminants and 25 kg for small ruminants (see Table 10). If the available rangelands produce 0.5 tonnes of dry matter annually and 80% of this is utilised by grazing ruminants, then less

than 100,000 tonnes of pasture is available annually. This is less than 20% of minimum requirements. Even if there was a two-fold error in the available data, this highlights the the size of the problem with over-population by livestock leading to very inefficient production (most feed used for maintenance rather than production), and further degrading the rangelands, which in turn compounds the problem. The over-utilisation of pasture is least problematic in Cova Lima, Manufahi and Lautem (pasture deficiency estimated at 20-40%), but even in these municipalities available feed appears to be only half of that required by the livestock in those areas. The solution lies in having fewer animals and controlling the use of forages fed to achieve live weight (production), which is a saleable commodity, whether it is for commercial markets or traditional ceremonies.

**Table 10. Parameters used to estimate grazing pressure on grasslands in TL**

440,185 ruminants	206,227 ha grassland
69,086 tonne live weight	0.5 kg DM/ha/yr
0.02 kg DM/day/kg live weight	80% utilisation
504,325 tonne DM/yr required	82,491 tonne/yr pasture available

Source: Geoffry Fordyce calculations

### 4.3. Household production systems

While the previous section provided a picture of cattle production systems at a regional level, this section aims to provide a picture at a household level. Table 11 summarises information gathered during field visits to five project sites, with groups of 3-5 households interviewed together. Because of the large variation between aldeia and households, and the anecdotal nature of the information, it is not meant to be definitive or representative, but to give the reader an understanding of farmers' perceptions of their production systems at local levels, and to frame the analysis below. This "picture" will be verified and quantified as household monitoring data becomes available and analysed.

**Table 11. Anecdotal information on cattle production systems from groups of households in five project sites**

<b>Zone and monitoring site for LPS/09/036</b>	<b>Herd size and type in group discussions</b>	<b>Feed &amp; water</b>	<b>Pens and cattle management</b>	<b>Labour</b>	<b>Cattle sales</b>	<b>Cultural values of cattle</b>	<b>Marketing</b>
<b>Eastern grasslands</b> Lautem D, Lautem SD, Parlamento Suco	20-30 cattle. Usually 100% conception but significant calf mortality (abortions etc.)	Grazing up to 1 hour away. 0-2 ha. cropping, more land could be reclaimed, but isn't (labour, yields). Water points on grasslands.	Cattle penned at night. Have to be herded back at night, can use salt to lure. Can tie up young calves during day (dogs and crocodiles are predators)	Father does most cattle work, children help when not at school	Don't sell females unless infertile, diseased or cull at 10y.o. Sell bulls when need money.	Very high cultural expectations and value attached to cattle for ceremonies (e.g. 77 as dowry for a local bride).	Significant number of traders from Lospalos for local and Dili markets
<b>Southern grasslands</b> Manufahi D, Fatuberliho SD, Fatucahi Suco	9-21 cattle. Can get "a calf per year" – see comment on sales.	Grazing. Leucaena in aldeia eaten by cattle. Sago. 2-3 corn crops per year, not cut or grazed (don't want cattle to get accustomed to crop areas). Bucket water in dry season.	Cattle come at night for salt and sago. Natural weaning (1yo)	Older generations stay on-farm. Younger generations can work in construction, transport. Wages \$3-4 / day, more for skilled labour interviewees stay on farm	Sell cows that miss 2-3 years of calving.	A big household might use 2-3 cattle per year for ceremonies (low compared to Lospalos). Dowry price about 4 cattle.	Local spotter, and several traders, including from Dili. Hard to aggregate cattle when roaming "wild" (need to be aggregated in pens = weight loss)
<b>Northern dry zone</b> Liquiça D, Maubara SD, Guico Suco	Average 1-3 cattle. Several 8-15 cattle	Communal grazing in aldeia land in wet season. 1-2ha. corn and cassava. Cut and carry corn silage but only for 3-4 weeks. Cut and carry grass. A few households in the aldeia have leucaena.		Children graze animals unless at school. Father does most cattle work, but when away or sick, mother can do it, or can hire labour (\$2-3/day). Most farmers work off-farm when not busy on-farm. \$3/day manual labour on	Sell bulls 2-3 y.o, earlier if need money (building new house, school, food). Many farmers sell bigger animal to	Holding 2 cattle for ceremonies (in-laws) every 3-4 years. Need about 5 cattle for dowry price.	Local traders. Trucks can access in wet season.

				roads up to \$7/day carpentry	traders, then buy smaller animals to fatten		
<b>Northern dry zone</b> Bobonaro D, Atabae SD, Aidabaleten Suco	10-12 cattle. Significant mortalities	0.5-10 ha. paddy rice (in large areas with other households), fed mainly in field but some cut and carry (but this requires cut at base of stem & more labour). Sago.	Cattle tied up day and night – concern about getting into crops.	About 2 hours cattle labour / day. Mutual help for harvest and can access straw from other households	Keep cattle for indefinite periods for cash and ceremonies when required		Sell to local traders on appearance of animal. Don't enquire with other farmers about prices. Low turnoff rates given proximity to Dili.
<b>Oecussi</b> Oecussi D, Pante Makasar SD, Naimeco Suco	3-8 cattle, some mortalities in dry season	Av 1.5 ha corn, 0.5 rice. Not much sago. Bulls fed leucaena, rice straw, corn silage.	Grazing, but penning at night, and cattle fattening in dedicated pens	About 1 hour per day on cattle	Don't sell females.	People for Oecussi don't eat chickens or fish. Significant ceremonial obligations.	

#### 4.4. Role of cattle in household systems

As suggested by the data above, developments in cattle production are forged by inter-related drivers and incentives of producers. These are discussed in this section as the “role of cattle in households systems” or reasons for raising cattle. These can be ordered from “uncommercialised” to “commercialised” systems, including ceremonial uses, place in integrated farming systems, as a source of savings, and for profit maximisation.

It is widely believed that keeping cattle for “cultural reasons” is deeply embedded and an obstacle to increased productivity. Farmers in TL operate under strong social pressures that must be taken into account in any projects or interventions. However, it is also widely believed that the “cultural value” of cattle is not as high as – and is diminishing relative to – the “economic value” of cattle. The “economic value” of cattle includes that of a source of “savings” for cash needs when required, but some more commercial and entrepreneurial households place a greater emphasis on productivity and profitability. Some households keep cattle for several or all of these purposes, in a “portfolio” approach to cattle production.

Figure 19 provides some local level guidance on the relative importance of different disposal channels for the households monitored in LPS-2009-036. In all sites the majority of cattle were sold to market, accounting for virtually disposals in the commercialised site of Fatucahi (Manufahi), with additional cattle sold for ceremonies in three sites. Ceremonies are important in Naimeco (Oecussi), and significant in other sites (except Fatacahi). A farmer in Guico had to use cattle to pay a fine, when his cattle caused crop damage in another household. Other data in Quigley *et al.* (2016) does not show strong seasonal patterns in disposals.

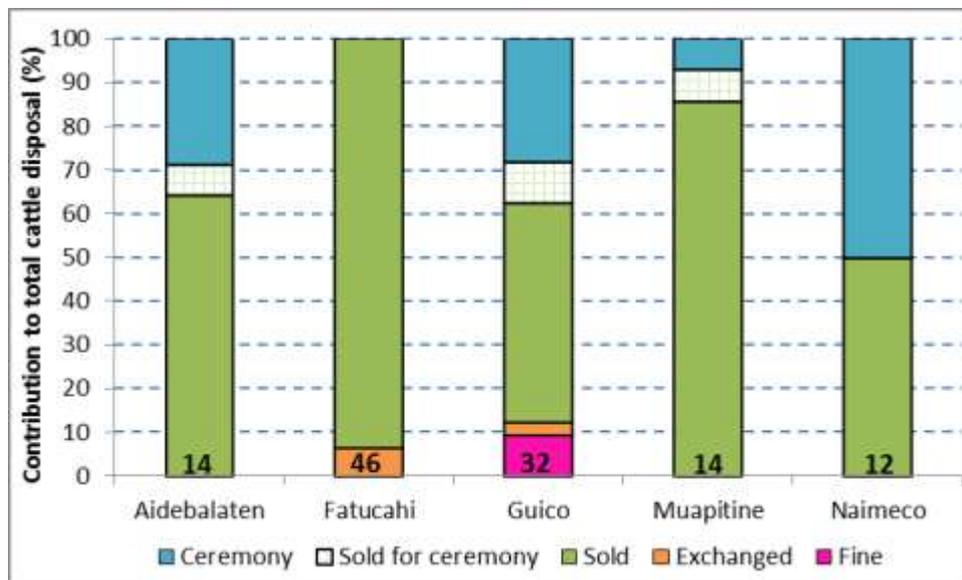


Figure 19. Type of cattle disposal over two years from five suco sites across Timor Leste.

Source: Quigley *et al.* (2016). Numbers in the columns represent the number of cattle sold over 2013 and 2014.

#### 4.4.1. Cultural considerations in cattle production

**Ceremonial uses.** All animals have a social value in TL. For example, roosters are used for fighting, horses for racing, and all animals (pigs, goats, sheep, goats, buffaloes and cattle) for rituals and ceremonies. Rituals include inaugurating sacred houses, rain-calling and grass-burning ceremonies, and farming rituals (before planting, after harvest, to stop pests, or to stimulate or stop rain, or for technological innovations). Ceremonies include weddings, funerals, end-of-mourning periods (desluto), or All Soul's day (finados) or graduations (Bettencourt *et al.*, 2013).

Animals play a major role in demonstrating social position, fulfilling powerful social obligations, maintaining complex social networks and distributing resources. Traditional commemorative practices generate a sense of emplacement and strengthen collective memory (see McWilliam and Traube, 2011; Bettencourt, 2013 and Cruz, 2003) and may be embedded in superstition.<sup>15</sup> Some government officials estimate that 50% to 70% of cattle in areas like Los Palos are used for "cultural" purposes and around half in Lliquica. However, the proportions are perhaps only 10-20% in urban areas, where cash presents for dowry and weddings can be seen as more useful.

While all animals are used for ceremonies, cattle and buffalo are particularly highly prized for dowry, weddings and funerals.<sup>16</sup> **Dowry** is a transaction between "wife givers" and "wife takers". In patriarchal land ownership systems, such as Los Palos, the husband's family pays, but the transaction can be reversed in matriarchal systems (Suai, Same, Maliana). The transaction value depends on many factors, including local traditions and the social standing of the families and individuals. In areas such as Los Palos, the traditional dowry for a local bride is as high as 77 cattle or buffaloes, but is lower in other areas or (in Los Palos) for brides from "outside". Even with high bride prices—and the need to divide family land between sons—families still prefer to have sons in Los Palos.

The husband's family negotiates with the bride's family, but there is also negotiation within families to collect and distribute the dowry. Lack of agreement on dowry price can result in the marriage being called off. The parents of the husband commonly provide the dowry, but it can be assembled from brothers and throughout the extended family. Animals are usually paid in "instalments" (e.g. 25 on marriage and 10 per year after that or when required), especially in areas where high dowries are paid. Recipients can use the dowry for various purposes – to sell, for savings, to repay debt, or for other cultural events.

Animals are also often required for **weddings and funerals**. When families or neighbours attend the ceremony, they can bring gifts including rice or cash or large gifts, such as cattle and buffalo. The eldest daughter is responsible for collecting gifts at funerals, but then passing them on to other members of family (e.g. brothers and uncles of the deceased). The family has major obligations to host and feed the guests with meat for ceremonies. Funerals in places such as Oecussi can last up to

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<sup>15</sup> For example, if obligations are not met then the family will suffer illness. In one area with powerful spiritual forces, it is said that an animal will walk to a village and die on its own accord so it can be used at a ceremony.

<sup>16</sup> Surveys conducted by Bettencourt *et al.* (2013) (including in Aidabaleten) find that pigs and cattle followed by chicken and goats are the most important animals used for traditional ceremonies and festivities. Cattle and buffaloes can serve a sacred role.

five days, with dozens to hundreds of guests, and then commemorated after 40 days and again after one year. Several hundred cattle and buffalo can be consumed in extremely large ceremonies.

There are several material benefits in the high cultural value attached to ceremonies, including **nutrition**. Because of the size and perishability of cattle or buffalo carcasses, and lack of refrigeration, it is impractical for farmers to eat their own cattle (in a subsistence-type system). It is also impractical or costly for them to purchase beef at district markets. Pork fat can be cut and preserved, and the government is trying to introduce a means of salting and preserving beef, but on a small scale. Ceremonies therefore provide a practical, non-cash institutional structure to slaughter, distribute, and consume beef in the local rural community. There are also exchanges (barter) of presents at weddings and funerals where, for example, guests can bring in a bull and return home with a pig, or any number of other goods. Guests are served a portion of meat (e.g. in a cup), blood or offal. The nutritional benefits, however, depend on distribution between men, women and children.

It is also important to note that cattle for ceremonies are not a non-market (or non-cash) transaction. Guests or families who don't own cattle or sufficient numbers to meet social obligations must buy them from farmers or traders. It is common for households to buy cattle for ceremonies through sales (e.g. coffee) or on credit from neighbours and pay back over time (e.g. one year). The obligation and urgency of the purchase puts upward pressure on prices, which are very often higher than prices paid by slaughtermen. If social standing is important, there can be premiums for big or fat cattle. Attributes of horn size (a function of age) is important for buffaloes. The large ceremony market can benefit farmers and traders selling into it, but can also over-value the animals for other markets (butchers) or ceremony recipients with different preferences who might prefer to accept cash. Thus, in theory, progressive farmers could capitalise on the ceremony market through higher prices and increased productivity that enables them to meet demands or obligations.

The high cultural value attached to ceremonies also has drawbacks for producers. With a marriage on the (even distant) horizon, and with the likelihood of a ceremony in the family or community, farmers need cattle "on hand". For funerals, cattle can be required quickly (e.g. that day). The obligations mean that farmers in areas such as Los Palos hold large numbers of cattle to meet expected or unexpected occasions. A farmer can hold large numbers of cattle (e.g. 50) but many or all of these may be committed to members of their own or other families, or must be kept in case the need arises. That is, even with a large herd, the household can have low net assets, be in net debt, or the herd can be run down so the farmer has to borrow from someone else to fulfill obligations. Conversely, households with more daughters than sons can be net recipients. This is one reason why it can be difficult for farmers to estimate their stock numbers, or do not want the community to know that they have large numbers of cattle. In areas where there are strong cultural considerations (of stock numbers, timing and relationships), productivity and profitability are not priorities.

Policy makers are concerned about the negative impacts on the development of the livestock sector, the capture of cattle that could enter into formal supply chains, and the commercialisation and modernisation process. There are concerns for rural livelihoods, where households draw down assets or spend resources on ceremonies that may otherwise be spent in other ways (investment, production, food, education, health).

Multiple levels of government in TL discourage the over-use of resources for ceremonies, but this has proven difficult in the face of deeply embedded customs.<sup>17</sup> MAFF considered regulations to limit livestock gifts for ceremonies but did not go ahead because of the difficulties of implementation. Government in Ermera announced a decree to stop traditional ceremonies for eight years to allow households to meet basic needs and build up assets. Liquica DNVP recommends that farmers limit gifts at ceremonies and is “monitoring” the situation. A suco chief in Manufahi encourages farmers to use fewer cattle for ceremonies (two or less) so they can have more income to send children to school and university, but also understands traditions so hasn’t asked them to stop the practices.

**Traditional rules in cattle management.** Natural resource management and land use is governed by traditional law—*tara bandu*—recognised by communities and administered by chiefs (*liurai / dato*), elders and a council of elders.<sup>18</sup> These local institutions are more powerful than the formal institutions of the state, which may have little presence or legitimacy at local levels. Any state regulations (e.g. limits to ceremonies, land tenure reform, grazing or stocking limits) would have to align with local institutions to be accepted.

Traditional law is particularly important in managing damage by livestock to crops. There are rules about when cattle are allowed to graze in community cropping (especially rice) areas to avoid damage (which can be complicated by a staggered harvest or a follow-on crop). Cropland around the aldeia where cattle graze is fenced and sometimes guarded by family members. Cattle can wear yokes, but they inevitably get into crops. A survey conducted by SoL in four districts found that cattle accounted for an average of 9% of crop losses, especially sweet potatoes and to a lesser extent maize (Lacoste *et al.*, 2012). Pigs were the main culprits. In cases of crop damage, compensation is paid by livestock owners to crop owners, which can be in the form of livestock or cash (e.g. \$50-\$100).

**Land tenure.** Authority over land is held by “origin groups”, who are descendants of first possessors of the land. Origin groups form alliances with “subsidiary households” who enter the community through marriage and in-migration, and then have the same rights to land as origin groups members. Origin groups make decisions on land allocations, the clearing and cultivating of new land, and maintaining rituals and prohibitions (*tara bandu*) to form part of “an overall system of ritual and spiritual order” (Fitzpatrick *et al.*, 2008).

Within the customary land and origin group system, land tenure varies by types of land. Residential, garden and plantation plots have clearly defined boundaries and are “owned” and inherited by families. Group members can seek permission to claim and cultivate (annual) cropping land, which can then be returned back to communal property after harvest, or if the household does not farm in subsequent years. Grazing, forest, and lake land can be described as communal. Grassland use is governed by the group,<sup>19</sup> but group members can freely access grasslands. There can also be overlap between groups. The boundaries of group land can be ill-defined, may not be contiguous, not

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<sup>17</sup> The banning of ceremonies in several countries (South Africa and Swaziland) is reported in Banerjee and Duflo (2011).

<sup>18</sup> *Tara bandu* is described by Batterbury *et al.* (2015) as customary resource prohibition markers.

<sup>19</sup> For example, Fitzpatrick *et al.* (2008) describe how permission to graze around Mehara Lake in Lautem as lake levels recede is governed by *ratu* owners, which are clans or agnatic groups who hold ritual (but not necessarily customary) authority over land.

coincide with administrative boundaries, overlap with other groups, or be negotiable between groups.

Issues of common grazing have been linked to over-stocking, over-grazing and grassland degradation (including regenerative capacity, weeds, soil compaction and weed invasion) although evidence of the relationships is lacking (FAO, 2008). If grasslands are over-stocked, productivity (measured in terms of beef production rather than stock numbers) will be sub-optimal at best and very poor at worst.

There has been debate and measures to reform property rights in TL, including stronger private property rights or wider state ownership by some government and foreign agencies (USAid), legal pluralism empowering communities, and full recognition in law of communal and customary land management (Batterbury *et al.*, 2015). Clarifying grazing rights and identifying people responsible for stewardship of grasslands is seen as a prerequisite to more intensified cattle production (Anderson, 2008).

