

IFC SADI Agri Sectors

**Value Chain Analysis for
The NTT Beef Industry**

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Executive Summary

Beef cattle in NTT: Sector Profile and Value Chain Analysis

NTT Beef Industry- Summary of Industry Potential, Issues and Recommendations

Industry Potential

The sector profile and value chain cost analysis outlined in previous sections have identified the potential for improved smallholder returns in the NTT beef industry. The main factors that create this potential for NTT smallholders are summarised below.

- Beef cattle are a traditional farming enterprise for smallholders in NTT with a well established system of buying and selling cattle and established marketing networks in major markets.
- There is current strong demand for NTT beef in Jakarta and market trends indicate that demand for beef is increasing as a growing middle class prefer beef over alternative and traditional sources of protein.
- In addition to favourable market conditions, beef from Bali cattle are favoured over cross bred and imported boxed beef in Jakarta markets. NTT has the right genetic base for increasing Bali cattle production.
- New forms of finance for smallholder cattle purchase have been tested and have potential for further expansion providing farmers the opportunity to improve returns and remove them from unfair trading practices with traders.
- With improved knowledge and access to inputs for increased forage production and/or improved use of integrated cropping systems, smallholders have the potential to improve dry season nutrition for cattle and improve productivity.
- Local DINAS estimate that there are large areas (over 750,000 hectares) of undeveloped land that have potential for cattle grazing, although this land should only be developed if sustainable land management practices are employed and additional indigenous forest is not cleared.
- Continued strong demand for Bali cattle in Java will be important for smallholder returns. Current exchange rate and market conditions are favourable for producer prices. Supplies and the landed price (dependent on world beef prices and IDR exchange rate) of imported beef will affect returns in the future.

Industry Issues and Value Chain Analysis

The following points summarise the main issues for the NTT beef cattle industry, as they relate to the needs of smallholders.

- Traditional cattle ownership and a lack of access to finance for cattle purchase leave smallholders vulnerable to unfair trading practices. Current selling arrangements do not facilitate the flow of price/weight market information.

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- A challenge to making an assessment of industry potential in NTT is that the information found in secondary data and previous reports is not always congruent with the information collected in field research. However, the field work and review of previous studies on Bali cattle would suggest that smallholders in NTT do not hold comparative advantage in producing beef for export to Java over producers from other regions. This conclusion is based on the following:
 - a. poor productivity, poor nutrition, low growth rates and high calf mortality, although Bali breeding cows have high natural fertility;
 - b. poor access to finance for smallholders to purchase cattle and inputs for forage production;
 - c. low feed growth, poor pasture management and low liveweight gains during the dry season;
 - d. poor roading infrastructure and proximity to end markets;
 - e. a lack of processing capacity for added value activities and cold chain facilities to provide smallholders and traders with alternative marketing options;
 - f. unattractive investment climate due to high local taxes and opaque cost structures; and
 - g. heavy reliance on Jakarta for beef returns and high transportation costs to this important market.
 - A lack of weighing stations at village level leaves farmers with a lack of information on cattle purchase/sale weights and prices, rate of weight gain and results in a high degree of mistrust within the industry.
 - A lack of a breeding subsector results in poor understanding and development of improved cattle genetics and the use of inferior bulls and dams for breeding. The industry requires a cohesive strategic direction for breeding and dissemination of improved Bali cattle genetics to maintain current gene pool and prevent further erosion of the breed.
 - Cattle productivity is very low resulting in poor returns to farmers and risk of further unsustainable herd off-take.
 - Training and extension services to smallholders are very limited. Traders also need to be engaged in improving the quality and productivity of local cattle. The economic benefits for all industry players need to be clearly identified in this process to create buy-in. The network of regional DINAS offices have a crucial role to play in extension and do not currently engage with research providers.
 - Cultural obligations to provide cattle for traditional celebrations can inhibit development of the breed and limit returns to smallholders.
 - A decreasing NTT herd size caused by unsustainable slaughter rates, poor productivity and increasing use of traditional cattle land being used for horticultural crops.

- With existing cattle traders generating profitable returns from trading cattle it can be difficult for new entrants to supply beef to the Java market due to the strong networks that exist.