It seems unlikely that property rights and management of grasslands will change significantly in the foreseeable future to allow, for example, exclusive grazing (enclosure) on paddocks for individual families. This means that beef producers seeking to increase productivity of grasslands and cattle will need to seek other land management plans that might include fencing of smaller fodder / forage areas (similar to management of cultivated land) to keep out other stock and wild animals or more intensive penning and cut and carry systems.

**Gender.** The management of small animals (pigs and chickens) is considered women's work, while large animals are considered men's work. A similar division applies in rituals, where pigs have a feminine symbolic value, while buffalos and cattle are masculine social goods (Bettencourt, 2013). Much of the labour (grazing and pens) is done by men.

#### 4.4.2. Place in crop-livestock systems

Cattle have a role in integrated crop-livestock systems in much of the developing world as a source of draught power and transport, manure for organic fertiliser, and to consume residues from cropping activities. This role is discernible in TL, but not as pronounced. Cattle are not widely used for draught or transport, which is done by horses (for carts) and buffalo (for the puddling of rice fields).<sup>20</sup> Bettencourt *et al* (2013) reports that the use of livestock for draught power in Bobonaro is modest (40.6% in one rice-growing site, 20.6% in another and not used in the other) and being replaced by mechanical traction. Manure from cattle pens is commonly applied to cropland, but will be constrained by the high incidence of extensive grazing. Thus, it is likely that inputs into the cropping system is a modest and diminishing reason for households to keep cattle.

#### 4.4.3. Cattle as a source of "savings"

When assessing reasons why households raise cattle in Indonesia, studies find that "economic reasons" are more important than other "social reasons" (wealth and status) (Deblitz *et al.*, 2011; Mahendri *et al.* 2010; Patrick *et al.* 2010). While cultural factors are probably more important in TL than Indonesia, "economic reasons" are also commonly cited as the most important factor in TL. As suggested in Table 4, households produce cattle as a "cash cop" that contributes directly the cash

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<sup>20</sup> In Lospalos, buffaloes aren't used for draught. Buffaloes that are can't be used for dowry and can't be eaten when it dies.

flow of households. However, the term “economic reasons” is highly aggregated and a distinction is made here between keeping cattle as a source of “savings” and for “profit maximisation”.

Cattle are widely thought to be kept as a source of “savings” to be sold to meet cash needs. As a large discrete asset and with limited alternative savings methods (e.g. a bank account), cattle sales are used to periodically buy large or important items including house construction, motorbikes, education and medical expenses.

The use of cattle as a source of savings does not, however, mean that cattle production systems are “commercialised”. Cattle kept for “savings” are rarely profit-maximising. Households have large amounts of capital tied up in cattle kept for long or indefinite periods, where inefficient animals are not culled, marginal declines in growth rates and fertility set in, and cattle gain and lose weight over multiple wet and dry seasons. This leads to low turnoff rates (Section 2.2). Furthermore, sale of cattle when required to meet immediate household needs (i.e. a forced sale) can mean farmers take current market price in a poor bargaining position.

#### 4.4.4. Commercialisation

The process of commercialisation can be seen as moving from a “savings” mode of production to a more productive and profitable (or “profit-maximising”) mode of production. A related and commonly used paradigm is the movement from being a livestock “keeper” where livestock are kept in “survival mode” to a “producer” (Luke, 1989; Neidhardt *et al.* 1996; Winter, 2011, Kemp, 2011). “Producers” are most likely to be receptive to new technologies and practices, and can raise fewer more productive animals. A final trait of more commercialised producers is that they are more likely to be specialised in a particular activity (e.g. cattle production) rather than diversified across multiple agricultural activities. As mentioned above, there can also be specialisation within the cattle sector, in either cow-calf production or fattening.

The transition to more commercialised systems is a deep-rooted and transformative process that has a large impact on livelihoods, daily lives and communities. In addition to more precise farm management and planning systems, it can require integration into the formal finance system (see Section 3.5), where savings are held in a bank account rather than in the form of cattle. The risks and resources involved in specialisation mean that most farmers will not make the transition. However, farmers with the resources, capacity and support to uptake these systems have the potential to increase productivity and incomes. There can be benefits for increased resilience to external shocks (climate, family, political) and improved welfare (nutrition, health care, and education).

While in general the TL cattle production sector is uncommercialised, there are several areas and cases of more commercialised household production systems, or potential for their development and inclusion in subsequent project activities. For example:

- CCT has in the past contracted large numbers of cattle fattening households and traders throughout many districts (Liquica, Maliana, Suai, Same, Oecussi, but not in the east). While the CCT business is now limited to Oecussi, there are numerous households that have recent experience in specialised fattening. At the same time, however, CCT are quick to point out that this does not mean that the contracted households are “commercialised”.

- Various agencies have conducted training with Village Livestock Workers (APS) in cattle nutrition and health. Many of the APSs are farmers themselves, and struggling to earn a living through service provision. Some APSs may make suitable targets.
- Numerous cattle traders in TL who hold cattle for various lengths of time to aggregate cattle (see Section 5.3) could be classed speculative cattle fatteners. These knowledgeable and business oriented households may also make good project partners.
- The suco chief of Mauputine (in Lospalos) had established a kandang to fatten 15-20 bulls for about 6 months. The venture is reportedly struggling to establish sufficient forages.
- In Fatucahi suco in Mahafahi, there is a cattle spotter who keeps about 8 bulls on feed and employs a few relatives on a profit-sharing basis.
- There is a commercial farm run by a group of young graduates (called “Loberra”) in the outskirts of Dili that produces pigs, chickens and keeps approximately 10 bulls on feed.
- A big trader from Same approached BOSS to assist in helping to set up a fattening business
- There are households in Suai and Liquica who buy feeders from cow-calf households (that “need” to sell animals) for specialist fattening, but this doesn’t necessarily mean that the households are efficient or “commercial”.
- Oecussi currently has large numbers of specialised cattle fatteners and traders, and also forage growers and traders. This provides an indication of what is possible in many parts of TL.

While these structures do not necessarily mean that the producers will be “commercialised”, further investigation would reveal the viability and incentives of the households and levels of commercialisation across broader areas or farmers. The experience of other Southeast countries is that as households become increasingly exposed to the developing economy and markets, and develop farm management skills, more “progressive” farmers could be expected to emerge.

## 5. Domestic cattle marketing

Before examining the international informal trade in live cattle, this section looks at cattle trading domestically. Several studies have reported on cattle marketing in TL (Serrão et al., 2007; Ministry of Economy and Development, date unreported). However, the studies provide little insight into the structure and conduct in the sector, which this section tries to address.

The structures of the sector determine the conduct of cattle marketing. With no large abattoir that takes ownership of cattle, and only one case of contract production (CCT), the vast majority of cattle are traded through spot markets, where cattle are usually purchased by cash “on the spot”. With no major live animal marketplaces, cattle are purchased by individual slaughtermen and traders in small lots at the farm gate. Cattle are mostly purchased through visual assessment, where traders estimate the carcass weight of the animals. However, when modern butcher shops (EDS and Talho Moris) buy cattle from traders, they buy over the scales at the central Dili abattoir. Operating alongside – and with implications for – the wet market and butcher market, there is a vibrant trade in cattle for ceremonies (see above). Road infrastructure can be poor and roads inaccessible in the wet season in some areas, but rapidly improving with several new major road systems (to the west and south) increasing access to many areas.

## 5.1. Cattle flows

Estimates in Section 2.4 suggest that about 6,600 cattle may enter Dili per year, and another 10,000 are traded within the (13) districts. Estimates in Section 6.3.4 suggest that another 5,000 cattle are traded annually into Indonesia. This would mean that at least 20,000 cattle are traded in TL per year for slaughter, probably more due to multiple transactions before slaughter.

Further estimates on cattle movements into Dili are recorded by DVNP due to regulations to monitor and “control” animal movement (MAFF 18/2008). Data reported at four checkpoints from 2009 to September 2013 are reported in Table 12. The aggregate amounts are presented in Figure 20.

**Table 12. Recorded cattle and buffalo transits through four checkpoints, 2009-2103**

	2009	2010	2011	2012	2013 - Jan- Sept	Total
<b>Balibar</b>						
Cattle	1,157	959	851	940	591	4,498
Buffalo	415	251	458	347	157	1,628
Total	1,572	1,210	1,309	1,287	748	6,126
% cattle	74	79	65	73	79	73
<b>Tibar</b>						
Cattle	760	1,282	441	612	752	3,847
Buffalo	217	114	161	226	187	905
Total	977	1,396	602	838	939	4,752
% cattle	78	92	73	73	80	81
<b>Hera</b>						
Cattle	1,562	1,083	1,075	1,378	616	5,714
Buffalo	1,002	1,049	977	607	607	4,242
Total	2,564	2,132	2,052	1,985	1,223	9,956
% cattle	61	51	52	69	50	57
<b>Cova Lima</b>						
Cattle	1,202	2,258	678	879	635	5,652
Buffalo	364	247	320	284	190	1,405
Total	1,566	2,505	998	1,163	825	7,057
% cattle	77	90	68	76	77	80
<b>Total</b>						
Cattle	4,681	5,582	3,045	3,809	2,594	19,711
Buffalo	1,998	1,661	1,916	1,464	1,141	8,180
Total	6,679	7,243	4,961	5,273	3,735	27,891
% cattle	70	77	61	72	69	71

Source: DGLVS

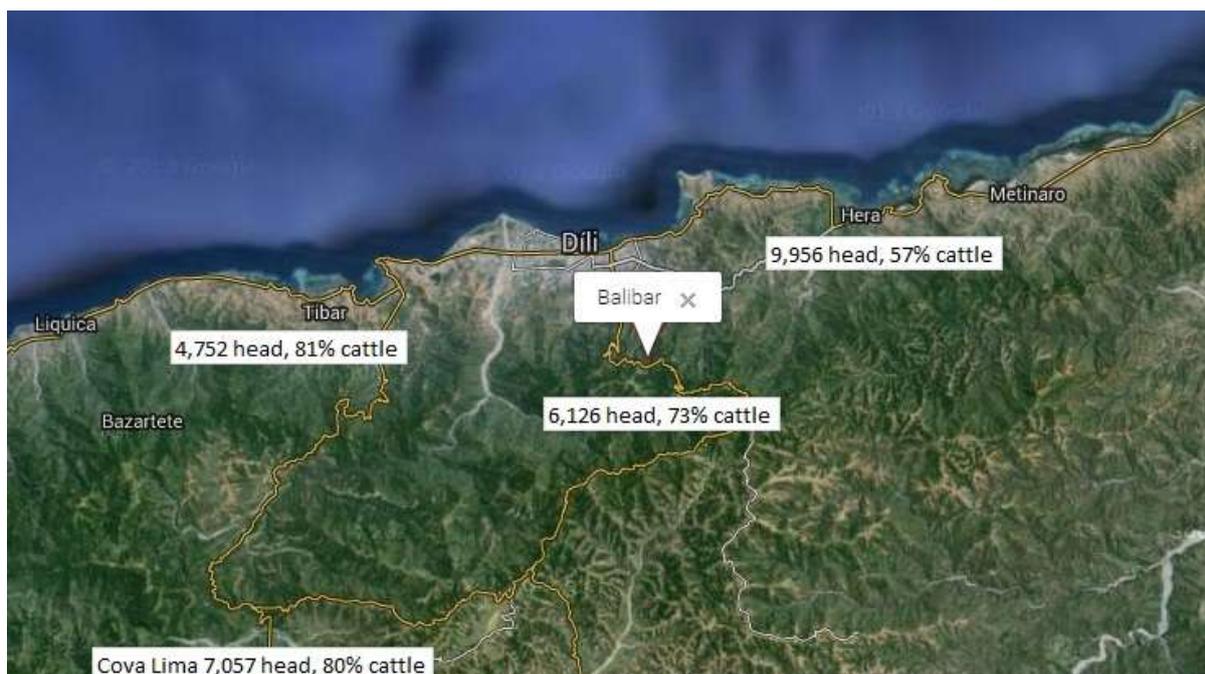


Figure 20. Aggregate bovine trade volumes in four checkpoints, 2009 to September 2013.

Source DGLVS

While the data provides a picture of cattle and buffalo movement into Dili, the data is likely to contain errors over space or time. It is likely that recording has become less rigorous over time, and that rigour varies by checkpoint. For example, one checkpoint visited is open from 8am to 5pm, and police are supposed to – but don't necessarily – check at night. Even during the day, trucks can be missed. The animals are supposed to be accompanied by a letter from the point of origin (village head), but if not, checkpoints can issue one or they can be overlooked.

Equivalent figures derived from Lautem SPVD are presented in Table 13. As expected, much higher percentages of buffaloes are sold from Lautem.

Table 13. Recorded cattle and buffalo sales from Lautem to Dili, 2009-2103.

Source: Lautem SPVD

	2008	2009	2010	2011	2012	2013 Jan-Oct
Buffalo	853	867	732	672	430	343
Cattle	895	974	737	616	396	332
Total	1,748	1,841	1,469	1,288	826	675
% cattle	51	53	50	48	48	49

A further breakdown by month and sex is also provided in Table 14.

Table 14. Recorded cattle and buffalo sales from Lautem to Dili by sex and month, 2013

Source: Lautem SPVD

	Buffalo			Cattle			% cattle
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2013	Male	Female	Total	Male	Female	Total		
Jan	13	4	17	13	7	20		54
Feb	14	5	19	16	10	26		58
Mar	22	9	31	17	6	23		43
Apr	28	20	48	34	15	49		51
May	39	16	55	30	4	34		38
Jun	22	5	27	19	5	24		47
Jul	37	12	49	26	5	31		39
Aug	35	7	42	22	2	24		36
Sep	26	5	31	40	13	53		63
Oct	12	12	24	43	5	48		67
Nov								
Dec								

## 5.2. Animal identification, checkpoints and “control”

Along with the two laws on meat retail (overviewed above) and slaughter regulations (below), the other two major laws relate to cattle movement. The law “Animal identification, registration and circulation regime” was passed in 2014 has had a long gestation. Anderson (2008) outlined the need to identify and control animal movements in response to increased industry commercialisation, specialisation and movement of animals. The report recommended that animal identification be required to provide a vaccination record, to reduce theft, to give owners more control over their animals including as collateral for loans, and to improve policy-makers’ understanding and response to industry developments. It also recommended measures to increase control over animal movements for environmental reasons (to allow for grazing regulations for protected areas or to meet carrying capacity, and reduce the spread of weeds), for disease control and quarantine in particular areas, to reduce theft (animals that cross checkpoints must be accompanied by a proof of purchase at the point of origin), and in the interests of public health (zoonosis) and amenity in urban areas (large animals walking in urban landscapes). These concepts were incorporated into the 2014

law, “Animal identification, registration and circulation regime“, which notionally applies to all animals (except poultry) (see Box 2).

While not stipulated in the law, several sources (research, MAF, slaughterhouse and slaughtermen) reported that there is a ban on the slaughter of productive or pregnant females. Permit documentation also records the purpose of the movement (slaughter or ceremony) and several

#### Box 2. Summary of “Animal identification, registration and circulation regime“

In “Animal identification, registration and circulation regime“, Chapter 1. “General Provisions” stipulates that the law is to be supervised by the DNVP and the SPVD (District Services for Husbandry and Veterinary). Chapter 3 “Sanctions” stipulates that fines of \$50-\$500 can be applied. Chapter 3 “Procedures of Seizure” (for infringing animals). Chapter 4 “final and Transitory Provisions”.

The Annexes consist of the following: Chapter 1 “General Provisions”. Chapter 2 “Bufaline and bovine identification and registration” regime should consist of ear tag identification and an animal identification card, farm records, and data should be kept on a computer database maintained by the DNVP. The animal identification records animal birth, sex, breed, holding (farm), issue date and disease prevention measures. All farmers are supposed to register their bovines. DNVP are to inspect 5% of holdings per year, which can be reduced to 2.5% when the database is operational, and an annual report produced. Animals without identification are to have “displacement” (movement?) restricted.

Chapters 3 to 5 make similar provisions for sheep, goats, pigs and horses. Chapter 6 “Livestock bazaars, transporters and merchants”. Markets should be supervised by DNVP or SPVD (that must record animal transactions and traders), have appropriate loading/unloading, feed, water, manure and disinfection, cleaning and infrastructure. Animals must be free of brucellosis, Septicemia haemorrhagica and other diseases defined by DNPV. Transporters must not allow litter from vehicles, have disinfection and cleaning instillations, and maintain records on cattle transactions. Merchants (traders) must follow the same requirements as transporters and, if cattle are held by traders, follow the same requirements as markets.

Chapter 7 “Animal circulation” stipulates that animals traded must be accompanied by an identification card or (if not vaccinated and tagged) a declaration from a competent authority (e.g. village head). Condemned animals will be sent for mandatory slaughter. Transit “guides” can be issued for immediate slaughter, holding or market. This must be accompanied by an “existence declaration”. On slaughter, tags are returned to DNVP or SPVD. In the case of an epizootic outbreak, the DVNP can take measures to avoid disease dispersion. Chapter 8 is titled “Final Provisions”.

sources reported that MAFF may use the data to regulate excessive slaughter of animals for ceremonial uses. Cattle are only tagged if vaccinated, which occurs in areas where there are vaccination programs or that are located close to MAFF vet stations. Some suco chiefs (for example in Fatucahi) said that they do personally sign documents to allow the transport of cattle (one to two trucks per week) and keep records, which detail the names of sellers, numbers, and purposes. However, other suco chiefs claimed that they don’t do these tasks.

The second law pertaining to animal movement, “Animal movement restriction inside urban areas” (see Box 3), was passed by Parliament in 2014. The stated justification for this law was that the social-economic evolution of the country requires enhancement of hygiene, public health values, disaster prevention, prevention of damage caused by animals and environmental protection in urban and peripheral areas.

### Box 3. Summary of “Animal movement restriction inside urban areas”

In “Animal movement restriction inside urban areas”, Chapter 1 contains general provisions. Chapter 2 “Animal Control” prohibits the keeping of loose or tied animals in urban areas, roads and public places; the raising of livestock and animals in urban areas (except for own consumption); off-leash dogs; and the passage or accommodation of herds. Chapter 3 “Animal Owners” specifies owners are responsible for damage and waste from animals, and must allow inspections and animal immunisation. Chapter 4 “Sanctions” outlines fines (\$50 to %500 for an individual and \$1,000 for a legal person) and animal apprehension. Chapter 5 “Transitional and Final provisions” specifies an adjustment period of 12 months (from enactment of law) to be enforced by local authorities with assistance from DNVP.

Again, the law appears to be implemented at least partly to improve aesthetics or as a sign of modernity. These laws may also be instrumental in closing down small slaughtermen that hold animals in urban areas.

### 5.3. Slaughtermen and cattle traders

This section overviews the dominant marketing channel for cattle in TL, where trade for slaughter in Dili or district centres is conducted by slaughtermen and traders. The markets have a number of characteristics – summarised in general terms here, with some regional permutations in Table 15 for the domestic trade and

Table 20 for the Indonesian export trade.