Recommendations for IFC TA

The following points summarise the key recommendations made in the value chain analysis. The recommendations are aimed at establishing a TA program that can improve smallholder returns over a ten year period. The recommendations focus on the following general areas so as to improve:

- smallholder credit conditions;
 - smallholder trading conditions and bargaining position;
 - animal nutrition, cattle productivity and farm management practices;
 - smallholder management of crops; to be grown with beef to improve ability of the whole farm system to generate cash for smallholders;
 - the genetic base of the industry and reduce the decline in regional herd numbers.
- The NTT beef industry does not contain a “lead firm” of significance with which IFC SADI could investigate developing a partnership to implement TA interventions. IFC SADI should collaborate with the BEE program to investigate the needs and requirements of existing beef processors and traders. Investigate opportunities to work with existing SME’s involved in trading and local processing to test the economics and feasibility of investing in cold chain facilities for added value export to Jakarta.

This process may identify opportunities to improve supply chain channels, provide opportunities to link smallholder farmer groups to traders and processors and provide improved insight on industry issues and the social networks that the industry relies upon for successful trading.

- Conduct a detailed study of NTT social structures and how this affects the growing and trading of cattle in the province. Incorporate the new knowledge of social structures into project planning and implementation and develop methods of utilising the favourable aspects of this structure for the benefit of smallholder beef farmers.
- Investigate new models of smallholder cattle finance and investigate opportunities to partner and develop commercial livestock financing operations with new and existing finance providers. For example:
 - Engage BDS providers to train loan appraisers and improve operating procedures for the TLM Foundation to move the lending operation from an aid program into commercial and financially sustainable livestock financing operation.
 - Work with farmer groups and associations to explore joint security credit schemes.
 - Explore the feasibility of tripartite lending operation with farmer groups, a local bank and a large cattle exporter (e.g., Pak Daniel of Kupang). Use farmer groups to implement a demonstration farm and a program for improved farm management.

- Collaborate with ACIAR and BPTP to establish a demonstration farm with selected farmer associations or groups to identify key on-farm productivity barriers to improving smallholder returns : e.g.,
 - Explore improved dry season forages to improve cattle growth rates and breeding cow milk production, calf survival and cow conception rates.
 - Investigate animal health requirements for breeding cows.
 - Improved pasture, grazing management and better.
 - Improved breeding and fattening practices.
 - Implement farmer training on budgeting.
 - Investigate integrated cropping systems where farmers can utilise crops (including tree crops) that can be grown well with cattle grazing or used for forage.

- Collaborate with BEE to verify whether current regulations and taxes are in-fact a barrier to further investment in the industry (i.e., processing and cold chain).

- Evaluate the impact of local taxes (retribution) on internal trade (trade being essential for generating wealth) explore more efficient means of raising government revenue through BEE.

- Conduct a feasibility study, including market analysis and capacity study, for an investment in a Kupang abattoir and cold chain to the Jakarta market for chilled and frozen meat trade.

- Collaborate with KDP Sub-program 1 to improve NTT road infrastructure to overcome wet season supply constraints and provide technology to clustered farmers (e.g., village based weigh stations, AI services). Any central or village based cattle scales should be provided as a service on a commercial basis- utilise existing cattle buying and trading companies e.g., local traders and NGOs would provide the best avenue for a sustainable TA intervention of this type.

- Conduct a survey of Jakarta based live cattle buyers to identify key requirements for NTT beef industry to improve bull prices and returns to smallholders.

- Collaborate with ACIAR to evaluate current practices for live shipment of cattle to Surabaya and handling of cattle at central markets to develop improved practices for shippers to reduce live-weight losses and minimise animal welfare issues.

- Engage local DINAS to review current services to smallholders and encourage DINAS extension workers to become involved in demonstration farm trials to develop improved extension services to smallholders and improved local policy development.

- Establish a nucleus breeding operation that can access superior Bali genetics and encourage farmers to become involved in commercial beef breeding enterprises. Work with ACIAR and existing NGOs that are working with farmer groups to establish an nucleus herd and begin progeny testing bulls to identify superior genetics.

Any work to improve the utilisation of AI should focus on a nucleus breeding herd

with farmers interested in breeding stud bulls rather than as a technology for widespread adoption amongst smallholders. The challenges (outlined in section 3.5) of increased adoption of the technology by smallholders are too great to justify inclusion in an IFC SADI TA program.