- The trade is conducted through a hierarchy of actors, including slaughtermen and traders who buy and sell their own cattle outright, and in some areas, collectors and spotters who provide services for a fee and don’t take ownership.<sup>21</sup>
- Slaughtermen and traders have extensive purchase networks, and can buy direct from farmers, or through local level collectors and spotters. Relationships with farmers and cattle purchasing skills are a key part of their operations.
- Barriers to entry limit the numbers of traders and slaughtermen in the sector. A large amount of working capital is required (i.e. up to \$10,000) and there are significant risks in losing this capital due to non- or late-payment of buyers (said to be common) or poor purchase decisions.
- To enter the sector, traders sometimes have to receive money in advance from slaughtermen (if they have good relationships) until they build up capital.
- With large amounts of capital tied up in live cattle, small slaughter numbers and to reduce transport costs, cattle are bought in small lines – by the truckload. The most commonly used trucks Mitsubishi Fusion Colt can hold 8-9 head of 1-2 year old cattle, 7 head of 3-4 year old

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<sup>21</sup> There is reportedly a big trader in Baucau with 15 spotters in many districts.

cattle or 4 big buffaloes. Even with few specifications, it can take some time (a week in some cases) to aggregate a truckload of cattle, which incurs large search, holding, and truck costs.

- 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 appear to have relatively good information about prevailing prices through other farmers and local traders or collectors. It is widely reported that the value farmers have of their animal can be influenced by attributes valued in “traditional” uses, but which are not valued by the commercial slaughter trade – e.g. horn size and age, especially for buffalo.
- In many areas visited (Mauputine, Guico), how the transaction is initiated incurs a significant price difference. If farmers ask traders to look at and buy their cattle, they are more obliged to sell and less likely to negotiate because they don’t want to waste the trader’s time and have him return with an empty truck. Traders also say that if called out, there can often be only one or two cattle (so incur high transaction costs). In contrast, if traders approach farmers looking for cattle, then farmers are in a better position to say no or negotiate.
- For ceremonies and traditional customs, hosts have powerful obligations to provide food and presents. If a brother-in-law gets married for example, gifts—especially cattle and buffalo—must be presented. The immediate and fixed demand increases prices significantly – up to 25% higher than “market” prices – as listed in Table 15. There is a premium for better (bigger and fatter) cattle.
- Farmers sell through traders (don’t take cattle to market themselves) but can sell directly to other farmers for ceremonies.
- Farmers prefer immediate cash payment, but in relationships where trust has been established, there can be delayed payment.
- Most slaughtermen prefer large animals (due to lower unit transport costs and higher yields) and there appear to be price premiums for these animals. However, the amount of capital tied up in large animals can be an obstacle for smaller slaughtermen/traders. In virtually all cases, the need to aggregate a truckload of cattle in a timely way means that virtually all types of cattle (large, small, age) are bought. Most slaughtermen and traders also deal with buffaloes.
- Many innovative permutations exist in trading systems, especially where trust has been formed. For example, one trader in Guico (Armando):
  - Receives an order from a Dili butcher (numbers, type)
  - Then visits farmers and agrees to buy cattle
  - Then pays farmers (e.g. \$10) to take the cattle to a specific place on the roadside on or before a specified time (can be tied there overnight).
  - The truck driver for the butcher then picks up the cattle, takes them back to Dili, where the butcher and the trader finalise the prices by phone. Money or a balance of the money is sent back by the butcher (carried by the driver) to the trader, or traders can arrange delayed payment to farmers.
  - This reduces the cost of the trader travelling to Dili, but can result in \$15-20 in telephone calls. There can also be delays and fines (of \$20-\$50) if the driver is asked for transport permits and business licences.

Table 15. Characteristics of cattle marketing in project sites<sup>22</sup>

	<b>Dili</b>	<b>Lospalos</b>	<b>Liquica</b>	<b>Manufahi</b>
<b>Traders</b>	<p>About 16 Slaughtermen in Dili that source 1-3 cattle per day (7-21 / wk)</p> <p>Have holding yards 3-10 cattle Most Dili Slaughtermen are from the districts so keep supply networks there</p> <p>Cipriano buys throughout country</p> <p>At the Tibar checkpoint, there are several regular traders from Bobanaro, 3 from Suai; 4 from Ermera that buy in Suai, 3 from Liquica (Armando, Mariano from Loess and David) and one from Maliana (Miguel).</p>	<p>5 cattle traders in Lospalos</p> <p>3 slaughter at Lospalos market, but also sell to Dili (e.g. Amando Noronha, about 10 cattle per week)</p> <p>2 other independent traders that sell to Dili (e.g. Manuel, 20-30 cattle / wk)</p> <p>Best areas to source form are Lospalos, Maupitine and Lorehe</p>	<p>More cattle go to Dili now than the border</p> <p>2 traders in Liquica and Guico</p> <p>Armando (used to work for Cipriano) buys over bigger distances Mariano mainly buys locally</p> <p>Plus local butcher – trader (Hilario)</p> <p>May be 1 truck sold out from Guico per week (suco chief)</p>	<p>Several traders??</p> <p>Major trader based in Dili is Joaquim Miguel Duarte</p> <p>Big butcher-trader from Same is Augusto Amaral (owns 3 trucks, 6 workers, buys 2 truckloads per week for Dili). Buys around Fatuberliu and Alas</p> <p>Can buy through local brokers (\$15 on a successful transaction)</p>
<b>Transport costs</b>	<p>Truck rental to Dili from Maliana is \$200-300 and from Suai is \$400</p>	<p>Butcher-trader truck hire 8-11 cattle</p> <ul style="list-style-type: none"> <li>• local Lospalos \$30-100</li> <li>• From Sub-district Iliomar \$250</li> <li>• Lospalos – Dil- \$250</li> </ul> <p>Trader tuck hire (8 small cattle)</p> <ul style="list-style-type: none"> <li>• \$60 from north</li> <li>• \$150 from sub-district Iliomar and Ililai</li> </ul>	<p>Armando truck hire</p> <ul style="list-style-type: none"> <li>• Guico to Dili \$150 with driver</li> <li>• Doesn't hire helpers – done by farmers</li> <li>• In remote areas, and wet season, pays farmers (e.g. \$10) to take cattle to roadside</li> </ul>	<p>Own truck - Mitsubishi Fusion Colt, max 11 cattle, \$22,000.</p> <p>Same to Dili - Uses 80 litres of fuel</p>

<sup>22</sup> Trading structures in Maliana and Oecussi for the Indonesian live cattle trade are outlined in

Table 20.

		<p>Roads generally poor</p> <p>Iliomar and Lore OK</p> <p>In many other areas, need to walk cattle to main road in wet season (coincides with high demand period)</p>		
<b>Other costs for traders</b>		<p>Can hold at market up to one month with costs for</p> <ul style="list-style-type: none"> <li>• feed</li> <li>• weight loss</li> <li>• Labour (3 people)</li> <li>• No penning costs</li> </ul> <p>Traders supposed to register (no cost)</p> <p>Permit to transport to Dili (\$1 per animal) for checkpoints</p>	<p>Permit \$1</p> <p>Cigarette fees \$10-15 per truck</p> <p>A complicated transactions can cost \$10-15 per head in telephone calls</p>	<p>One or two workers to join trader on trip</p> <p>Can backload (cement, building materials)</p>
<b>Prices</b>	<p>2013 – Miguel - purchase prices</p> <ul style="list-style-type: none"> <li>• \$400-550 small</li> <li>• \$700 large</li> </ul>	<p>2013 Mauputine farmer</p> <ul style="list-style-type: none"> <li>• 1yo – if traders come &lt;\$200, local ceremony \$250</li> <li>• 2yo - \$300 trader, \$400 ceremony</li> <li>• 3yo – \$400-450 trader, \$550-600 ceremony</li> <li>• 4yo – usually sold before this</li> </ul> <p>Butcher-trader Lospalos 2013</p> <ul style="list-style-type: none"> <li>• Big buffalo - \$1,200 for ceremony</li> <li>• 1 yo cattle - \$150-200</li> <li>• 2 yo cattle - \$450-500</li> <li>• 3 yo good condition - \$600-650</li> </ul>	<p>Guisu farmer – 2015 sell:</p> <ul style="list-style-type: none"> <li>• 1 yo - \$270</li> <li>• 2 yo - \$450</li> <li>• Big cattle – \$700 – 800/head</li> <li>• Big buffalo - \$1500/head</li> </ul> <p>If there is an urgent need for cultural ceremonies the price will be higher.</p>	<p>Andre Hornai -2014 (Fatucahi)</p> <ul style="list-style-type: none"> <li>• 1 yo - \$300</li> <li>• 2 yo - \$400 – 450 (300 kg)</li> <li>• 3 yo - \$500</li> </ul> <p>2014 Sell 4 bulls weight 350 kg/bull. Pay spotter: \$10/head</p>

		Trader - 3yo cattle <ul style="list-style-type: none"> <li>• 2013 - \$500, similar to previous years</li> </ul>		
<b>Estimated margins / markup</b>		At market <ul style="list-style-type: none"> <li>• buys from farmer (\$450)</li> <li>• Holds at market</li> <li>• Sells (\$520)</li> </ul>	Armindo <ul style="list-style-type: none"> <li>• Buys from farmer \$400-\$500</li> <li>• Holds on farm</li> <li>• Sells \$450-\$500 (\$50 markup)</li> </ul>	
<b>Seasonality</b>	Monthly numbers can double over Christmas / new year	Monthly numbers can double in Christmas / new year		

#### 5.4. “Over-the-scales” buying by “modern” butcher shops

Two of the butcher shops that slaughter at the Tibar abattoir overviewed in Section 8.8—EDS and Talho Moris—have cattle purchasing systems not dissimilar to other slaughtermen in Dili, but have sought to introduce over-the-scales purchasing.

EDS buys cattle and transports with its own trucks (a truckload per trip), especially from Same because of family connections there, or through spotters (for a \$15/animal fee). Talho Moris did buy cattle from EDS (at a high price) but now buys mainly from traders who source cattle from Maliana, Los Palos and Same and deliver to the Tibar abattoir. The butchers have a running list of the areas, traders and even farmers with good cattle supply or who seek to set up relationships. The butchers have a preference for heavy cattle, but buy a wide range of male cattle (200-500kg), mainly in the 230-260kg range.

One of the defining and important aspects of the modern butchers is they buy cattle over-the-scales on a per kilogram basis. This is in order to increase certainty in business operations (to avoid over-estimating meat yields) and reduce over-valuation by farmers based on attributes valued for traditional/customary use.<sup>23</sup> There are potential benefits in over-the-scales marketing including increased objectivity, transparency and especially in assisting in farmers in quantifying (per kg) profitability and production. However, over-the-scale buying occurs in various ways.

In the initial period of establishing over-the-scales buying, demonstrations were conducted for farmers by weighing cattle on farm, and paying based on the standard prices (below) minus transport and other costs. This allowed farmers to see their cattle being weighed and for immediate payment. However, the practice proved difficult to extend for several reasons. Farmers are unfamiliar with the practice, there can be mistrust that the scales are manipulated (common in TL), and weighing discounts the value of culturally appreciated attributes. Some farmers were worried that if they sold by weight and others didn't, then traders wouldn't buy from them. It is logistically difficult for the butchers to carry scales to all cattle purchasing areas, to set up on firm level ground and to control cattle without yards. Girth tapes overcome some of these problems but are seen by butchers to lack precision.

Thus, cattle are weighed at the scales set up permanently at the Tibar abattoir. Butchers or traders could conceivably truck cattle from the farmers, 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 perceived risk of not getting paid (or not paid in full, or at a discounted weight). There are examples (from Fatucahi) where a group aggregated a line of cattle from several farmers and trucked to Dili (but was reported to have encountered a logistical problem). Aggregation and

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<sup>23</sup> This is different to butchers and traders in TL (above) and most other countries, who prefer to buy by eye because they are more experienced than sellers (farmers) in knowing the yields and value of the animal. TL may differ because many farmers still value their animals on the ceremony market or on attributes for that market. The butchers are also supported by MAFF and international agencies that see benefits in unit pricing and objective measurement.

trucking by groups is feasible in groups that can work together, coordinate and incur the costs of aggregation and trucking, but also entails risks and costs.<sup>24</sup>

Talho Moris now buys from traders who buy cattle on a negotiated subjective basis (by eye, per animal) with immediate payment to farmers, then transported to Tibar where traders sell the cattle to butchers over-the-scales. Differences in the purchase and sales price are accumulated by the traders. However, in competitive markets, the trader margins should diminish and be passed back to farmers (see discussion above). EDS buys through subjective measurement and negotiation.

The price schedule of the modern butchers for cattle *landed at Tibar* in the second half of 2014 and first half of 2015 was as follows: >250kgs - \$2.70; 200-250kgs - \$2.50; <200kgs - \$2.00. Prices dropped about 10 cents in the latter half of 2015. In 2013, prices for the heaviest animals were \$2.30. The price movements over time are roughly in line with changes in world beef prices. Depending on the weights of the cattle under review and transport and other costs, the actual prices paid by traders selling to “modern butchers” appear to be similar or competitive with the prices paid by other traders and slaughtermen (see 5.3 above). Thus, it should not be assumed that by selling through chains “modern butchers” will have a major price or income effect, but this is an empirical question that will vary in individual cases.

## 5.5. Catchment and aggregation

This section estimates the numbers of cattle demanded by traders and butchers, and who are able to be supplied at a local level. On the demand side, a butcher who requires one animal per day to slaughter—or a trader who sells one truckload per week—would need 7 cattle per week, or 365 per year (assuming they don’t work every day but work more in festival times).

Table 16 presents data from the 2010 Census for sucos and sub-districts in ACIAR Project LPS-2009-036. Based on an assumed turnoff rate of 15%, it suggests that only one suco (Aidabaleten) turns off enough cattle (429) to supply one (small) butcher or trader for the year. In practice, turnoff rates may be lower, some cattle will be used for ceremonies, there may be several slaughtermen and traders operating in the area, and it will be difficult to find (probably 7) sellers willing to sell 7 cattle at any one time. Thus, even these small slaughtermen or traders need to buy from larger catchment areas. Local aggregators—collectors and spotters—are required to aggregate across these distances. Larger traders (who buy three trucks per week) buy across and between whole districts.

Table 16. Cattle per project suco and sub-district

District	Suco	Households with cattle	Cattle	Turnoff	Sub-district	Households with cattle	Cattle	Turnoff
<b>Bobanaro</b>	Aidabaleten	537	2,863	429	Atabae	1,092	6,130	920
<b>Liqica</b>	Guito	126	452	68	Maubara	1,099	3,012	452
<b>Lautem</b>	Muapitine	167	1,005	151	Lospalos	1,315	7,476	1,121
<b>Manufahi</b>	Fatucahi	60	195	29	Fatuberliu	477	1,501	225
<b>Oecussi</b>	Naimeco	363	824	124	Pante Macassar	2,883	8,503	1,275

Source: 2010 Census

<sup>24</sup> In other countries, there can be “holdup” where a transaction is not made and the sellers incur the costs of holding and trucking animals home again.

The implication for any development project, is that a development project working at a household, group, aldeia or suco level would be too small to provide consistent supply of cattle (especially to specification) to even one butcher. If a marketing arrangement (e.g. off-take agreement) was made with a butcher, supply would have to be drawn from a broader catchment across several sucos or a sub-district. Higher productivity and turnoff would improve the logistics of producing commercial lines (a truckload). Controlled mating to reduce calving spreads and coordinate turnoff is not feasible.

Aggregating a truckload of 10 cattle in an aldeia or even suco is not straightforward, given cattle turnoff numbers. In addition, a high degree of trust between farmers is required to aggregate cattle, share costs and divide up payments, and there are significant transaction, transport, weight loss, feed and logistics costs and risks (which is why spotters and traders dominate the marketing system). However, coordinated local level marketing initiatives may be feasible in some areas with productive cattle systems, good road and transport infrastructure, and good relationships and local leadership (an example in Fatucahi was mentioned above).

Questions also arise about the timing of sales. On the supply side, calving occurs mainly mid-year (early dry season), controlled mating to adjust this is unfeasible and cattle are kept for long and indefinite periods, so the timing of turnoff is staggered. Live weights will be at a peak at the end of the wet season / early dry season (April-June). In some areas, it can be hard to truck cattle out in the wet season, and cattle sales increase in dry season. On the demand side, demand increases in holiday periods (Christmas, Easter in Christian areas), for ceremonies (which are more common in the dry season), when school fees are due (February / March) and may be needed to purchase food in the hungry season (when crops haven't grown in Dec-Feb). Activity in the border trade will be highest leading into Idul Fitri and Idul Adha in the second half of the year, but changes frequently with administrative and exchange rate developments. Given the large number of factors that often pull in different directions, trying to optimise production and marketing systems on a precise intra-year basis would seem to be a low-order priority, and will vary by area and even by household.

## 5.6. Cattle markets

Unlike many countries (or parts of West Timor), there are no major specialised live cattle markets in TL, due to the low densities of cattle. There are however several aggregation points including:

- District wet markets (see above) such as in Maliana and Lospalos where cattle can be held for slaughter and sometimes sale.
- Slaughtermen, especially in Dili where cattle are slaughtered, are also known as “collection points” that sell cattle, including for ceremonies. Prices are considerably higher than the districts (e.g. \$800 vs \$670).
- Although not visited, there is apparently a cattle market in Acaco 45 min away from Suai for aggregation into the Indonesian border trade (although with variable numbers).
- There was reported to be a cattle/livestock market (in Comoro) which is no longer operational.
- A specialised livestock market facility has been established connected with the Tibar abattoir (this is separate from the holding pens of the abattoir). The aim of the establishing the market was to facilitate the trade of animals from traders or even farmer groups, direct to the abattoir, or for ceremonies or to slaughtermen that operate out of the market for slaughter. It is a large area, with basic facilities (an unloading mound and pens). The market is notionally open every

day for the trade of all types of cattle and buffalo, but only trades 30-40 cattle per week. Few cattle were at the market or traded when visited (several times) and one interviewee thought that only one or two trucks would be traded intermittently per week (not a regular periodic market). Centralisation of slaughter would increase activity at the market.

- The SDVP of Lautem has developed plans for a livestock market based on a similar model (of connected slaughter and market), following guidelines in design of holding, watering, and waste management facilities.

## 5.7. CCT

CCT has its roots in the Indonesian state marketing company PUSKUD, and operates cattle operations in a similar way to PUSKUD in West Timor. After independence, the branch became CCT (Cooperativa Café Timor) and is supported by the National Cooperative Business Association (NCBA), an international development organization based in the US. NCBA and CCT are large recipients of funding from USAID (which also funds PUSKUD in West Timor).

The main business of CCT is coffee marketing, but also markets vanilla, cocoa, cassava and cattle. CCT started in the cattle marketing business in 2003 in Dili, but due to a lack of feed they moved to Liquica, then expanded to Suai, Same and Maliana and finally Oecussi in 2008. With the banning of formal trade in 2010, the company contracted to just 2 districts (Suai, Oecussi) and is no longer distributing cattle in Suai. The company claims to have fattened 5,000 cattle from 2003, with distribution of about 1,000 per year at the peak of operation, and now down to about 360 per year. Some of the current traders in areas in places like Liquica have a background in buying or fattening for CCT, and there must be hundreds of households that were linked to CCT with at least some experience in specialised contract fattening.

CCT has a branch (including holding yard) in Oecussi, with three extension staff. When CCT started, they used independent collectors / traders to source cattle, but didn't get the cattle they wanted, so this is now done by CCT staff. Cattle from Oecussi are sent by truck on a ferry to Dili (said to be \$10/head), where cattle are held at Comoro (capacity 60 cattle) for sale mainly into the ceremonial market in Dili. Buyers for ceremonies in Dili usually seek heavier cattle (to increase reputation) and are under strong social pressure to buy so prices can be high (e.g. \$2.40/kg LW in 2013, higher than prices paid by the butcher shops).

CCT obtains (from NCBA) the large amounts of capital required to buy cattle on a large scale. The company enters into contracts with farmers to fatten the cattle. The cattle are weighed on dispatch (around 110-130kgs) and again on return to the company and the weight gain multiplied by a set price (\$1.80/kg in 2013), used to derive determine "profit", which is split 70:30 by the farmer and the company. Vet services are provided by CCT, households must provide pens for cattle fattening, and pay all feed and labour costs. CCT estimate that one labour unit in a household can fatten 3 cattle from their own feed and labour resources. The agreement (which can be formal or informal) specifies that the farmers will feed cattle to 280kgs, but farmers often want to sell at a younger age, so have a significant problem in side-selling. CCT therefore receives cattle as light as 220 kgs (but then might not distribute to these households in the next round). CCT has extension and "socialisation" programs but feeding practices and growth weights are clearly very variable.

The CCT cattle operation has been the recipient of donor support (Oxfam and Caritas) for training and production and forages. Some TL experts believe that the prices and terms offered by CCT are not “fair” (although this may be because of the low incidence of owner-keeper and contract relationships in TL). In any event, CCT operates on relatively small scale, only in Oecussi. However, CCT does have extension staff, linking to network of approximately 100 fattening households, so could be included in any training and outreach program conducted.

### **5.8. Brief conclusions**

Farmers and other stakeholders in TL hold a widespread perception that cattle prices are “too low” and that traders and slaughtermen make “too much money”. There appears to be areas where the system could be improved, but the dominant “spot” cattle marketing system does not appear to be dysfunctional. For example, while traders inevitably know market prices and the end-value of animals better than farmers (information asymmetries), most farmers do have access to price information and can select between multiple sales channels (through word of mouth or phones). While slaughtermen and traders no doubt have trading territories and alliances (collusion), there is still competition for cattle at local levels, and margins don’t appear to be excessive. Thus, there do not appear to be major windfall gains to be made in wholesale reforms to the marketing system. Rather, incremental gains may be possible in particular cases, which have to be assessed on an individual basis.

## 6. Live cattle trade to Indonesia

Non-oil exports from Timor Leste are dominated by textiles (most of which goes to Indonesia) and coffee (worth nearly US\$16 million in 2013). Timor Leste has a long history of trade of surplus agricultural products into Indonesia (copra, candlenut, livestock) and trade in agricultural and other products continues formally and informally along the border.

The live export of cattle from TL to Indonesia is a significant export item for TL and—when legal and recorded—the subject of considerable attention from government and development agencies. However, as TL was unable to meet the processes and logistics of a legal live trade, trade flows reduced and Indonesia shut down the formal trade into West Timor at the end of 2010. With growing demand for cattle in Indonesia, the informal trade continues, however, at perhaps the same scale of about 5,000 cattle per year, worth up to \$4.2 million in 2013 and 2014. Volumes declined in 2015, especially with the devaluation of the Rupiah (of 34% against the US\$ since January 2013 and 14% since January 2014) and disruptions to the Suai trade route.

Cattle remain a significant export industry for TL, with significant implications for policy and rural incomes. This section examines the pre-2010 legal trade in cattle between TL and Indonesia, mainly to reveal lessons that might be applicable if and when the legal trade is resumed. The post-2011 informal trade is not well documented, partly because of the lack of secondary data and the sensitivities of the trade, so is analysed in some detail in this section. The section concludes with a discussion of implications into the future.

### 6.1. The formal trade era

#### 6.1.1. Trade volumes

Data on the number of cattle (and buffalo) exported to Indonesia under the legal trade regime is incomplete and reported variably. MAFF statistics (see Table 3) record that

- The number of cattle exported to Indonesia peaked in 2005 when 2,913 were exported. These volumes declined to just 1,201 cattle in 2008 and 910 cattle in 2009.
- The number of buffalo was recorded as nearly 100 in 2005, increased to 410 in 2007 and then 76 in 2009.
- From no recorded exports of hides in 2005-7, nearly 5,000 hides were exported in 2009.

These official figures appear to be understated against other estimates that include the grey trade. For example:

- MAFF Agribusiness (2007) estimated cattle exports to West Timor were 6,000 in 2006 (only 400 head of which were exported through CCT)
- Anderson (2008) reported that 5,000 to 6,000 adult male Bali cattle were exported annually to NTT (all but a small percentage of which were shipped onward to Surabaya for slaughter in Java)
- Based on data from MAFF Division of Livestock, the World Bank (2010) reported that 3,000 were exported with a total value of \$750,000 (said to include estimated illegal/informal border export, including from the Oecussi district, with 80 percent assumed to be cattle and the remainder buffalo).

### 6.1.2. Quarantine and customs processes

The numbers of legal exports were constrained partly by modest demand for cattle in Indonesia at the time, and partly by the structures and procedures of the formal trade. These are outlined in Sendall and Associates (2006), illustrated in Figure 21 and detailed in Box 4.

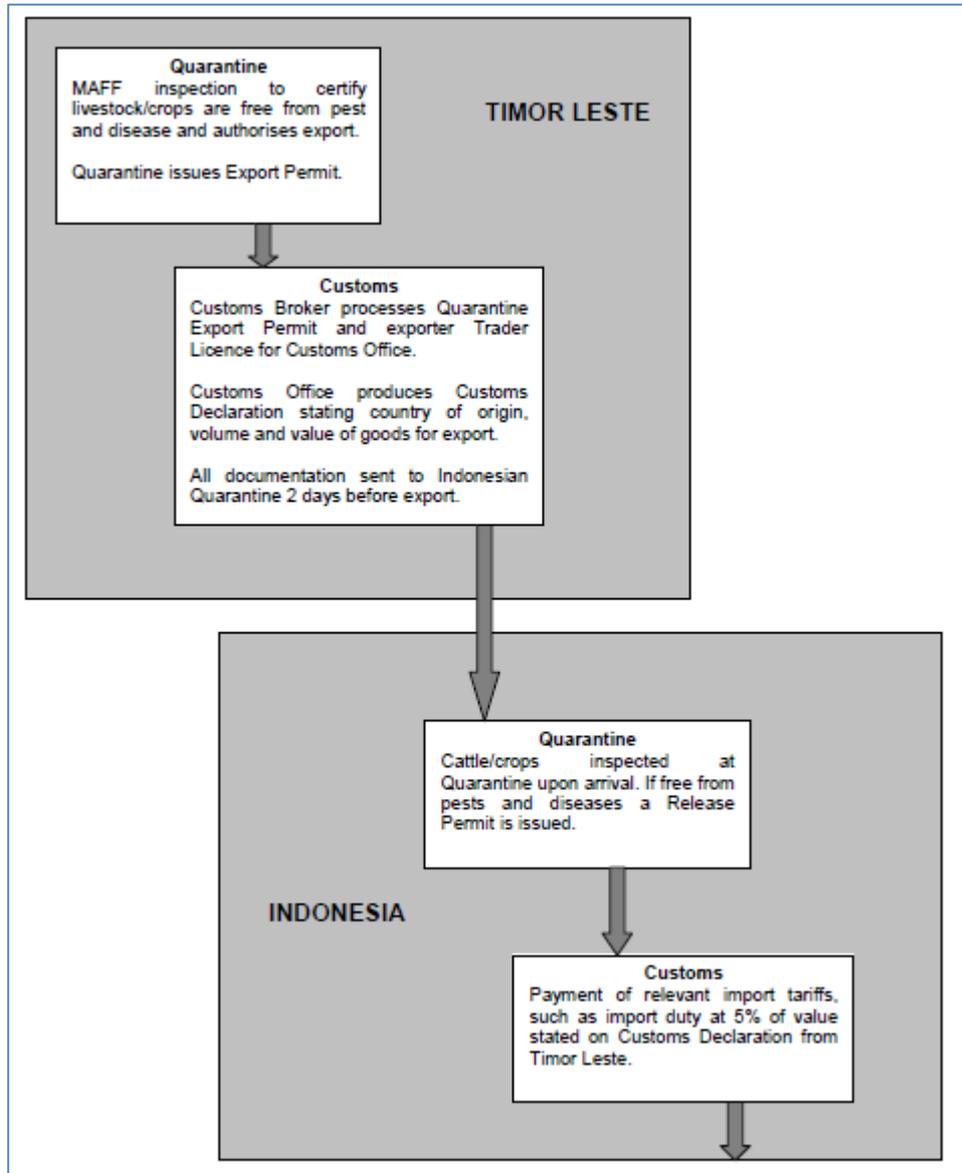


Figure 21. Quarantine and customs procedures East to West Timor pre-2010

Source Sendall and Associates (2006)

**Box 4. Processes for the legal export of cattle to Indonesia pre-2010. Source: Sendal (2006)**

**Timor Leste Quarantine (export)**

- An export permit is issued (without charge) by the Quarantine Office and MAFF Department of Livestock after inspection of livestock in place of origin (Quarantine and MAFF Livestock Officers). A minimum of 50 cattle are processed at one time at a minimum weight of 280kg/animal.
- The Department of Livestock then certify that animals are healthy and free from disease and authorised for export.
- Officially, cattle exported from TL to Indonesia require authorisation from the Director General of Livestock in Jakarta. This would be required if cattle were shipped directly from Dili to Surabaya, but the requirement is waived for cattle exported overland to West Timor (Atambua).
- However, Timor Leste Quarantine services were unable to comply with international WTO Agreement on Sanitary and Phytosanitary Measures (WTO-SPS) to produce 'Health Certificates' for livestock.

**Timor Leste Customs (export)**

- The Export Permit and a copy of the Exporters Trading Licence was required to produce a Customs Declaration by TL Customs (country of origin, volume and value of the goods to be exported). No customs fee was charged by the Customs Office, but are by customs brokers.

**Indonesian Quarantine (import)**

Upon entry to Indonesia, cattle passed through a number of steps under Government Regulation No. 82 of 2000 'Concerning Animal Quarantine'

- Animal Quarantine notionally required a health certificate issued in country of origin stating the period for which cattle have been free of Category 1 diseases (haemorrhagic septicaemia, brucellosis, foot and mouth disease and swine fever) as well as infectious animal diseases and ecto-parasites
- Presentation of documents, including Certificate of Origin (stating type of animal, origin, health treatments), an Export Permit, and Customs Declaration
- Indonesian Quarantine required submission of documentation 2 days before entry, entry through designated points, and inspection at the point of entry by Indonesian Quarantine
- Animals imported for breeding purposes were held in quarantine for up to 7 days if healthy, and for 14 days if showing symptoms of sickness, or rejected.
- Import duties for live animals (except for breeding purposes) were 5%
- Quarantine is also required for inter-island shipping in Indonesia. Cattle exported from Timor Leste to Atambua for direct shipment to Java only needed to enter quarantine once.

As suggested above, in an agreement signed in Kupang in 2005, Indonesia allowed exports from TL through an Export Permit rather than a Health Certificate, based on international SPS standards, initially for a period of 2 years. The agreement was extended in 2007 for another 2 years. At the request of GoTL, the agreement was extended again in January 2009 for another year, and again at the end of 2009 for another year. Indonesian and international agencies urged TL to sign the International SPS Agreement, but TL could not fulfil all criteria (including laboratories).

At the same time, even the relaxed processes in the pre-2011 era were simplified or by-passed on both sides of the border. For example, Indonesian Quarantine did not always collect import permits (only export permits), the source of cattle shipped from Atambua to Surabaya were sometimes not declared, and livestock checks at border points were reported to often be notional. The culmination was that Indonesia banned the border trade through export permits. The last consignment was reported in August 2010.

### **Trading structures**

The regulatory environment of the legal trading era forged trading structures. A limited number of TL traders legally exported live cattle and buffalo bulls to Indonesia in 2008; the largest exporting company was CCT, followed by others in Cova Lima (Rui Nainou and Joao Berloco) (World Bank, 2010, citing MAFF Livestock Division) and a few district-based traders.

Trading structures were concentrated for a number of reasons:

- Customs and quarantine requirements—run through agencies in Dili—entailed administrative demands and risks that most small traders couldn't manage. CCT in particular had the structures and skills to organise the documentation through its office in Dili and links with PUSKUD in West Timor.
- Traders were required to assemble lots of a minimum of 50 cattle, which is logistically and financially demanding.
- The main aggregation point in Bobonaro was in Soso (close to Maliana) that was said to be inconveniently located and in poor condition, including poor water and fencing. Cattle were held for up to a month to meet the minimum export lot size of 50, incurring feed and labour costs. Cattle were trucked mainly through the main trading post of Motain, close to Atapupu.
- Cattle lots assembled in western districts were not easily inspected by government qualified vets, who were not stationed full time in the districts.
- Sendal and Associates (2006) also reports that traders from Indonesia were reluctant to buy cattle in TL, partly because of the risks of obtaining the required documentation (e.g. import permits). Most cattle from Timor Leste were therefore exported by TL traders to the Indonesian quarantine station in Atambua (Haliwen) where Indonesian buyers bought the cattle.
- Quarantine and customs services were available in Dili, but not Oecussi making the trade from Oecussi technically illegal (and precluding exports from Oecussi for shipping from Wini).

The regulatory requirements and the concentrated trading structures were inevitably circumvented even in the pre-2011 era, through informal trading of smaller lots and more flexible holding, trading and administrative arrangements.

## **6.2. Trading points**

Enforcing a ban on the trade of cattle is logistically difficult. West and East Timor share a large border, with a large areas of grazing land, and established trading areas on both sides. Data from the office of (NTT) Provincial Border Management Board shows the border distances and villages between Timor Leste and Kabupaten in West Timor:

TL-RI – 229.5kms, of which:

- Belu and Malaka – 115kms, 34 villages

- TTU – 104.5 kms, 14 villages
- Kupang – 10.5kms, 2 villages

The legal trade in the full range of (non-animal) products is well established along the border.<sup>25</sup> The informal trade in cattle is distributed across a large number of points (Table 17, Table 189, Figure 22). Research on the West Timor side of the border reveals around 24 crossing points that are frequently used because they are close to the army and police posts, where traders and farmers have established personal and trade relationships. There are at least another 24 other border areas where there is no monitoring, but are often traditional market areas or grazing lands where people and animals cross. Trading sometimes occurs at these points, free of “informal” costs, but higher risks of penalties. Trade flows are therefore lower in these “potential” border points.

**Table 17. Cattle crossing points in East Timor**

Aldeia (village)	Suco	Sub-district	Notes
<b>Maliana</b>			
Mota'ain*	Batugade*	Balibo	Active in formal trade era
Nunura*	Leolima	Balibo	
	Cowa* (otherwise Cova or Kowa)	Balibo	Active in formal trade era, main trading era now
Memo*	Tapo/Memo	Maliana	Active in formal trade era
Tunubibi*	Tapo/Memo	Maliana	
	Saburai*	Maliana	
Oburo*	Deudet	Lolotoe	
<b>Cova Lima</b>			
Wala (place name, otherwise known as Beiseu)		30 minutes from Suai	
Fatumea*	Fatumean	Fatumean	
Saele	Maudemo	Tilomar	Current legal trading post – Tues and Fri – with Metamauk in W Timor
<b>Oecussi</b>			
Oelole*	Bobocasse	Pante Macassar	Trading concentrated on Fridays
Cruz – Nunisea (place name)		Passabe*	Trading concentrated on Tuesdays
Oesilo	Bobometo	Oesilo*	

**Table 18. Cattle crossing points in West Timor**

Village	Army post	Kecamatan	Cattle crossing point
<b>Timor Tengah Utara District</b>			
Manusasi*	Manusasi	Miomafo Barat*	Established

<sup>25</sup> There is a Joint Border committee (JBC) comprising delegates from TLS-Indonesia that has five technical sub-committees, one of which is the Technical Sub-Committee on Border Movement of Person and Goods, and RI-TL Crossing. There are seven traditional **border markets** (legally formed in 11 July 2011) in Belu/Malaka-TL (Motatian, Metamanuk, and Turiskain), TTU-TL (Napan, Haumus, and Haumeni ana), and Kupang –TL (Oepoli). There are eight **traditional border crossings** agreed by the two countries, namely Motaain-Batu Gade, Metamanuk-Salele, Turiskain-Hekesak, Bailulu-Memo, Wini-Pante Makasar, and Laktutus-Belulik Leten.