An Overview of Agribusiness in NTT

East Nusa Tenggara (Nusa Tenggara Timur / NTT)

NTT province consists of 566 islands with a land area of 47.3 thousand km². the provincial population is around 4.1 million (2004), spread over 42 islands. The main islands in NTT include Flores, Sumba, Timor, and Alor. The West Timor region, which is directly adjacent to the Democratic Republic of Timor Leste, constitutes 32 percent of the total area and is inhabited by around 38 percent of the total population of NTT.

There is no single common "culture" to be found in NTT with the populations on the different islands of the province making up at least 40 different ethno-linguistic groups. The cultural traditions of Sumba are different from those of Timor, Alor, or Flores. Compared with most other Indonesian provinces, NTT is notable for its diversity.

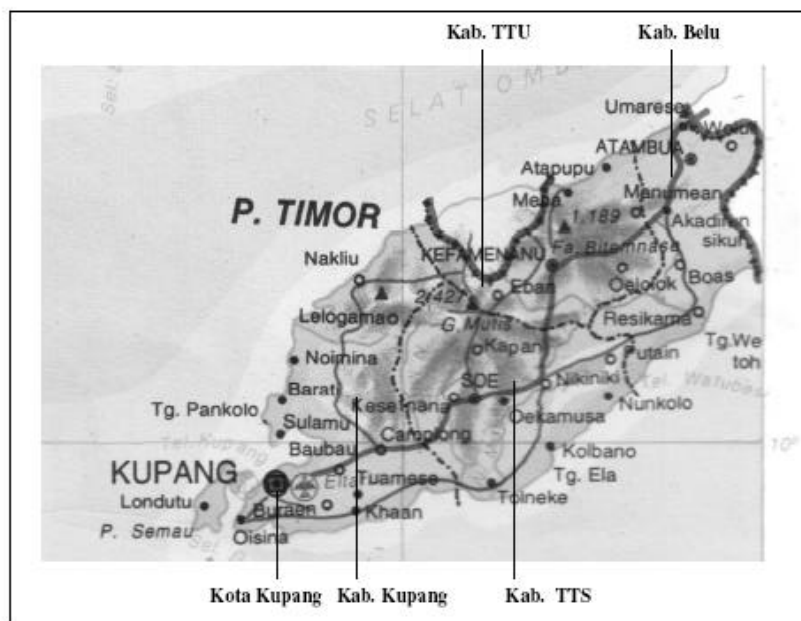
Administratively, the NTT province is divided into 15 *kabupaten* and one *kota*. Out of them, four *kabupaten* and one *kota* are located in West Timor. They are Kab. Kupang, Kab. TTS, Kab. TTU, Kab. Belu, and Kota Kupang. The demographics and map of the West Timor region is shown below.

Table 1 Profile of NTT and the Five Kabupaten/Kota in West Timor, 2004

Description	NTT Province	Kabupaten				Kota Kupang
		Kupang	TTS	TTU	Belu	
Area (Km ²)	17,349.9	5,898.3	3,947	2669.7	2,445.6	160.3
Population	4,188,774	337,406	405,993	197,174	352,176	258,104
Population Density/ Km ²	88	57	103	74	144	1,610
# of Kabupaten /Kota	16	-	-	-	-	-
#of Kecamatan	203	28	21	9	17	4
# Villages & Kelurahan	2,569	186	212	159	166	45

Source: SMERU Research Institute (October 2006)

Figure 1. Map of West Timor region



Agriculture is an important part of the regional economy in East Nusa Tenggara making up more than 40 percent of Gross Regional Domestic Product (GRDP) (Ministry of Agriculture 2006). However due to stronger growth (relative to agriculture) in other sectors, agriculture's share of GDRP declined from 51 to 42 percent from 1990-2003. The livestock sub-sector makes the largest contribution to agriculture in NTT at around 42 – 45 percent and or around 13 – 14 percent of GRDP. Agriculture is also important for regional employment where smallholder farming, transport, trading and downstream services account for around 80 percent of total employment. The major agricultural products of NTT include cattle, corn, tamarind, candlenut, tubers, nuts, betel nut and coconut. Kabupaten Kupang is the main producer of cattle in NTT; almost 25 percent of the total cattle in NTT come from this *kabupaten*.