<i>Oelbinose</i>		<i>Miomafo Barat</i>	<i>Potential</i>
Haumeni Ana*	Haumeni Ana	Miomafo Timur*	Established
Timbate		Miomafo Timur	Established
<i>Ainan</i>		<i>Miomafo Timur</i>	<i>Potential</i>
<i>Ninulat</i>		<i>Miomafo Timur</i>	<i>Potential</i>
Napan bawah*	Napan	Bikomi Utara*	Established
<i>Haumeni</i>		<i>Bikomi Utara</i>	<i>Potential</i>
Baen		Bikomi Utara	Established
<i>Nino</i>		<i>Insana Utara</i>	<i>Potential</i>
Wini*	Wini	Insana Utara	Established
<i>Naikaka A</i>		<i>Mutis</i>	<i>Potential</i>
<i>Naikaka B</i>		<i>Mutis</i>	<i>Potential</i>
<i>Naikaka C</i>		<i>Mutis</i>	<i>Potential</i>
<b>Belu District</b>			
Silawen	Motaain*	Kakuluk Mesak	Established
<i>Tuneki</i>		<i>Kakuluk Mesak</i>	<i>Potential</i>
Tulakadi*	Soalare	Tasifeto Timur	Established
Asulait	Asulait	Tasifeto Timur	Established
Defala	Defala	Tasifeto Timur*	Established
<i>Mahen</i>		<i>Tasifeto Timur</i>	<i>Potential</i>
<i>Maubusa</i>		<i>Tasifeto Timur</i>	<i>Potential</i>
<i>Nunura</i>		<i>Tasifeto Timur</i>	<i>Potential</i>
<i>Turiscain</i>		<i>Tasifeto Timur</i>	<i>Potential</i>
<i>Wehor</i>		<i>Tasifeto Timur</i>	<i>Potential</i>
<i>Wehor II</i>		<i>Tasifeto Timur</i>	<i>Potential</i>
Lookeu	Lookeu	Tasifeto Barat*	Established
<i>Nanaenoe</i>		<i>Tasifeto Barat</i>	<i>Potential</i>
<i>Laktutus</i>		<i>Tasifeto Barat</i>	<i>Potential</i>
Maulakak	Baudaok*	Lasiolat	Established
Asu Manu	Bala	Raihat	Established

Turiskain	Manu Mutin	Raihat*	Established
Mauhitas	Tahon	Lamaknen	Established
Kewar	Kewar	Lamaknen	Established
<i>Delomil</i>		<i>Lamaknen</i>	<i>Potential</i>
Henas	Henas	Lamaknen Selatan*	Established
Lakmaras	Pauk	Lamaknen Selatan	Established
Lutarato	Fahululik	Lamaknen Selatan*	Established
<i>Fohuk</i>		<i>Lamaknen Selatan</i>	<i>Potential</i>
<i>Fohuklilik</i>		<i>Lamaknen Selatan</i>	<i>Potential</i>
Laktutus	Laktutus	Nanaet Dubesi*	Established
<b>Malaka District:</b>			
Ailala	Ailala	Kobalima Timur	Established
Kota Biru	Kota Biru	Kobalima Timur	Established
<i>Auren</i>		<i>Kobalima Timur</i>	<i>Potential</i>
<i>Hasiot</i>		<i>Kobalima Timur</i>	<i>Potential</i>
Metamasin	Metamauk	Kobalima Timur*	Established
<i>Kotabot</i>		<i>Kobalima Timur</i>	<i>Potential</i>
<i>Kateri</i>		<i>Malaka tengah</i>	<i>Potential</i>
<b>Kupang District:</b>			
<i>Oepoli pantai</i>		<i>Amfoang Utara</i>	<i>Potential</i>
Oepoli sungai*	Oepoli	Amfoang Utara	Established crossing point 24. Current legal trading post – Tues and Fri – with Saele in E Timor



Figure 22. Location of cattle trading points.



### 6.3. Trade flows and conduct

Broad trade flows from TL to RI are presented in Figure 23,<sup>26</sup> while some of the details of the conduct of the trade are shown in

Table 20. The border trade occurs through three main channels.

#### 6.3.1. Northern border trade

For this trade, cattle are sourced from throughout much of Bobonaro, especially the high density cattle areas in the west of the district, such as Maliana, Balibo and Cailico. Areas in the east of the district such as Liquica that did export many cattle in the past supply much less today (a truckload per month) as more cattle are diverted to Dili. Cattle from throughout Bobonaro also flow back to Dili including Maliana (one or two trucks per week).

Interviews in one collection area suggested that in an average week in high season (dry and high demand for 6 months), about 2 truckloads of cattle (6 cattle per truck) and one of buffalo (four per truck) might cross the border from Maliana, where the main traders with connections in West Timor are based. In wet and low demand seasons (6 months), fewer cattle are traded. This would amount to 415 animals per year. There are three such areas in Maliana, so may total about **1,250** cattle and buffaloes per year. In addition, an unknown number of cattle closer to the border can be walked across. Thus, while the border trade is significant, local officials believe that it is not as large the other two (Cova Lima and Oecussi).

When the trade was legal (2010), the main aggregation and trading area was in Soso (close to Maliana) and sold through Cova, Turiserim and Memo. The main trucking point now is Cowa, to concentrate logistics and numbers for Indonesian traders, but other crossings include Loltoe, Sabrai and Nunura. Cattle do not cross the main northern border crossing on the northern coast (Mota'ain / Batugade). However, cattle are also trucked or walked to several transit areas in West Timor (Belu Kapupaten) including Raihat and Lamaknen and Baudaok. The majority of these cattle are destined for ports in TTU (Wini) and Belu (Atapupu) although there may be some leakage to the urban areas of Atambua and Kupang.

Indonesian traders play a lead role in conducting trade in the area by setting orders, providing some or all of the capital and in some cases even helping to select cattle. A limited number of TL traders—4 main ones in Maliana—aggregate cattle to broad specifications based on liveweight (not age which is used widely in TL) up to an average of 350kgs. The traders hire trucks to source cattle sometimes from significant distances (e.g. Liquica), hold and aggregate cattle at their trading bases, and truck them to the border for delivery to Indonesian traders. The TL traders deal with local documentation from source areas (suco chiefs) and border authorities (police in Indonesia).

#### 6.3.2. Southern border trade

Only limited fieldwork was conducted in Cova Lima (as it is not a project district). However, the border trade 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. Other mooted markets in the south, such as gas and oil fields, haven't materialised yet. Like Bobonaro, much of the cattle

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<sup>26</sup> Note for Figure 21: Belu kabupaten has been split into 2 – Belu n the North and Malaka in the south.

trading is based in the district capital of Suai. The hire of a truck for 8 cattle from Suai to the border at Wala costs around \$150.

Interviewees said that in 2013, traders sent two to three trucks per week to the border, nearly all containing cattle—there are few buffalo in the region. Trucks hold up to eight animals, suggesting they may be lighter animals (using the standard 3.5 ton Mitsubishi Colt). This would make up to **1,250** animals per year. The main crossing points are Wala (30 minutes west of Suai) and Fatumean (longer to the north-west). However, there are large tracts of uninhabited land in the region and no doubt significant numbers of cattle pass through by other means and crossings. From transit and aggregation points in Malaka Kabupaten—Ailala, Kota Biru, Metamauk—cattle are distributed either north to Atapupu or Wini, or west to Kupang.

While this is an active trade area, illegal trade is more strictly controlled by a group comprised of MAF, Ministry of Commerce, Customs, Quarantine and Police that patrol illegal activities in the border on a monthly basis. Authorities reportedly cracked down on the illegal trade in August 2014, when police arrested a trader. No charges were laid, but traders and farmers are deterred by the police, army, bribes, cost and risk. There are other reports on the West Timor side that the newly created Malaka District initiated the stoppage because it could not “access” export quota for cattle from the district, and therefore shut down entry into the district from Timor Leste. The disruption poses a significant problem for the cattle industry and producers in Cova Lima, and trade numbers have reportedly reduced significantly (below the 1,250 cited above).

However, it is reported (Tempo, September 19, 2014) that animals can be legally traded at the border points of Metamauk (in Kobalima) and Salele (Cova Lima), where locals with a Transboundary Identity Card can trade up to five cattle for “basic needs”. Trade only occurs on Tuesday and Friday (although another informant said the trade days were Tuesday and Thursday) and even then only intermittently, so may total a few hundred per year.

### **6.3.3. Oecussi trade**

Cattle in Oecussi can be aggregated on order from Indonesian traders who visit Oecussi. Cattle are then trucked to the border. The structures for cattle exports from Oecussi are different in some areas (Passabe and Oesilo), where significant numbers of traders and/or integrated fattening operations buy, feed and sell their own lines of cattle. The cattle can be kept for anywhere between one week and six months through intensive feeding. This has stimulated forage production in the area and the trade of forages, including leucaena and gliricidia. For an idea of costs, a fattening household in Passabe was given access to tree forages on 0.5 ha for \$75, which fed 2 bulls for about 3 months. The fattening households and traders on border areas then walk cattle to the border, negotiate with Indonesian buyers and receive payment. There appears to be few authorities to deal with.

As an enclave district, the border trade into Indonesia is the major market for cattle. Because of the trading and fattening systems, turnoff rates in Oecussi may be higher than other parts of TL—say 15%—which for a herd of 16,000 (conservative) might mean 2,500 cattle. Of this, the majority would be exported. There are only two slaughtermen in Oecussi (Pante Maccassar) who slaughter one animal per day each (from Nitibe, Costa and Lifau). Together with restaurants that slaughter for themselves and local consumption, slaughter within the district may account for a maximum of

1,000 cattle. Slaughtermen in Pante Macassar have lobbied government to stop illegal trading so that they can source more cattle (at lower price).

Most cattle are traded mainly through the south-eastern areas of Oesilo (1,200 animals) and Passabe (850 animals), although cattle are drawn from throughout the enclave. Traders interviewed in Passabe said that 20 bulls can be traded on Tuesdays and Fridays, but only a few on other days, which might amount to as much as **2,000 cattle**. Cattle from these areas are traded into TTU and then on to Kefamenanu, Atambua or Kupang. However, there is also a flow of animals through the north-west of Oecussi (Citrani – Oepoli) that are trucked to Kupang.

#### 6.3.4. Aggregate numbers

The trade flows presented above broadly conform with estimates of inflows of cattle on the West Timor side of the border collected from interviews with cattle traders, local collectors, heads of villages, and heads of Dinas Peternakan in TTU and Belu. These values were aggregated to derive the values in Table 19, to total 6,900 cattle. Importantly, however, these estimates are maximum values and actual numbers will be lower than this, but **probably above 5,000**.

Table 19. Estimate of aggregate cattle flows by type and region, 2014.

	Maliana-Belu, Covalima-Malaka	Oecusi-TTU and Kupang
Bulls>200kgs	<3,000	<1,000
Mature cows	<500	<400
Breeder stock	<1,000	<400
Feeder stock	<500	<600
<b>Total</b>	<b>&lt;4,500</b>	<b>&lt;2,400</b>

Source: Fieldwork in West Timor

Significant numbers of households sell cattle to traders (either in TL or Indonesia). If they supplied an average of two animals 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, 7,313 Bobonaro and 6,178 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 (see Figure 7).

If about 5,000 cattle are traded over the border, at an average live weight of 300 kgs 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 animal), this would equate to \$25,000 for each agency.

#### 6.3.5. Movement in Indonesia

Table 19 also provides a breakdown of cattle flow by type of animal. The majority of cattle are bulls (up to 4,000). These are potentially ready for slaughter in West Timor but the majority are likely to be shipped to other islands.

- Cattle that enter through Belu and Malaka are sold to cattle traders in Atambua or Kupang
- Cattle that enter through the TTU-Oecusi border are sold to Kefamenanu or Atambua or Kupang.
- Cattle that enter through the Kupang-Oecusi border are sold to Kupang.

Trade routes are not necessarily direct. Traders may have to move cattle around to utilise export quota from various districts in West Timor. There are weight limits (275 kgs) on the cattle to be traded, so may require further fattening in West Timor. There are also restrictions on the movement of cattle in West Timor; for example cattle from TTU are exported through the more distant port of Atapupu than the closer port of Wini.

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). To get an idea of the importance of the TL cattle in total cattle shipped out of NTT:

- In 2010, according to official DGLAHS statistics (understated to conform to quota limits), Kupang “exported” 26,453 cattle and TTU 8,212 cattle (actual numbers are said by local officials to be 12,000 cattle)
- In 2012, according to (more reliable) Customs statistics, NTT “exported” 66,000 cattle (quota limit), about 60,000 of which was from Tenau, Atapupu and Wini. This does not account for the additional informal cattle exports from NTT
- As an indication of the size of the flow of cattle from TL, the kabupaten of TTU had an export quota of 8,000 cattle in 2013, but actually exported 12,000 cattle, and is recorded in Dinas Livestock statistics to have a total cattle herd of 9,863.

For inter-island cattle trading, the main destinations are:

- Surabaya (5 days/4 nights, but East Java bans any incoming cattle, so they are then trucked to Jakarta)
- Kalimantan (South Kalimantan 5 days/6 nights and East Kalimantan 6 days/7 nights).
- Sulawesi : A small number of bulls—and even cows—are also sold directly to cattle traders from Sulawesi, who use wooden boats to transport cattle from Wini and Atapupu to Makasar (South Sulawesi). Makasar traders do at least one shipment per month from April to November every year, with only 40 to 60 cattle per shipment.

Table 19 also suggests that up to 30% (or up to 2,300) of cattle imported from TL are females (cows or heifers). Females are notionally not permitted to be exported from West Timor for disease reasons (brucellosis) but there is some trade (reported to be 3,000 from TTU in 2012). In addition, there are up to another 1,100 feeder cattle from TL that are fattened in West Timor. High beef prices, government policy (cattle distribution and the “rescue of productive females”) and well-developed fattening and marketing systems in West Timor provide demand for breeding and feeding cattle from TL.

Cattle moved around West Timor must be accompanied by documents, including a cattle ID letter with details on earmarks etc. to monitor ownership (for rustling), a selling permit, and an animal health certificate. Buyers in West Timor obtain ownership documents from the village heads in the crossing points (for a fee).

Exports must then comply with a series of regulations including

- Decree No 113/Permentan/PD.410/10/2013 regarding Quarantine Responsibility for live cattle Imported to Indonesia (Ministry of agriculture Agriculture)
- Decree No. 85/Permentan/PD.410/9/2013 regarding Importation of live cattle to Indonesia (Ministry of Agriculture)
- Decree no 24/ M-DAG/PER/5/2012 regarding Importers Recognition Index (Issued by Indonesian Ministry of Trade)
- Legal documents of holding ground ownership in Indonesia (for live cattle)
- And a series of company documents
- In addition, the company has to allow Indonesian quarantine officers to take samples and perform health inspections during the time cattle are quarantined in Indonesia.
- As mentioned above, there are also “export” quotas for the province, and per district.

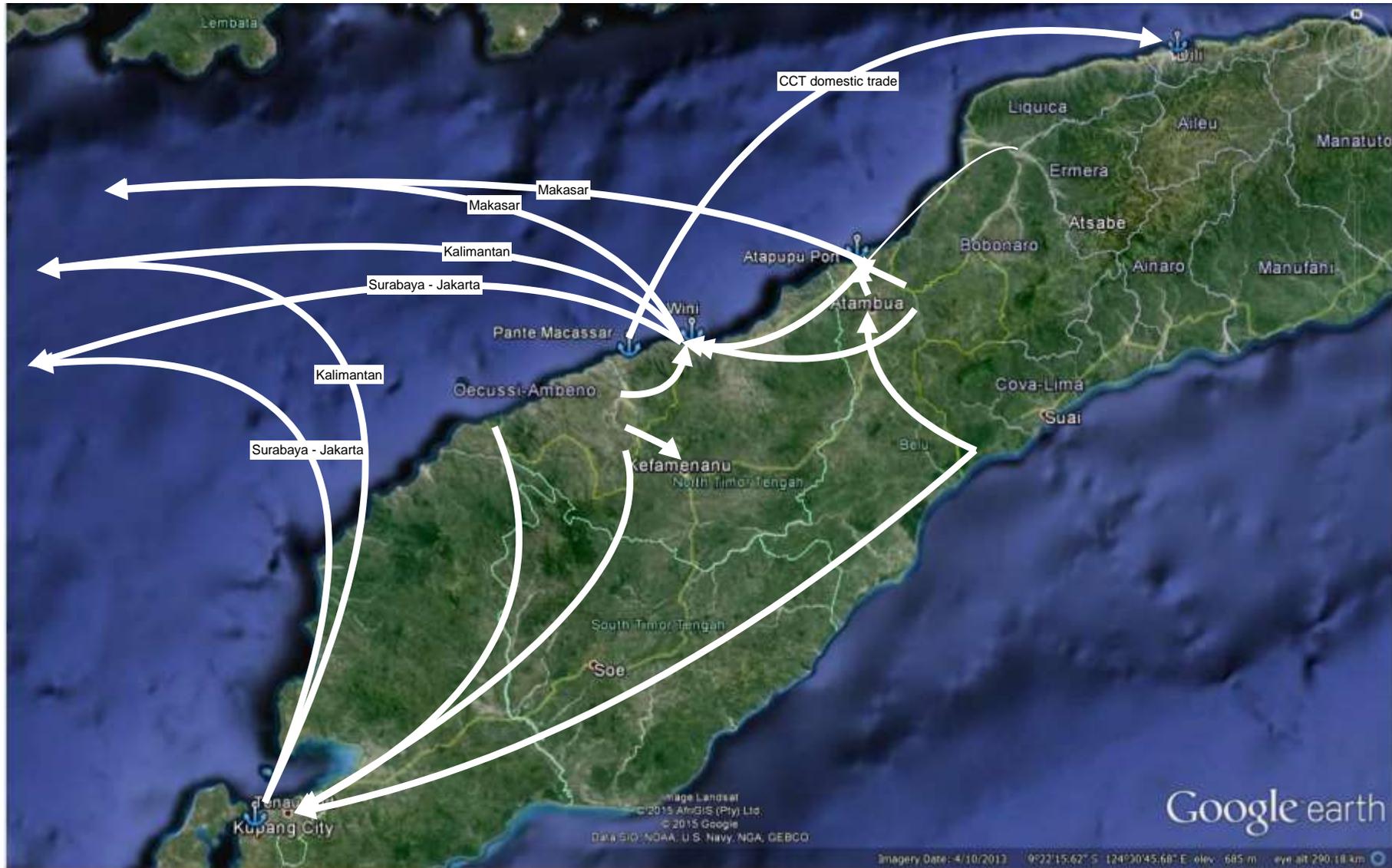


Figure 23. Broad cattle flows from East to West Timor

**Table 20. Summary of cross-border trading structures and practices**

	<b>Bobonaro / Maliana</b>	<b>Oecussi</b>
Trading systems and conduct	<ul style="list-style-type: none"> <li>Trading by truck done by a limited number of TL traders</li> <li>Indonesian traders visit TL traders to negotiate order and sometimes select cattle</li> <li>Indonesian trader transfers capital to buy animals to TL trader</li> <li>Local traders aggregate (from as far away as Liquica)</li> <li>TL traders transport to border, unload, and West Timor trader takes delivery</li> </ul>	<ul style="list-style-type: none"> <li>Trading based around fattening households in Oecussi</li> <li>They buy cattle for feeding (variable periods)</li> <li>Indonesian traders can inspect and negotiate</li> <li>Fattening households or a limited number of Oecussi traders transport cattle to border (usually walked)</li> <li>Transaction and payment occurs at border</li> </ul>
	In addition, significant numbers of cattle from border areas are walked over the border and traded by local households – that enter the trading hierarchy in West Timor	
Traders	<ul style="list-style-type: none"> <li>4 main traders based in Maliana identified, limited to those with connections with Indonesian traders and border authorities</li> </ul>	<ul style="list-style-type: none"> <li>2-4 big traders in Passabe</li> <li>20 smaller traders (fattening, speculative) operating near border in Passabe</li> <li>Fattening households that trade cattle in Pante Macassar, Oesilo and Passabe</li> </ul>
	These traders link with a hierarchy of collectors and traders in West Timor. However, these lead to a limited number of inter-regional exporters with the necessary resources, skills and export licences - 2 in Kupang, and similar numbers in Wini and Atapupu. These shipments are made on order from “importers” and traders from Jakarta also buy directly and export from West Timor	
Transport	<ul style="list-style-type: none"> <li>Truck hire (6 cattle) Maliana to border - Cowa \$100, Turiskain \$60</li> </ul>	<ul style="list-style-type: none"> <li>Pante Macassar to Passabe \$15/animal</li> <li>From Passabe, cattle walked to border (Huameni Ana etc.)</li> <li>From Oesilo, walked to border (Bikmoi etc.)</li> <li>Oecussi-Dili ferry \$150/truck (CCT)</li> </ul>
Other trade requirements	<ul style="list-style-type: none"> <li>TL police \$9-10 per animal, \$5 per person. Can be sliding scale (i.e. full costs for initial truck, then less or gratis over the week)</li> <li>Indonesian army - Rp150,000 / animal</li> </ul>	<ul style="list-style-type: none"> <li>Documents from suco head for transport \$5/animal</li> <li>TL police – no fee</li> <li>Indonesian army - Rp150,000 / animal</li> <li>Vaccination program and tagging from 2014 – required to sell cattle</li> </ul>
	Within West Timor, costs to transport cattle include	
	<ul style="list-style-type: none"> <li>Ownership and other documents from village heads – Rp10,000- 20,000 / animal</li> <li>Animal Health certificate – Rp18,000</li> <li>And numerous other costs – there are reported to be 15 checkpoints between Soe and Kupang</li> </ul>	
Cattle	<ul style="list-style-type: none"> <li>Cattle weights said to increase – e.g. from 250kgs 2011 to 350kgs 2014</li> </ul>	<ul style="list-style-type: none"> <li>Cattle often fattened (intensive feeding) to some degree</li> <li>Variation in type of animals by season (young feeders, bulls)</li> </ul>
	NTT applies a weight limit on exported cattle (275kgs)	

Prices	<ul style="list-style-type: none"> <li>• Price based on estimated liveweight (not age etc.)</li> <li>• Big bull for export \$800, compared to domestic price \$600</li> <li>• Prices high in 2011 (\$2.80), declined 2012-3 (\$2.30-\$2.50)</li> <li>• Price for export \$2.80/kg in 2014, compared to domestic (\$2.40)</li> </ul>	<ul style="list-style-type: none"> <li>• Purchase feeder cattle - \$230/2 yo bull</li> <li>• Cattle prices up to \$900 for a large mature bull 5yo, but significant discounts for poor condition (e.g. \$500)</li> </ul>
	<ul style="list-style-type: none"> <li>• In West Timor, Sept 2014 prices in urban centres were Rp28,200/kg for 200kg animal; Rp100/kg per additional 25kg; Rp29,000/kg &gt;300 kg animal</li> <li>• The appreciation of the \$ against the Rp over the last 2 years has made cattle from TL more expensive for Indonesian buyers</li> </ul>	
Seasonality		<ul style="list-style-type: none"> <li>• Busy period May to October, and high demand for younger animals (e.g. 1yo) February to March appears to be related to Idul Fitri in Indonesia</li> <li>• Fattening households shortage of feed Oct-Nov. But can and do buy in feed.</li> </ul>

#### 6.4. Formalisation of trade into the future

Information presented above suggests that the informal cattle trade to Indonesia is significant at around 5,000 cattle, worth about \$4.2 million supplied from an estimated 2,500 households.

With numbers at levels similar to those of the pre-2010 era, and demand and prices in Indonesia increasing, it could be argued that there is no major imperative for TL to formalise the trade, but rather to maintain the informal status quo. Formalisation of the trade 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).

Money has been budgeted for the state to invest in these items, but has not been formally introduced to or passed by parliament. The state could recoup some costs through taxes and fees on the trade, but these revenues are not high given the investments involved.<sup>27</sup> Formalisation of the trade also entails longer holding periods of larger lots in a limited number of holding areas, which increases costs for traders. The additional fees and costs might mean that legal export channels are resisted or circumvented by well-established traders on both sides of the border. Policy-makers too may question the investment in the export market, when the domestic market is growing, is technically much easier to service and when the state has invested significantly in key sectors (e.g. retail and slaughter that would benefit from increased cattle supply and lower competition from the export market). Other policy-makers advocate the development of a beef rather than cattle export sector.

There are, however, benefits from the formalisation of the trade.

<sup>27</sup> For an idea of the magnitudes, based on a trade value of \$4.2 million, if the GoTL charged an export duty of 5%, then this equates to just \$210,000 in government revenue. Similarly, if fees were charge for customs and quarantine services (say, \$5 per head), this would equate to \$25,000 for each agency.

- High prices and demand in Indonesia provide scope for increased exports—perhaps double—where it will become harder to turn a blind eye to illegal trading. TL has an interest in promoting export expansion if the objective is to increase competition, prices and income for larger numbers of cattle producers.
- TL is embarking on a vaccination and identification program, which would benefit from the extra monitoring required in an export trade
- Perhaps most importantly, the illegal trade entails risk and costs for traders and farmers, such as fines or holdup. The case of Suai from 2014 shows that the trade flow can be severely disrupted through periodic crackdowns. 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. slaughtermen and agencies with a stake in the Tibar abattoir).

Thus, GoTL is developing plans and a strategy to formalise the trade. The barriers to doing so do not appear insurmountable.

- For a start, the (former) Secretary of State for Livestock is supportive of measures to resume legal trade<sup>28</sup>
- GoTL has initiated at least 3 meetings with Indonesian counterparts about formalisation – in both Jakarta (central government) and Kupang (NTT government).
- NTT governments (both provincial and in border districts) are supportive of resumption of the trade (to increase trade volumes). 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 eartag (as Timor Leste is doing especially in Oecussi as a condition of trade).
- TL has a new animal laboratory in Caicoli (Dili) (Ausaid) that would be sufficient for testing of diseases – serology, bacteriology and parasitology. It is administered by the Directorate of Veterinary Services (not Quarantine).
- Indonesian Quarantine may not be opposed to resumption of trade, but DGLAHS, which is on the same horizontal level, were said to be opposed. Cattle policy, self-sufficiency and imports have been highly politicised in Indonesia in recent years.
- TL is now a member of OIE, which facilitates the development and recognition of standards and has taken part in various WTO-SPS technical assistance activities (e.g. regional workshops).

The major issue and obstacle is whether GoTL can issue health certificates compliant with the WTO-SPS Agreement, and the integration with domestic animal health and vaccination programs.

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<sup>28</sup> Anderson (2009) developed plans to strengthen quarantine through increased resourcing of the quarantine service, a tri-state quarantine agreement with Indonesia and Australia, and an internal quarantine system through development of a 'stock squad' to assist with bio security in epidemics, and a system for compensation for animals seized as part of an epidemic.

Assessment of the costs, benefits and feasibility of meeting international protocols are beyond the scope of this report.

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 – to reduce transaction and transport costs to traders
- The size of lots – to maintain flexibility and costs to traders, but also manage costs for government inspection
- The time and costs required to fill quarantine and customs processes would have to be simplified
- Several interviewees raised the prospect of direct exports (through Dili / Com port, or Pante Macassar) to reduce transport and other costs, especially if WTO-SPS health certificates can be issued. To achieve a system like that at Atambua, substantial investment would be required in facilities (holding, loading etc.) and administrative systems (customs, quarantine)—especially for international shipments—that may or may not be justified given the trade volumes and value. Oecussi is seeking to develop as a Special Economic Zone, and cattle are one of the few viable economic activities in the enclave. There may be resistance from embedded trading interests in West Timor.

## 7. Slaughter

Similar to 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 (an abattoir). Also like the retail sector, GoTL is seeking to move the relative importance of these structures toward more modern structures through regulation, inspection and centralisation of structures. Implementation will be difficult, and could be expected to increase costs / prices.

### 7.1. Slaughter for ceremonies

A large proportion of cattle are killed by non-specialist slaughtermen, including farmers, especially for beef consumption at ceremonies (Section 4.4.1). This is reported to be crude and often cruel. Cattle can be killed by spear, knife (that may not be sharp), and tendons can be cut to immobilise the animal.

### 7.2. Slaughtermen

Slaughtermen kill the vast majority of cattle in TL and have several structural features. They operate in rudimentary, individual facilities. This is different to Indonesia, where (legal) slaughtermen (jagal) operate individual operations but kill in certified slaughter kill facilities (public – city and suburban). Second, like Indonesia, slaughtermen are usually integrated operations, integrated 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 opportunities especially through links between slaughtermen and producers. At the same time, however, the slaughtermen are relatively small and

speculative. Unlike abattoirs in some countries (e.g. China), they don't enter into long term contracts or provide inputs and services to secure supply.

Further details on the butcher sector are provided by Varela (2014) and case studies of butcher operations are provided below.

#### Box 5. Characteristics of slaughterhouses in TL (Valera, 2014)

Varela (2014) conducted a survey of 35 "slaughterhouses" in TL (butchers, and the Tibar abattoir), in 13 districts and 11 of which were in Dili. Several features emerged from the study.

- Butchers operate small, high turnover operations
  - 60% slaughter one animal per day, with only 5% slaughtering five animals or more per day
  - 20 of the butchers slaughter every day, with the other 15 more irregularly
  - 75% slaughter overnight / early morning, and 25% during the day (with implications for inspection and closing operations)
- Butchers are active in sourcing their own cattle
  - Most slaughterhouses buy animals directly from just producers (49%), or both traders and producers (46%), with only a small number just buying from traders (6%)
- 88% of animals are identified (brand and ear cut)
- A variety of killing methods were used; knife (23%), machete (16%), both knife and machete (50%), spear (42%) and in one case pistol (4%).
- The facilities are rudimentary. 24 of the slaughterhouses didn't have walls, 6 had walls, 14 had no roof, and 13 had zinc roofs. Most had water.
- Worker numbers ranged from two to 13 people, the largest category (32%) employed four people.
- Wages ranged from \$3-10 per day, with the largest category (64%) paid \$5.
- Cattle killed were light, with meat yields ranging between 40kg and 100 kg (with 35% in the 100kg range).
- In 2013, the most slaughterhouses sold beef for \$6/kg
- Bones were said to sell for \$2.50-\$3/kg (although this seems high)
- Conforming to information in Section 3, 35 butchers (100%) sell beef to markets and consumers, 23 (74%) sell to restaurants, seven reported that they sold to supermarkets, with only one selling to other butchers

#### 7.2.1. Dili

There are 16 slaughtermen in Dili (including Tibar), the majority of which are small. The two largest in Dili are Miguel and Cipriano.

**Miguel** operates out of a large courtyard area on the main road leading west out of Dili (Comoro Suburb) where the company has a bus service, shop and other businesses. To the side is a holding

yard and slaughter area. The slaughter area consists of a simple concrete slab with a tin roof. Miguel's company slaughters about 10 animals per week on three days per week. Average meat bone-out yield is around 80-90kgs. Beef is sold on benches in front of the courtyard and carry-over stock is stored in the shop fridge. In addition to the slaughter business, Miguel also trades cattle, especially into the ceremony market in Dili. They sell about 15-20 animals per month, with a mark-up of about \$150 per animal.

For both lines of business, Miguel buys one or two truckloads per week, with an average of about 15 cattle, mainly through traders who buy principally from Lautem and Maliana and deliver cattle to the yard. Purchase prices range from \$400-550 small to \$700 large, and he has a preference for heavy cattle. The yard can hold about 15 cattle tethered to a peg in the ground, and are fed grass and rice straw, and has a well for water for cattle and washing out the slaughter area. The company doesn't pay any slaughter fees or taxes.

**Cipriano** has been a butcher since Indonesian times (1992), and moved his current slaughter place in Comoro market in 2009. The company is called Luga Gua Furak. Lda.

Cipriano slaughters every day, with throughputs of 70-80 cattle and 50-60 buffaloes per month. These numbers can however rise to 200 over December (Christmas / New Year). In addition, he trades five or six animals a month for ceremonies. The buyers sometimes ask the staff to help slaughter (on an independent basis). He employs up to 18 people in the slaughter and beef operation, and a total of 60 people including buyers.

A large range of cattle are killed, but prefers bulls over 2 years of age and said that they don't kill productive females (only infertile / haven't calved for three years) apparently to conform to government policy. He buys large or small animals, based on price and conformation (he thinks cattle fed forages rather than banana trunks or just grazed have higher yields). He buys from throughout TL (Same, Lospalos, Maliana, Baucau, Manatutu) but not Oecussi or Suai. He has four trucks, and buys cattle/buffalo through buyers that work for him, who receive a \$15 per animal wage. He has three or four people in each district who source cattle for him. He buys on a per animal basis and believes households don't want to sell on a per kilogram weighed basis. He thinks his prices are higher than EDS and has generated trust with sellers over many years.

He buys cattle and buffaloes inter-changeably, again depending on price and estimated yields. He considers Timorese consumers prefer buffalo meat, but that restaurants prefer beef. They should be sold separately so consumers know the difference. Prices of beef sold at his stall near the slaughter area were:

- Generic beef from own stall \$6/kg
- Offal \$3/kg
- Customers could also buy beef and have it minced (flour garlic etc.) at a cost of \$1/kg

Prices of product sold to other outlets were:

- Institutions (army, hospital, police) \$6.50/kg varies by order size, up to 50kgs/day
- "Minimarkets" (\$6/kg, 5-10kgs/day)
- Supermarkets (\$6.50/kg, 100kgs/week)
- Restaurants (\$6/kg, 60kg/day)

The “integrated” animal holding, slaughter and retail area had very poor hygiene conditions. Cattle and buffaloes were tethered in mud next to the slaughter area, where slaughter effluent, manure and rubbish flowed undrained into the market where pigs scavenged. Cipriano asked the government to upgrade the facilities, but they didn’t, and have announced that Comoro market would be closed (but the slaughter operation was still operating in February 2015).

When enforced, he may move operations to an area of land he has in the east of Dili. A new simple structure (tie area, slaughter area, hide treatment / stocking, concrete slab, water) would cost him about \$10-15,000. However, the area is 21kms from the centre of Dili, so he would need to distribute product. Like other slaughtermen in Dili, Cipriano believes that he has been excluded from utilisation of the Tibar abattoir, but hopes to participate when the operating contract is renewed in 2017.

### 7.2.2. Districts

There are slaughtermen in the districts who slaughter for stallholders in local markets and for restaurants. For slaughter at market, several stallholders can coordinate to buy a carcass to sell that day.

The Ministry of Economy and Development (year not reported), reports that there are four slaughtermen in **Lautem** district. One interviewed said that three slaughtermen take turns to use the designated slaughter area at the Lospalos market (every three weeks on Saturdays, when two to three animals are slaughtered. Facilities were basic (no water or power) and hygiene levels were low. Lautem SPVD notionally inspects the facility but does not monitor slaughter in the sub-districts. Permits are not required and no fees are paid. Slaughtermen need to employ about four people to help with slaughter, but the same crew is used to do trading, which is an associated business activity of the slaughtermen.

There are said to be 12 slaughtermen in **Bobonaro** who slaughter at their own homes (Ministry of Economy and Development (year not reported). In Maliana, cattle were killed in town, but the local government attempted to close this activity down in 2011 and built a new slaughter place in Curluli. The facility was an elevated open concrete structure with tie rails, a baffling design and located at least 10kms from the town centre on a poor road. It had evidently not been used for a very long time. As a result, cattle are killed in front of houses and restaurants in Maliana. A butcher interviewed said that three cattle are killed in Maliana per day, but can be higher when more cattle are available in June/July. Like Oecussi, slaughtermen have to compete with Indonesian buyers for cattle and heavy animals (over 400kgs).

There was also a slaughterhouse in **Liquica** run by an individual butcher but it is no longer used, because of poor management (sourcing cattle, butchering, sales). However, there is another well-known butcher (called Martius) in the district. Local restaurants call him to check availability, but Martius will not necessarily have cattle on hand to slaughter, in which case the restaurants will buy from Dili.

There was a public abattoir in **Oecusse** where slaughtermen used to slaughter but it no longer operates (no water, lack of hygiene). There are now two slaughtermen in Pante Macassar who slaughter near their houses. The slaughtermen slaughter twice a week, five to six animals per week (so total 12 in the town). There is a market on the edge of town but the main market appears to sell

warungs in town and to some institutional customers. The slaughtermen complain that the illegal trade of cattle to Indonesia makes it more expensive and difficult to source cattle. Cattle from Oesilo and Passabe are sold at higher prices over the border, restricting supply to Nitibe, Costa and Lifau. This also means that cattle are lower grade (although the slaughtermen may also prefer lighter cattle because they are easier to handle). Slaughtermen have lobbied district government to close down the trade.

### 7.3. Slaughter regulations

The State has sought to regulate the slaughter sector through the development of a new law, titled “Slaughterhouse Permit Regime”. This was introduced in parallel with the meat marketing regulations (Section 8.5), aiming to complement the regulations and to help regulate and centralise operations (see Box 6).

#### Box 6. Summary of the “Slaughterhouse Permit Regime”

The stated goals of the “Slaughterhouse Permit Regime” are to improve hygiene levels and public health, improve environmental impacts (effluent), increase public confidence in meat as a major food item, stimulate supply and self-sufficiency (including import replacement), regulate or stop outdated practices, and to promote development of the corporate sector.

Chapter 1 “Scope, definitions and classes of slaughterhouses” defines the relevant animals (bovine, buffalo, ovine, caprine, swine), types of slaughterhouses (public, private and mixed), and that National Directorate for Husbandry and Veterinary (DNPV) has a mandate to provide services to third parties (butchers).

Chapter 2 “National Animal Slaughter Network” introduces the National Animal Slaughter Network (R.N.A.) as a set of slaughterhouses to secure the public supply of meats by providing services to third parties for a fee. The DNPV decides if a slaughterhouse may or may not be included on the RNA based on their modernisation of the slaughter sector, remodelling for technical and economic efficiency, and profitability.

Chapter 3 “Licensing” specifies technical health conditions are established by the DNPV. Within 18 months, the DNPV will either grant a licence, grant a temporary one year license (that can be extended for consecutive one-year periods) or close the establishment. Developers of new slaughterhouses submit applications (design, slaughter capacity, cold storage, equipment etc.).

Chapter 4 “Transfer of slaughterhouses or houses of slaughter” reiterates that slaughter houses will need a licence, or can be fined, or closed by DNPV, aided by the Food and Economic Inspectorate of the Ministry of Commerce, Industry and Environment. Chapter 6 reiterates that slaughterhouses have 18 months to comply with the regulations.

The Law contains an Annex on “Technical and hygienic conditions of slaughterhouses” including site, ground dimensions, instillations, and provisions relating to the design and implementation of the slaughterhouse. Facilities required include roads, water, drainage, water treatment, parking, workshops, loading ramps, enclosure facilities for stunning, bleeding, skinning and carcase preparation, quartering, gut management, salting; freezing and isolation of condemned offal and carcasses; and machinery including boilers, cooling equipment and compressed air.