The Dutch are identified NTT has "minus-area" of limited development potential 300 years before the Indonesian government officially classified the province as a "daerah-minus". NTT has the poorest soils and lowest rainfall in all of Indonesia and the mountainous terrain on many of its islands limits the possibilities for extensive agriculture. The province also experiences pronounced El-Nino weather patterns ensuring that once every few years (on average, one year in three) there is likely to be a drought. A number of droughts have had a significant impact on the province over the past century with the 1997 98 drought being one of the worst on record. Under these conditions farmers must strive to minimise risk rather than maximise production and with low investment in the province there are few alternative forms of employment. Most of NTT's population (86 percent during the 1990s) is involved in agriculture and engaged in some of the least productive forms of agriculture in Indonesia (Fox, J, 2007)¹.

¹ SMERU newsletter article- James, J. Fox, professor at the Research School of Pacific and Asian Studies, the Australian National University.

The limited economic activities in NTT are reflected from the low GRDP per capita figures of only Rp2.2 million (2003), while on West Timor the GRDP per capita ranged between Rp1.7-1.9 million. NTT has a high rate of poverty and the number and proportion of the poor are shown in the table below.

Table 2
The number and proportion of poor people in West Timor, 2004

Kabupaten	# of poor in Kab. (000s)	% of Kab. pop'n
Kupang	109	33%
TTS	149.5	37%
TTU	62.7	31%
Belu	70.4	21%
Kota Kupang	27.8	11%
NTT Province	1,152.10	28%
National		17%

Source: SMERU Research Institute (October 2006)

NTT has only a small manufacturing industry (3.2 percent of GRDP, 2003) with limited scope for generating employment opportunities and the region has a heavy reliance on imported manufactured goods from Java. With agriculture forming the basis for such a large share of economic activity in NTT, improving this sectors' performance will have a relatively large impact on poverty alleviation.

The climate in this region is semi-arid climate, with the relatively low rainfall and the low indigenous vegetation. The main agricultural activities are livestock and estate crops. Local authorities estimate that there is around 740,000 hectares of dry meadow areas that have potential for development into cattle grazing, however anecdotal evidence from field research suggests that the area available for grazing is decreasing and being used for other uses such as horticultural crops. NTT is a major livestock producing region and is the second largest producer of beef cattle producer in Eastern Indonesia, behind South Sulawesi (DGLS, 2006). Cattle fattening is a traditional farming enterprise and a major source of cash income for farmers, especially on West Timor Island. The dry climate and steep terrain on West Timor Island lends itself to livestock production and the region has a history of producing high quality Bali cattle for export to Java. A major industry issue has been the decline in cattle populations in NTT due to high demand for beef and unsustainable slaughter rates.

Estate crops such as coffee and cocoa grow well in NTT. The province has recently been identified by major coffee buyers as a producer of high grade Arabica coffee and various donor funded programs are seeking to catalyse development of the coffee sector on Flores. The historical lack of smallholder access to fertiliser and agrichemicals and the pristine mountain environment may provide significant marketing opportunities for Arabica coffee if the industry is able to organise reliable supply.

Aquaculture and fisheries, in various forms (open water, brackish water pond, fresh water pond, paddy field and seaweed culture) is also a major primary industry and mainly located on Flores.

With the province spread over 566 islands the cost of transport for NTT between the districts and with other parts of Indonesia is high and is a barrier to trade and further economic

development. The role of sea transportation is important for the province. A major problem is the poor condition of roads during periods of high rainfall. Official state data indicates that only 20 percent of the region's regency and village roading are in good condition while other roads can be prone to slips and closure during heavy rain (BPS NTT, 2003).

The limited size of local markets for the sale of agricultural products (due to very low levels of local consumer disposable income) highlights the importance of the region's infrastructure for trade. In general, smallholders can capture the best returns by supplying export (including inter-regional export) markets. With high transportation costs and a lack of investment in NTT processing capabilities agricultural products for interregional and export market have been limited to traditional products e.g., cattle, cashew nut, sea weed and coffee. Other products such as banana, orange and avocado struggle to compete in Java markets due to the high cost of transportation.

The fieldwork conducted for the VCA of priority commodities covered the areas of Kupang, and TTS Sub District for Beef Cattle, Ruteng, and Bajawa (Manggarai Sub District) for Coffee and West Manggarai Sub District for Cassava.

Business Operating Environment in NTT

The business operating environment in NTT, with respect to the level of informal and formal charges and taxes that farmers, middlemen and traders are required to pay was found to be a significant frustration of local business people although not necessarily a significant barrier to business. Further field research in this area is required to identify the impact that local charges have on the beef cattle industry.

A recent study on the NTT business operating environment by the SMERU Institute found that the NTT cattle industry has been the subject of various regulations and excessive charges, starting at the village level. Most regulations include charges, such as: the certification of calves and a permit to export, *retribusi* to cover the administration cost, a quota limit on the number of cattle exported, and the SPK charge for issuing a permit for import and export, the services of slaughtering houses, the services of livestock markets, the services of livestock health checks, and quarantine.

Other findings include that the presence of many middlemen and traders at the village and sub-district (*kecamatan*) levels has very limited impact on price information, since product prices are mostly determined by a small number of inter-island or large traders that form a monopsony market structure. The recent increase in the number of traders and exporters coming to Kupang, has not fully benefited farmers, due to the limited information on product location and excessive inspections that give rise to informal charges and uncertainty.

The study found that the regional governments in NTT persist with imposing charges and regulations to agricultural products although the contribution of these charges to regional government revenues is very small. Some progress has been made on reducing regulations and charges for agricultural food crops, however less progress has been made in the beef cattle industry. The regulations and licensing have drawn out informal charges applied at various levels that distort the marketing of cattle (amongst other agricultural products) and in turn limit the opportunity of farmers to receive better prices and incomes.

1. Indonesia in the global beef industry

Indonesia is a minor beef producer

Indonesia is a relatively minor beef producer on a global scale compared to the top ten beef producers although total beef slaughter has increased considerably over the past few years. While there has been growth in the beef feedlot industry, anecdotal evidence indicates that much of the increase in Indonesian beef production has occurred due to unsustainable off-take from the national breeding herd.

Table 3 Major World Beef Producers (tonnes 000's)

	1994	2000	2001	2002	2003	2004	% World Production	Avg Growth/vr
Argentina	2,783	2,718	2,461	2,493	2,621	3,024	6%	0.87%
Australia	1,825	1,988	2,119	2,028	2,073	2,033	4%	1.14%
Brazil	5,136	6,579	6,824	7,139	7,231	7,774	15%	5.14%
Canada	899	1,263	1,262	1,294	1,190	1,496	3%	6.63%
China	2,806	5,352	5,509	5,866	6,324	6,779	13%	14.16%
France	1,627	1,528	1,566	1,640	1,632	1,565	3%	-0.38%
India	2,682	2,858	2,885	2,912	2,940	2,966	6%	1.06%
Indonesia	385	386	382	373	397	488	1%	2.68%
Mexico	1,365	1,409	1,445	1,468	1,504	1,543	3%	1.31%
Russia	3,240	1,894	1,873	1,957	1,990	1,951	4%	-3.98%
USA	11,194	12,298.00	11,982.00	12,427.00	12,039.00	11,261.00	22%	0.06%
Others	21,884	21,334	20,462	20,908	21,188	21,654	42%	-0.11%
World	55,825	59,606	58,769	60,505	61,127	51,273		

Source: FAO Stat

2. Size and Structure of the NTT Beef Cattle Industry

The NTT beef industry is made up of a large number of smallholder farmers

Data from local DINAS offices indicates that in 2003 there were approximately 330,000 smallholders (farming households) in the NTT district and around 136,000 smallholders farming cattle (Agriculture Census, Sensus Pertanian (SP) 2003). This data also indicates that the trend over the past twenty years has been an increase in the proportion of smallholders farming cattle to around 45 percent. Field research suggests that the vast majority of cattle farmers in NTT (over 90 percent) are smallholders with one to three cattle each.

The NTT beef industry has a fragmented structure with a large number of smallholders supplying a relatively small number of large traders. Most traders supply the Java market with live bulls although there is a small trade in cull cows for the local NTT market.

The climate and topography in NTT, particularly West Timor, mean that smallholders in remote areas can be restricted to cattle farming and horticultural crops for subsistence purposes. Beef cattle farming in NTT is a traditional farming enterprise with smallholders being reliant on cattle for cash income and low rainfall during the dry season limiting smallholders farming options to livestock enterprises.