As with the meat marketing regulations, slaughter regulations will be difficult to apply. DVNP and other government staff start work at regular hours and have limited human resources. Slaughtermen operate small operations, slaughter at night or early morning. Slaughtermen are also significant employers, community members and provide the predominant sales outlet for cattle producers. Imposition of regulations and higher standards and closure of small low-cost slaughtermen will increase the price of beef significantly.

#### **7.4. Certified abattoirs**

If and when the “Slaughterhouse Permit Regime” is implemented and enforced, slaughter will effectively be confined to a limited number of abattoirs that meet (or that more closely meet) standards. One abattoir that meets most standards is located in Dili (Tibar), and others are notionally planned in some districts.

##### **7.4.1. Tibar**

The Tibar abattoir facility is located in Tibar suco (Liquica district), about 10 kilometres west of Dili. The facility was one of about 10 plants built by JICA (Japanese aid agency) in Indonesia in 1996/7. After independence, the plant fell into disrepair with only intermittent operation between 2000 and 2004. The abattoir was refurbished by MAFF (that own the plant) through support from the state (PM special budget) and with support from ILO, NZAid and Irish Aid (several hundred thousand dollars). The plant was opened for operation in June 2012.

While MAFF owns the facility, a company called Ebai has the operating contract for the abattoir. Originally, the operating contract was to be a joint venture with three companies, but one of the investors (EDS) emerged as the sole investor and operator with a five year contract (2012-17). As overviewed in Section 8.8, EDS owns a butcher shop / beef distributor in Dili that buys its own cattle. Virtually all the cattle slaughtered at Tibar are sold through the butcher shop of EDS and another (extended) family company, Talho Moris. However, the intention is that the plant will provide service slaughter for other slaughtermen (who will be closed down under the “Slaughterhouse Permit Regime” law). The current slaughter (and inspection) fee is \$30 per head. Ebai then pass on a proportion of this (\$7.50) to MAFF as part repayment for use of the plant. Water and power costs are provided free by the state (not MAF) and MAFF provides inspection services. Ebai pay all other costs, although the company didn’t know what these are (because it is a small part of the overall company). About four people work at the plant to unload, slaughter and wash out.

The abattoir consists of a large slaughter area with basic but appropriate slaughter facilities, a race, killing box, stunning facilities / gun. Slaughter records show that 45-53 animals are killed at the plant per month, an average of 4 days a week, and 2-4 animals per working day. The low throughput and capacity utilisation is due to lack of demand for service slaughter (see below). With increased demand and upgrades, capacity could be into perhaps 50 animals per day. On the capacity side, there is a rail for moving carcasses, but it is not used (carcasses are moved around the plant by hand). There are currently no cold storage facilities at the plant, which means that carcasses cannot be hung or aged. A refrigerated cold container purchased for the facility is housed at EDS so carcasses are cold stored at butcher shops, although there are storage limits there also. Carcasses can be cut to order in the boning area, but are usually transported in quarters to the butcher shops that have butchering facilities. Government has plans and a budget allocation (tens of thousands of dollars) to increase chilling and freezing capacity.

The plant has mains power and plans to install 3 phase power, but in the meantime needs to use a generator to work the hoist. The plant has a hot water system, but needs to increase flow by installing a bore and 6 inch pipe, funded by government. Effluent runs untreated into the fields nearby. Importantly, the plant has cattle weighing scales (platform scales with a central sensor).

In the same large grounds of the abattoir facility, there is a large covered kandang of feeding bays for cattle held for slaughter. The kandang has a capacity of 36 animals, but receives a maximum of one or two truckloads (8-16 cattle) every few days. Cattle are fed a mix including straw and sago through hammermill. The abattoir area is connected through a gate to a **cattle market** area with basic facilities, including an unloading mound and pens (see Section 5.6).

DGLVS is said to conduct pre- and post-mortem inspection through vets at the plant on every kill. Live animal examinations check eyes, nose, feet and manure. Post-mortem inspection is conducted on liver, heart and intestines. Vet salaries are paid through DGLVS, but may in the future recover some costs through the abattoir/inspection services.

Low current slaughter numbers and capacity utilisation are because other slaughtermen have chosen not to use the service slaughter facilities for a number of reasons:

- Even with significant state subsidisation, slaughter fees (\$30 per animal) are high compared to the negligible slaughter costs of individual slaughtermen. In prevailing markets, it may not be possible for butcher shops to recoup these fees through price premiums of beef, especially for generic, low-value beef in wet markets. MAFF has indicated that it may waive its fees (\$7.50) during the socialisation period where slaughtermen will pay to Ebai to provide slaughter services.
- Tibar is located about 10 kilometers to the west of the Dili city, which is a significant distance for traders who want to transport beef and by-products in hot, dusty conditions. In response, the government has proposed supplying transport for the slaughtermen (they are said to have a suitable fitted truck). This would apply another cost either to the slaughtermen or, if subsidised by government, the state. In addition, another abattoir is planned in Bemori in the east of Dili.
- The “Slaughterhouse Permit Regime” has not been enforced yet, so slaughtermen have no imperative to use the Tibar facility. Enforcement may see increased volumes through Tibar, but resistance or non-compliance to the law is likely.
- Slaughtermen also complain about the operating structure of the abattoir with the belief that there was not enough consultation or inclusion with slaughtermen that has left EDS as the sole operator of the (state-subsidised) plant. Several slaughtermen said that they would use the plant, but not under the current structure, and would seek a different structure and terms when the contract is renegotiated and renewed in 2017.

#### 7.4.2. District abattoirs

As mentioned, the “Slaughterhouse Permit Regime” is designed to be implemented not just in Dili but also in the districts, to form the “National Animal Slaughter Network” comprised of national level and sub-national level abattoirs.

MAFF and ILO have drafted plans for abattoirs in Oecussi, Bacau, Maliana and Lautem, but priority lies in the highest beef consumption areas of Maliana and Bacau. All stakeholders acknowledge this is a very big and difficult step for the districts. Funding would have to come from local budgets (PPP)

and the plants would have to be locally managed, with high demands on local staff for management, maintenance, training and health and inspection procedures. Even if this was to be achieved, the low local demand / volumes and high capital outlays and operating costs means the plant is unlikely to be commercially viable, and ongoing operation would depend on state or NGO funding on public good grounds.

Despite the concerns, districts like Lautem retain plans to develop an abattoir, with the stated intent of increasing public health standards, generating employment and increasing incomes (prices) for cattle producers. The SPVD thought the beef would be for local consumption—not beef sales to Dili—so cold storage/transport facilities would not need to be installed. Several stakeholders believed that integrating the abattoir and butcher shop operations would simplify operations.

Given the challenges still existing at Tibar, the development of district abattoirs remain at a conceptual stage.

### **7.5. Slaughter policy options**

The slaughter policy of GoTL has had a long gestation period with strong advocates in government, consultants (e.g. Sendall and Associates, 2006) and development agencies (ILO, bilateral aid programs). Policy and programs to install larger certified plants (especially at Tibar) and shut down or reduce the operations of smaller “backyard” slaughtermen follow the paths of some other developing countries (e.g. China but over more than 15 years). While the policy direction seems appropriate, the Timor Leste beef industry is at an early stage of development, so the sequencing seems early.

The model adopted to manage the Tibar plant is different to commonly used models in south-east Asia. In Indonesia for example, service kill slaughterhouses are owned and operated by local (municipal) government—as a public good—where individual slaughtermen are encouraged to use the facility for low or no costs. The slaughterhouses are also located in close proximity to wet markets, so are easily accessible to slaughtermen and networks of retailers. In contrast, the GoTL has chosen a model most similar to the (also JICA built) abattoir in Mataram, which is owned by local government but contracted out to a company (PT Gerbang), although the mechanised slaughter line and cold storage facilities are barely operating.

This policy approach could eventuate in various 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 the state is forced to subsidise the slaughter facilities indefinitely. A large number of permutations or systems may operate side-by-side in segmented chains.

In the policy development and the refurbishment of the Tibar plant in the late 2000s, concerns about the location of the Tibar plant were raised (Anderson, 2008; and Anderson, 2009). It is of course not possible to change the location of the refurbished Tibar plant, in which the state has a large capital and political investment. Thus, the GOTL has several options:

- When the current operating contract on Tibar expires (2017) that it be renegotiated to allow for a larger number of investors (slaughtermen), but where slaughter is still conducted by designated staff of the operators. Several slaughtermen said that they would be willing to operate in the facility under a more inclusive structure.
- That the government operate the plant as a public slaughter place where individual slaughtermen can use the facilities to slaughter in parts of the facility (Indonesia RPH model). This would lower costs for slaughtermen, but the plant may not be designed for this model.
- Retain the current operating structure, in which case slaughter will be conducted by Ebai for the two “modern” butcher shops, and others reported to be considering entering the sector. The plant would then have to be run on a commercial basis, with reduced and phased out state input and subsidies. The plant is clearly not viable on current throughputs, but may be with expanded markets. One of the butchers estimated that if they could sell into supermarkets (import replacement) then he could slaughter an extra four per day, which may increase total throughput to 10 per day. The operator Ebai is interested in beef exports to Indonesia and other markets such as gas fields if they develop (although these may be serviced from a greenfield site in the south of TL). Further upgrades and investment would be required to expand slaughter capacity, cold storage, SPS conditions and cattle availability. The model of Haldia in Kupang is relevant (though less highly capitalised).
- If Tibar was specialised in slaughter for future growing, higher value markets, the state could consider investment in a separate Indonesian-style RPH service-kill abattoir accessible to all slaughtermen in Dili located in a more central location (e.g. Manlewana market; Bemori or Becora in central of Dili; or a location to serve the east of city).
- There are benefits in allowing consumer preferences and willingness to pay for food safety to guide (through price differentials) on slaughter investment. One such measure proposed by Anderson (2009b) is to class different types of slaughter operations (A, B and C), and for beef to be stamped and sold accordingly. To reduce illegal slaughtering, some municipal governments in Indonesia have piloted a program where retailers display a registration card (renewed every week) to show they have bought from legal plants.

## 8. Beef consumption and retail

Beef consumption levels and channels are important for several reasons.

- Levels of bovine meat / protein consumption in the TL diet is a factor in issues of under- and mal- nutrition levels in TL.
- While the live cattle export trade to Indonesia is significant, especially for western areas of TL, domestic consumption will be a major driver of aggregate demand, prices and incentives at production stages.
- The segmentation of beef consumption and channels also forges the demand for different types of cattle and agribusiness structures.

For generic markets and ceremonies, beef consumption is considered inter-changeable with buffalo meat consumption.

### 8.1. Consumption levels

Several sources of data on beef consumption in TL are presented below. While findings are divergent, and a consumption study was beyond the scope of this project, the data provides a picture of broad beef consumption levels in TL.

Soares et al (2010) claims to have surveyed 18,605 people, 81% of whom were farmers, with perhaps the remainder being urban consumers. While the survey is contradictory in some areas and not necessarily reliable, some of the relative values (proportions) are worth noting. They report a total annual per capita consumption of 31.9kgs (which is certainly overstated) with breakdowns of bovine meat (31%), pork (31%), poultry (18%), goats (10%) and horses (5%). Based on these figures, per capita annual bovine (cattle and buffalo) meat consumption is 9.2kgs and domestic consumption would amount to 10,000 tonnes of bovine meat. The survey also found that 76% of the Timorese population eat cattle and buffalo meat and virtually all of this population can access and buy beef. About half of these consumers consume beef once a month, and the rest on a more regular basis, 11% on a weekly basis, and almost none less than that.

The total values contrast with Directorate of National Statistics and World Bank (2008) who report meat consumption of 3.3 kgs/year, egg consumption of 2.2kgs and milk consumption of 0.2kgs. These levels are considerably lower than WHO minimum standards of 10.1kgs, 3.5kgs and 6.4kgs respectively.

Alternative estimates can be derived from net per capita supply methods used in Section 2.4, which is a proxy for per capita consumption. Subtracting net trade from domestic production and dividing by the TL population in the 2010 census provides an estimate of per capita supply. This varies (by 35%) depending on the domestic production method used (see Section 2.4). Based on the census data, average annual per capita bovine meat consumption in TL may be 0.95kg (0.56kg beef and 0.39kg carabeef). Based on trade/slaughter data bovine meat consumption may be 1.99kg (1.66kg beef and 0.30kg carabeef). Note that if the 278 tonnes of imported beef in 2013 (see Section 2.3) did make its way on to the domestic market, then carabeef consumption would double.

Based on Figure 5, Row 3, net supply is converted in per capita supply, and calorie and protein intake (based on coefficients used in FAOStat).

	Cattle in stock	Cattle slaughter	Cattle meat (t)	Buffalo stock	Buffalo slaughter	Buffalo meat (t)	Bovine slaughter	Bovine meat (t)	Source/assumptions
<b>3. Net supply</b>									
<b>3A. Aggregate supply (tonnes)</b>									
Census stats			593			417		1,010	
Derived			1,770			320		2,090	
<b>3B. Per capita supply (kg/capita/year)</b>									Based on 2010 census population of 1,066,582
Census stats			0.56			0.39		0.95	
Derived data			1.66			0.30		1.96	
<b>3C. Calories (kcal/capita/day)</b>									Based on conversions in FAOStat
Census stats			2.62			1.84		4.46	
Derived data			7.81			1.41		9.22	
<b>3D. Protein and fat (g/cap/day)</b>									
Census stats			0.20			0.14		0.33	
Derived data			0.59			0.11		0.69	

Figure 24. Per capita consumption, calorie, protein and fat consumption from beef and carabeef.

Source: FAOStat and derived

These bovine meat consumption levels are significantly lower than the average for least developed countries (4.8kg), lower than Indonesia (2.5kgs) and indeed lower than all Asian countries with the exception of North Korea, with similar comparisons for calorie, protein and fat intake.

## 8.2. Drivers of beef consumption

Longitudinal data on beef consumption is not available, but change in beef consumption will be driven by factors including incomes, population growth and urbanisation.

Beef consumption is clearly constrained by low income levels in TL. The Timor-Leste Household Income and Expenditure Survey 2011 found mean monthly per capita incomes of \$62 (urban \$93, rural \$50). Because of the small number of high income households, this equated to median per capita incomes of \$40 (urban \$64, rural \$32) where half of the population lives on \$40 or less per person per month.

Beef is normally regarded as a “normal” food item, where consumption increases with increased incomes. Beef consumption can be expected to increase if and when incomes increase for TL. Incomes and expenditures will be subject to developments in the oil sector, political stability, inflation, government expenditures on the public service and pensions, and long term institutional and human development.

Another—probably more important—driver of beef consumption is population growth. The national population of TL reported in the 2010 national census is 1,066,582. This represents an annual average increase over 2004 of 2.41%, the highest in the Asia-Pacific region. At these rates the population will double by 2039.

Relatedly, urbanisation is another driver of consumption. TL has an urban population of just 27%, one of the lowest in the world. However, 43% of the population is located in the three districts of Dili (234,331), Emera (114,635) and Baucau (111,484). Dili has by far the greatest population growth rate (4.8%), partly because of urban migration (Figure 25). It is also populated by many thousands of expatriates.

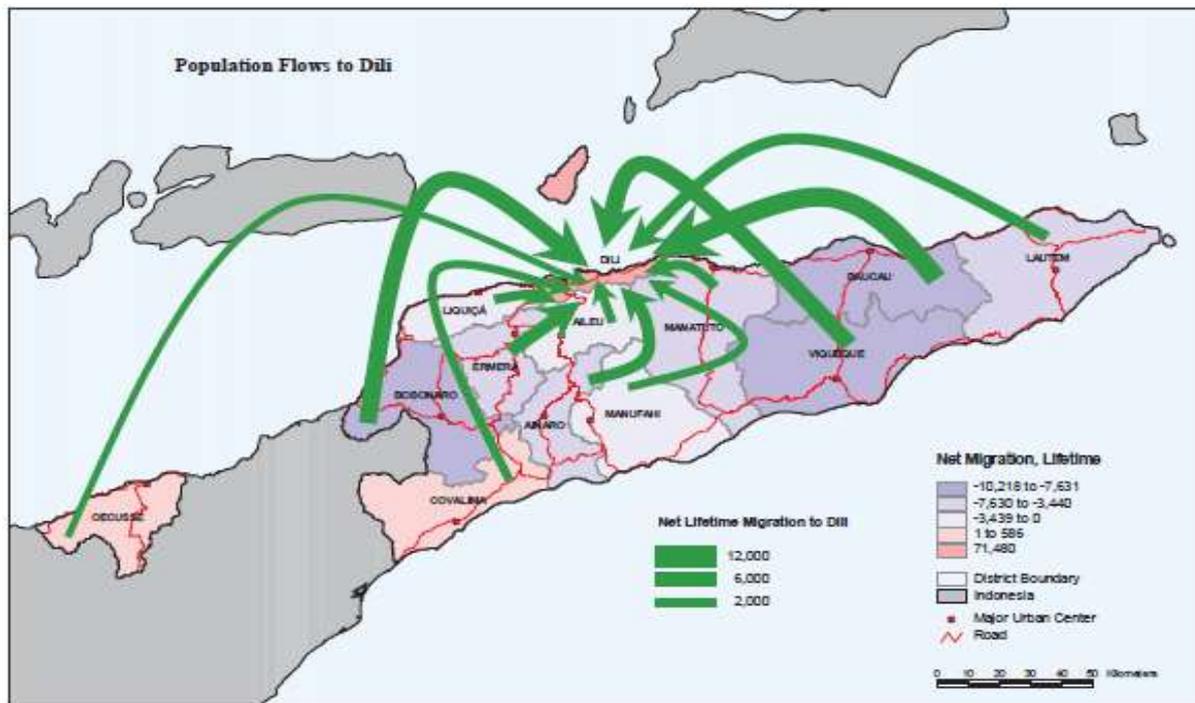


Figure 25. Urban migration to Dili

Source: 2010 national census

Using data on the inflow of cattle and beef into Dili (Section 2.4, Figure 5, Row 1B), per capita bovine meat supply in Dili of 3.94kgs is twice the national average. Almost all this consumption is beef (3.7kgs), with only 0.24kg buffalo meat (although this would be nearly doubled if imported carabeef was consumed in Dili). This would mean that bovine meat consumption in the districts is 1.3kgs (and 1.22kgs of beef).

### 8.3. Consumption channels and prices

Within the context of aggregate beef consumption levels, consumption differs significantly by retail and distribution channels. Wet market, supermarket, hotels/restaurants, butcher shops and ceremonies are overviewed below. 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.

The consumption survey of Soares *et al.* (2010) reports that consumers obtained bovine meat from markets (46%), through traditional ceremonies (18%), parties (13%), from friends (11%), slaughtermen (6%) and other sources (6%). No farmers consumed their own animals.

While these channels are presented as being discrete, fieldwork shows that there is considerable cross-over. For example, one interviewee thought that only government staff above level 3 could afford to regularly buy beef. However, wet markets in Dili are busy. With activity in the government, construction and resources sectors, higher-priced supermarkets are also busy, not just with foreigners but also locals. Higher-priced fresh beef sold through butcher shops is increasing for wealthy buyers, where nearby residents also buy low value cuts in small per-purchase quantities.

#### 8.4. Wet markets

TL has a hierarchy of markets consisting of:

- Two major markets in Dili
- Two regional hubs – Bacau and Maliana that trade seven days a week
- Periodic markets in district centres (1-2 days per week)
- And small markets in sub-districts. These markets are very rudimentary and “thin” (low volumes, small transactions, small number of buyers and sellers). Local markets also provide liquidity – for example, farmers take their farm produce to sell at the markets and then use the money to buy other products (especially food) to take home, with little surplus cash.

Most agricultural products move down the hierarchy, but there is also upward movement. However, as a perishable product, beef does not move between markets. In most markets, cattle are killed in or around marketplaces and then sold directly from the slaughter area, or through integrated stalls in the market. This model applied in some district markets visited (e.g. Lospalos and Maliana) and in one major market in Dili (Comoro).

There are many markets in Dili that sell beef – Taibessi (that replaced Halilaran), Manlewana, Bairopite, Maloa, Comoro, Leukasi (in Raikotu), Senggol, Ailelehun, Bidau Mota Claran, Becora. There are large numbers of food stalls and (mobile) street vendors in Dili, but few sell meat.

Hygiene levels in most markets, stalls and vendors are low and adulteration of meat is common. After many years of development, the GoTL passed a regulation on “Hygiene and sanitary conditions in the preparation, transportation and sale of meat and meat products”. The regulations effectively ban the selling of meat in small markets that do not comply with the regulations. In Dili, sales are channelled into two markets – Manlewana and Taibesi.

The main meat market is Taibesi in Eastern Dili. The large market contains a large concrete building purpose-built by government for selling meat in about 2012. The building contains 16 separate rooms for individual stall-holders of meat (13 for beef and three for pork). Facilities (concrete floors, benches, buying windows, water) were of good standard in the context of a developing country. Most of the rooms seemed used, but not busy, and the lack of refrigeration raises questions of how unsold meat is carried over. Stall-holders don’t yet pay lease fees but may be expected to in the future.

As was the case in other markets (Manlewana and Comoro), stallholders were not charged fees or costs for use of market space and facilities, which means that the state is subsidizing the costs of the buildings, and maintaining and running the markets. While centralisation of beef retail may increase some costs (transport, refrigeration), market costs appear to be absorbed by the state.

Stall-holders interviewed said they have been asked to buy beef through the centralised abattoir of Tibar, but thought it was too far away and were concerned about additional slaughter costs (see Section 7.3). They thought an abattoir in eastern Dili would be more accessible. Beef is therefore sourced from four main slaughtermen in Dili who slaughter 2–5 cattle/day (and 8-11 at Christmas and New Year. One stall-holder interviewed was integrated (cattle purchases, slaughter, retail). He buys cattle once per week (from Same, up to 10 cattle per truck), and has a small slaughter point (in Camea suco in the east of Dili) where he slaughters one animal per day. This equates to about 100kgs per day, and unsold beef is taken back to the slaughter area for refrigeration. Beef sold at Taibessi was said to come from all the main cattle producing areas of TL except Oecussi and Suai (Same, Liquica, Lospalos, Viqueque, Maliana, Manatuto). Beef is sold in undifferentiated form (by cut or “quality”) with prices shown in Table 21.

While Taibessi represents the “vision” of MAF, interviewees (including the coordinator of the meat section of the market) were less sanguine. The market is a long way (3 kms) from the main part of Dili along a narrow and congested road, which restricts access to meat for most of the city of Dili. The market area can get crowded, and small sellers (including beef sellers) set up on the periphery of the market (outside the designated area). Some consumers complain of low food safety standards in the market, which was said to be more because of lax inspection than the design of facilities.

Market officials said that government needs to invest more in the other endorsed meat market in Dili – Manlewana. The market is located in the west of Dili (but east of the river), 2-3 kms north of Comoro Road. Roads and market infrastructure are well planned. The market is comprehensive (food, clothes etc.). When visited there were only two small beef stalls operating on the periphery of the market and they purchased their beef from a “boss” at Taibessi market (see Table 21).

### **8.5. Meat marketing regulations**

As mentioned, hygiene levels in most markets, stalls and vendors are low due to the following factors:

- For small markets, meat is sourced from slaughtermen who are unregistered and, if bought from a distant butcher, transported through rudimentary methods.
- Slaughter within market places creates its’ own set of problems. For example, in the Comoro market in Dili, untreated effluent, slaughter wastes and rubbish flow undrained through the markets, past meat processing (mincing) facilities, stalls and customer traffic.
- GoTL is concerned that food sold on street sides and the periphery of markets disrupts traffic and pedestrian flows.

The GoTL has sought to address these problems through the law on “Hygiene and sanitary conditions in the preparation, transportation and sale of meat and meat products” (see Box 7).

**Box 7. Summary of “Hygiene and sanitary conditions in the preparation, transportation and sale of meat and meat products”**

The Regulations “Hygiene and sanitary conditions in the preparation, transportation and sale of meat and meat products” contains annexes on hygiene and sanitation for meat sector staff (Annex 1), pre-packaged meat products (Annex 2), minced meat (Annex 3), transport and distribution (Annex 4), sale (Annex 5) and poultry carcasses (Annex 6)

Annex 4 on “Regulation on Hygiene Conditions on Transportation and Distribution of Meat and its Products” is concerned with the handling of meat (hung, separation of offals from meat and red offals), vehicle (box, insulation or refrigeration) and source (from licenced slaughterhouse).

Annex 5 on “Regulation on the Hygienic Conditions on the Sale of Meat and Its Products” is concerned with place of sale (indoors, ventilation, temperature, exposure to sun, dust, touch, animals), materials (benches, hooks), infrastructure (water for washing out, drinking water, sewerage, refrigerators), washing and cleaning practices and source (from licenced slaughterhouse). Provisions are made in the regulations for sale of meat in supermarkets and food establishments.

Authorities charged with implementation are MAFF / DNPV and SPVD but can receive assistance from administrative and police authorities.

The GoTL will clearly have difficulties in implementing and enforcing the regulations. The Regulations stipulate implementation within 180 days (from May 2014), but periods of “socialization” and implementation have been extended. The regulations are national, but are likely to only be applied in Dili, and even there, unevenly. Centralisation of markets entails increased travel for suppliers, customers and integrated operations. The regulations would displace substantial numbers of meat stallholders and workers that form close-knit communities. “Socialisation” programs have met with some very direct “feedback”. In cases where markets were shut (such as Comoro), stalls started appearing again. One of the largest illegal slaughter operations in Dili is still operating at the market (see Section 7.2.1 above).

Increased regulation and centralisation has implications for employment (retail is a labour intensive sector), applies higher logistical demands, and costs that are ultimately borne by customers in a price-sensitive market. It is also relevant to note that there has not yet been a major incidence of human health problems from beef.

While measures to centralise the downstream sectors of the industry seem excessive and may not be implemented, the conditions in some smaller markets certainly seem unhygienic. Other more spatially efficient models could be examined including centralised (registered) slaughter points near to Taibessi and Manlewana market, the installation of refrigeration facilities in those markets, and the development and registration of small markets or vendors with hygienic facilities. In practice, the

process of muddling through notional banning of decentralised markets and socialisation periods is likely to continue for some time.

## 8.6. Supermarkets

Supermarkets are a significant channel for beef retail in Dili. There are seven major supermarkets with cold storage in Dili – Lita, Leader, Kmanek, Landmark, Pateo, Jacinto, and Dili Mart. Compared to markets, supermarkets are indoors, more hygienic, well lit, have cold storage and more packaging. Customers are mainly Timorese middle class (business, government, international organizations) and expatriates. The higher-end HRI trade buys predominantly from supermarkets. Three major supermarkets (Lita, Kmanek, Dili Mart) have the cold storage facilities to import, wholesale and distribute frozen beef to other supermarkets and the HRI trade. There are also dedicated importers with large cold storage facilities (e.g. Unipessoal LDA).

Most supermarkets have significant amounts of space dedicated to meat. The vast majority of beef stocked is imported, frozen product. Supermarket sales account for a large proportion of the imported frozen beef from New Zealand, Australia and Portugal. If 7 supermarkets sold 100 tonnes of beef in total per year, this would equate to about 40kgs of beef per supermarket per day. Supermarkets do little butchering themselves and buy pre-package products (e.g. osso buco, sirloin, mince, “boneless beef”, boneless rump, beef spare ribs, knuckle, tripe, tail). Prices are 20-30% higher than market prices for fresh domestic generic product (see Section 8.10).

Supermarkets are potentially of interest in chain upgrading initiatives. Prices are higher for specified domestic beef (due to higher sales prices, more differentiated cuts and forms of product). Some supermarkets (Kmanek) have participated in development programs (USAid) to stock domestic vegetables, with contracts to farms (e.g. Josephina farm) that have backward linkages to support for inputs and capital. Kmanek has large amounts of unused chilled cabinet space that could notionally be used for domestic beef. Only a few supermarkets (Leader) stock domestic beef (sausages and osso buco). Two supermarkets stock domestic beef for lower value products (mince, sausages, rendering) (in plastic heat sealed packaging, frozen). Others have trialled selling domestic beef but did not continue. Supermarkets are concerned about several aspects of stocking domestic beef. There are widespread concerns about the food safety of domestic beef, especially from small-scale slaughter operations, and the risks of selling contaminated fresh product to consumers and customers. Supermarkets in TL also lack beef butchering, packing and presentation skills.

This raises the prospect of supermarkets buying higher volumes of domestic beef slaughtered and inspected at Tibar abattoir (Section 7.4.1) and butchered by one of the two butcher shops in Dili (Section 8.8). This trade does occur in small volumes but there are significant obstacles to expanding the trade. With regard to quality characteristics, Tibar and the butchers do not have facilities for tender-stretching or ageing, butchers do not have specifications for their cattle purchases (age-weight, fat) because they cannot source sufficient cattle to specification (due to supply side constraints). As a result, quality for more discerning customers can be variable (although imported frozen product is not prime product). Probably more importantly, Tibar and the butcher shops cannot consistently meet the volumes required for large supermarkets (can be 100kgs/day), without upgrading their infrastructure or implementing government slaughter regulations (see Section 7.3).

### **8.7. Hotel, restaurant and institution trade**

Dili has a considerable number of restaurants and hotels—that range from high-end to low-end—and cuisines that include Timorese, Chinese, Indian, Padang, and Western. Restaurants interviewed by Johnston and Aniceto (2013) reported average monthly produce purchases of \$715, with only a small proportion being spent on beef.

In a survey of 11 restaurants in Dili, Serrão et al. (2007), six purchased their beef from local markets, and five from slaughterhouses. The main reasons were “freshness and quality”, “old suppliers” and “price”. Six of the restaurants bought in small volumes (per purchase) of 2-9kgs, with an equivalent amount prepared that day.

Higher end restaurants with Western cuisine (larger portions with slower cooking methods) that were concerned about food safety, quality and consistency purchased from supermarkets, including those such as Leader that wholesale meat. Butcher shops are also interested in sales to large restaurants but, like supermarkets, consistency of supply for quality and quantity is another step in upgrading and import replacement.

### **8.8. Butcher shops**

A significant development in the beef retail sector in recent years is the development of butcher shops. These butcher shops are the downstream component of a beef development program (BOSS) linked to the refurbishing of the Tibar abattoir, cattle marketing and veterinary / livestock extension services. Butcher shops have the potential to provide retail, wholesale, storage, butchering and packaging services that enable the supply of hygienic and higher value product, to increase demand and prices for cattle at slaughter and farm-gate stages.

There are currently two butcher shops in Dili; the first to set up in 2012/3 was Ebai, and this was followed by Talho Moris in 2013/4. Talho Moris and a separate operator are planning another butcher shop which, if actualised, will take the total to four. The owners of Ebai and Talho Moris are relatives in an extended family. They are both stand-alone (i.e. not integrated into markets or supermarkets). Each butcher sources cattle from the districts (bought themselves or through traders) that are service killed at Tibar abattoir, and transported to the butcher shops in quarter carcass form.

Both butcher shops have well-designed and hygienic butchering and retail facilities and butchers have been trained (under the BOSS program). Inspection is conducted by the Ministry of Health (MoH) at the butcher shops and by the MoA for disease at the abattoir holding yard.

The first modern butcher shop in Timor is owned by EDS, a large transport, logistics and earthworks company that also has the operating contract on the Tibar abattoir and a cattle farm. The butcher shop is located in Comoro Suburb in the west of Dili up a dirt road (of 3 kms) off the main road. The location was chosen because it is next to the machinery yard of the parent company and not for the convenience or exposure for customers, which affects sales. The company has two staff working at the abattoir and two in the butcher shop. With no cold storage at the abattoir, the shop has a (cold) shipping container (3-4 degrees) and two household box freezers. Sales are made at the shop, but also deliver using cold transport. The butcher shop produces about 20 different cuts and beef products that are presented in chilled glass cabinets for individual customers. However, the

company also custom cuts for restaurants, and sells some lower-value products (oxtail, mince, sausages) to two or three supermarkets.

**Talho Moris** is located in Bemori Suburb, which is easily accessible from central Dili. The butcher has a cold room but only holds four carcasses, and plans are underway to install another container that will allow the butcher to hang carcasses for about one week, and to increase capacity and volumes. This will be necessary if the butcher is to sell consistently in significant volumes into the restaurant and supermarket trade for prime cuts. The shop confirmed reports that local residents buy small amounts of lower value beef or secondary cuts from the butcher shops. This is partly because of higher hygiene levels, but also because the cost of the secondary cuts may not be much higher than markets, and because the scales of butcher shops could be trusted.

The sourcing of cattle is a key part of the operations of the butcher shops. Butchers weigh cattle pre-slaughter, and carcasses post-slaughter and sometimes the yields of cuts, which confirms the preferences for heavy cattle. The butchers have been able to source some heavy cattle, but not on a consistent basis, and do not have formal specifications on weight limits, age or breed. A line of cattle for slaughter at Tibar will therefore include a range of weights and ages.

For information on cattle purchasing practices, see Section 5.4.

## 8.9. “Traditional” / ceremony

See Section 4.4.1.

## 8.10. Prices and price differentials

Selected price data collected from the retail channels discussed above are presented in Table 21. Broad patterns that emerge in an initial assessment of the price information is that prices have increased modestly between 2013 and 2014, and that prices increase significantly down the continuum of retail outlets. This does not necessarily reflect margins in those outlets (as costs may have increased and differ by type of product and services offered) nor the prices that the outlets buy their inputs for. However, the capacity of supermarkets and butchers to value-add (through higher sales prices and more butchering and product differentiation), the modest but increasing volumes of beef sold through these channels, and the purchasing methods of those channels has implications for upstream sectors, including beef producers.

At the same time, there are challenges involved in building “modern” channels (like butcher shops) and for these butcher shops to supply supermarkets in quantities that would replace imports (a policy objective).

**Table 21. Prices of beef in major retail outlets, 2013-4.**

Retail outlet	2013	2014
<b>Local markets</b> (fresh local)	<b>Lospalos district market</b> <ul style="list-style-type: none"> <li>• Generic beef \$5/kg</li> <li>• Ribs / bone - \$3.5/kg</li> <li>• Offal - \$3.5/kg</li> <li>• Dry hide – down to \$0.90/kg. For 250kg animal might be 10-15kg big, 5-7kg small</li> </ul>	
<b>Dili markets</b> (fresh domestic)	<b>Comoro market</b> <ul style="list-style-type: none"> <li>• Generic beef from own stall \$6/kg</li> <li>• Offal \$3/kg</li> </ul>	<b>Manlewana</b> <ul style="list-style-type: none"> <li>• Generic beef – stallholder buys \$6/kg, sells for \$6.50</li> </ul>

	<ul style="list-style-type: none"> <li>• Mincing costs \$1/kg</li> </ul>	<ul style="list-style-type: none"> <li>• Bones \$2/kg</li> <li>• Pork \$7/kg</li> </ul> <p><b>Taibesi market</b></p> <ul style="list-style-type: none"> <li>• Generic beef \$7/kg</li> <li>• Bones \$3/kg</li> </ul> <ul style="list-style-type: none"> <li>• Generic beef \$7.50/kg on accurate scales</li> <li>• Generic beef \$5/kg on inaccurate scales (60% lower than accurate scales)</li> </ul>
<b>Supermarkets</b> (frozen imported)	<p><b>KManek</b></p> <ul style="list-style-type: none"> <li>• Leg bone-in \$9.90/kg</li> <li>• Striploin \$30.50/kg</li> <li>• Tail \$8.60/kg</li> <li>• Tripe \$3.95/kg</li> <li>• Pork belly \$5/kg</li> </ul> <p><b>Leader supermarket</b></p> <ul style="list-style-type: none"> <li>• Osso buco \$9/kg</li> <li>• Sirloin \$10.30/kg</li> <li>• Mince \$10/kg</li> <li>• “Boneless beef” \$9.25/kg</li> <li>• Boneless rump \$9.6/kg</li> <li>• Beef “spare ribs” \$5/kg</li> <li>• Knuckle 9.80/kg</li> </ul>	
<b>Butcher shops</b> (fresh domestic, some vacuum-packed)	<p><b>Ebai butcher shop</b></p> <ul style="list-style-type: none"> <li>• Topside \$9/kg</li> <li>• Silverside \$9/kg</li> <li>• Knuckle \$9/kg</li> <li>• Eye round \$9/kg</li> <li>• Scotch fillet \$13/kg</li> <li>• T bone \$15/kg</li> <li>• Rump \$12/kg</li> <li>• Picanha \$14/kg</li> <li>• Alcastra \$12/kg</li> <li>• Sausage \$8/kg</li> <li>• Rissoles</li> <li>• Oxtail \$5/kg</li> <li>• Rendang \$8.5/kg</li> <li>• Ribs \$6/kg</li> <li>• Round steak \$9/kg</li> <li>• Liver \$5/kg</li> <li>• Mince \$8.5/kg</li> <li>• Offal \$3.50/kg</li> <li>• Osso buco \$6/kg</li> <li>• Tenderloin \$20/kg</li> <li>• Sirloin \$13/kg</li> </ul>	<p><b>Talho Moris</b></p> <ul style="list-style-type: none"> <li>• Sausage \$7.50/kg</li> <li>• Chuck \$9.50/kg</li> <li>• Oyster blade \$9.50/kg</li> <li>• Rendang \$8.95/kg</li> <li>• Mince \$8.50/kg</li> <li>• Eye round \$9.50/kg</li> <li>• Silverside \$10/kg</li> <li>• Osso bocco \$7/kg</li> <li>• Steak \$10/kg</li> <li>• Ribs \$7/kg</li> <li>• Vacuum packed terderloin \$25/kg</li> <li>• Sirloin \$15/kg</li> </ul>

Source: fieldwork data

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