The major beef cattle producing areas of NTT are located in Timor Tengah Selatan (TTS), Timor Tengah Utara (TTU), Kupang and Belu district. The predominant breed farmed in NTT is the Bali cattle breed. The table below compares NTT Bali cattle numbers with other cattle producing regions and shows that the number of cattle farmed in NTT was declining up to 2001. Anecdotal evidence and other sources of data indicate that the reduction in total cattle numbers is continuing.

Table 4 Bali cattle Numbers by Region

Location	1998	1999	2000	2001*	Change (%)
NTT	633,704	633,451	442,940	472,626	-25%
NTB	429,847	374,970	376,526	392,090	-9%
Bali	524,615	526,013	529,064	533,042	2%
S.Sulawesi	823,245	749,392	718,139	751,277	-9%
Lampung	331,502	278,360	254,823	256,312	-23%
Other provinces	270,261	695,812	584,614	560,263	
Indonesia	3,013,174	3,257,993	2,916,944	2,965,610	-2%

Source : Talib., C ., K. Enwistle *et al* 2003

The table below shows how the NTT beef herd is distributed at the sub-district level with the four main cattle sub-districts being Kupang, TTS, TTU and Belu. Smallholders in these areas (particularly upland areas of TTS, TTU and Belu) live in harsh environments and lack a wide range of land-use options for generating cash income.

Table 5 Number of Cattle and Grazed Area in NTT, 2005

District/Municipality	Number of Cattle (head)	Grazing Area (ha)
Kupang	136,279	227,400
Timor Tengah Selatan	118,979	58,243
Timor Tengah Utara	58,242	86,399
Belu	94,434	24,010
Alor	1,268	7,149
Lembata	1,409	23,255
Flores Timur	1,555	33,291
Sika	4,795	19,389
Ende	6,647	910
Ngada	34,263	15,193
Manggarai	8,254	68,871
Manggarai Barat	2,193	8,218
Sumba Timur	41,023	215,797
Sumba Barat	6,497	83,635
Rate Ndao	14,489	16,513
Kupang Municipality	3,382	0
Total NTT	533,709	888,273

Source : Provincial Livestock Office of NTT, 2006

NTT smallholders rely on cattle as an important source of income

Beef cattle is an important source of income for smallholders in traditional cattle farming areas of NTT (e.g., Belu, TTS, TTU) and those sub-districts that lack suitable land for cropping and access to local markets (especially West Timor). Farmers in these areas are very reliant on beef cattle for cash income. Smallholders generally grow crops to meet

household requirements (e.g., corn, beans, other horticulture crops and cassava) and feed cattle surplus crops and cut grass, tree branches and banana stems.

Cattle feed competes for land with subsistence and horticultural crops. Corn is the major staple food in these districts (e.g. Kapan sub district) and field research indicates that cattle sales can make up over 80 percent of the family's cash income. Other cash income can be generated from hand woven traditional fabrics and sold in major towns.

Cattle farming and ownership is a traditional land-use and carries important social status

As well as an important source of income for smallholders, cattle also hold high social status for smallholders. The ability to offer beef (sometimes a whole cattle beast) at important social events such as weddings, funerals and the biggest Muslim day (especially in Hari Raya Idul Fitri, and Idul Adha) as a symbolic sacrifice for Muslim people, bestows the donor a higher status in the community than an alternative meat gift, e.g., chicken, fish (and pork in Christian areas).

As a source of cash income for smallholders in NTT, cattle farming makes a major contribution to the regional GDP and the table below shows this contribution. The data indicates that for the five years to 2004 the contribution to GDP has been stable.

Table 6

Contribution of Livestock to the NTT Regional Gross Domestic Product

Constant 2000 Prices (million rupiah)					
Regional GDP	2000	2001	2002	2003*	2004**
Total Regional GDP	7,850,624	8,221,573	8,622,491	9,016,717	9,519,960
Agricultural GDP	3,533,267	3,644,837	3,781,813	3,886,971	4,032,910
Livestock GDP	1,088,342	1,095,960	1,141,800	1,169,797	1,208,903
Agricultural's share of GDP	45%	44%	44%	43%	42%
Livestock's share of GDP	14%	13%	13%	13%	13%

Note :

* = preliminary figures

** = very preliminary figures

Source: DGSL, (2006)

A declining regional herd size is a major concern for the industry

The table below shows that NTT has around 21 percent of the Indonesian Bali cattle population in 2000, this share has steadily decreased overtime. The decreasing herd size in NTT is a concerning trend for the industry.

One of the causes of the declining herd size is the unsustainable off-take and high calf mortality that appears to affect the industry in NTT. While Bali breeding cows are relatively fertile, poor nutrition post calving is a likely cause of the high calf mortality. The table below shows that the NTT herd has a high proportion of cows relative to bulls and may suggest larger breeding cow herd sizes.

Table 7
Herd Structure and Calving Data (2000)

Province	Bulls	Cows	Slaughter and Export	Mortalities	Estimated Calving	Calving %	Mortalities (% calves)
NTT	11,077	224,025	78,283	71,567	149,089	67%	48%
NTB	39,050	153,197	72,550	11,878	79,183	52%	15%
Bali	71,940	184,572	66,475	10,347	122,322	66%	8%
S.Sulawesi	39,789	337,051	99,459	16,294	203,680	60%	8%
Lampung	19,554	165,084	178,836	5,163	73,740	45%	7%
Total	253,342	1,032,079	495,603	115,294	628,014	61%	18%

Source : Talib., C ., K. Enwistle *et al*, 2003

Due to the high demand for Bali cattle and the fallout from the Asian crisis reducing the supply of imported cattle, there have been considerable pressures placed on the Bali cattle population. The effect of the monetary crisis in 1998 increased the price of imported beef as the strength of the Indonesian rupiah dropped from 9,991 to 15,100 per US dollar. This currency collapse reduced the number of imported feeder steers (primarily from Australia) by 75 percent. According to local feedlot operators, the breakeven exchange rate for live cattle imports is 10,000 Rp per US dollar. If the exchange rate exceeds this level, it is not profitable to fatten imported cattle through feedlots (Hadi, *et al*, 2002).

Farmers have responded to the high prices by slaughtering large numbers of productive females. The regional herd has suffered by the slaughter/export of bulls and heifers with superior genetics. Smallholders need cash from the sale of their best bulls and therefore smaller sized bulls are often used for breeding. In addition to current slaughter practices, previous research suggests that a lack of a coordinated breeding sire and dam selection and testing programmes means that the Bali cattle genetic base in NTT has suffered as a result.

Central and local government have attempted to address the decline in NTT cattle numbers

Records over the past decade indicate that the size of the Bali cattle herd is declining in most areas of the Eastern Islands as export demand and slaughter rates exceed replacement rates. ACIAR data indicates that around 34 percent of all female cattle slaughtered are productive females. There is a national policy that regulates against the slaughter of productive females although smallholders have been able to sidestep this law by maiming productive cows (e.g., by breaking legs) and presenting them for sale as “cull cows”. This is a serious animal welfare concern.

Smallholders in a well functioning beef industry need the ability to slaughter heifers as well as bulls to meet market demands and provide cashflow. Smallholders need other incentives to improve the efficiency of production in their breeding herds.

The reduction in cattle numbers is also said to be caused by a reduction in grazing area and an increasing area being used for subsistence crops and horticulture. Smallholders choosing to grow crops on farmed areas may be better off than from grazing cattle and should be free to choose to do this.

A quota restriction on the total number of cattle exported from NTT to Java is also in place although there is little evidence that this quota is enforced or complied with.

High capital requirements and low access to finance make expansion difficult

Cattle breeding in West Timor is mainly located in the hill country Northeast of Kupang (Soe, TTU, TTS and around Belu) where farmers graze cattle on native pastures that can be used by more than one farmer. Purchase prices for breeding cows are around IDR2.0 – 3.0 million making herd expansion difficult for smallholders without reliable and transparent forms of finance.

Smallholders can be vulnerable to unfair trading practices

Due to the uneven cashflow and poor access to finance for smallholders, most cattle are owned by traders and buyers. The traditional arrangements include:

- “Contract breeding” where traders own breeding cows and split the profits 50/50 from the sale of calves;
- “Wage only” fattening where traders supply store² cattle to smallholders for fattening and collection in six months later (ranging from three to 12 months) splitting the profit from the sale of the cattle 50/50. Traders choosing to retain the animal for further fattening, estimate live-weights by eye and pay farmers based on the new value.

These traditional fattening arrangements leave smallholders in a weak bargaining position and vulnerable to unfair transactions. Smallholders often require cash before cattle are ready to be sold, in which case traders provide finance and deduct loans on the smallholder’s share of the profit.

New trading arrangements have been used by a number of NGOs. One such program Tanaoba Lois Marekat (TLM Foundation) has established a commercial cattle financing and trading enterprise that purchases cattle on behalf of smallholders from local markets, in effect providing finance to smallholders.

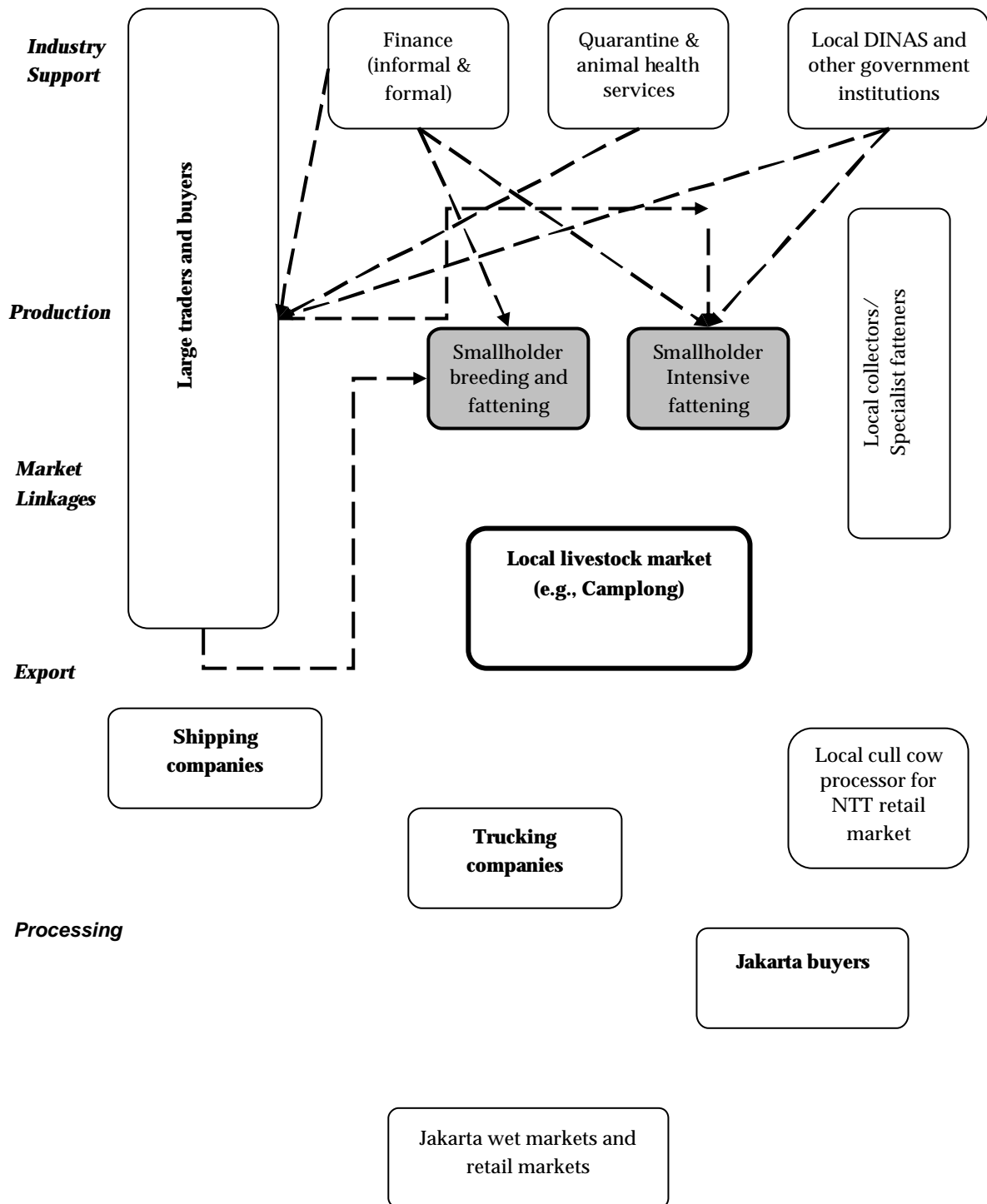
The following diagram shows the NTT beef industry value chain from smallholders to traders, shippers and processors including supporting structures and industries.

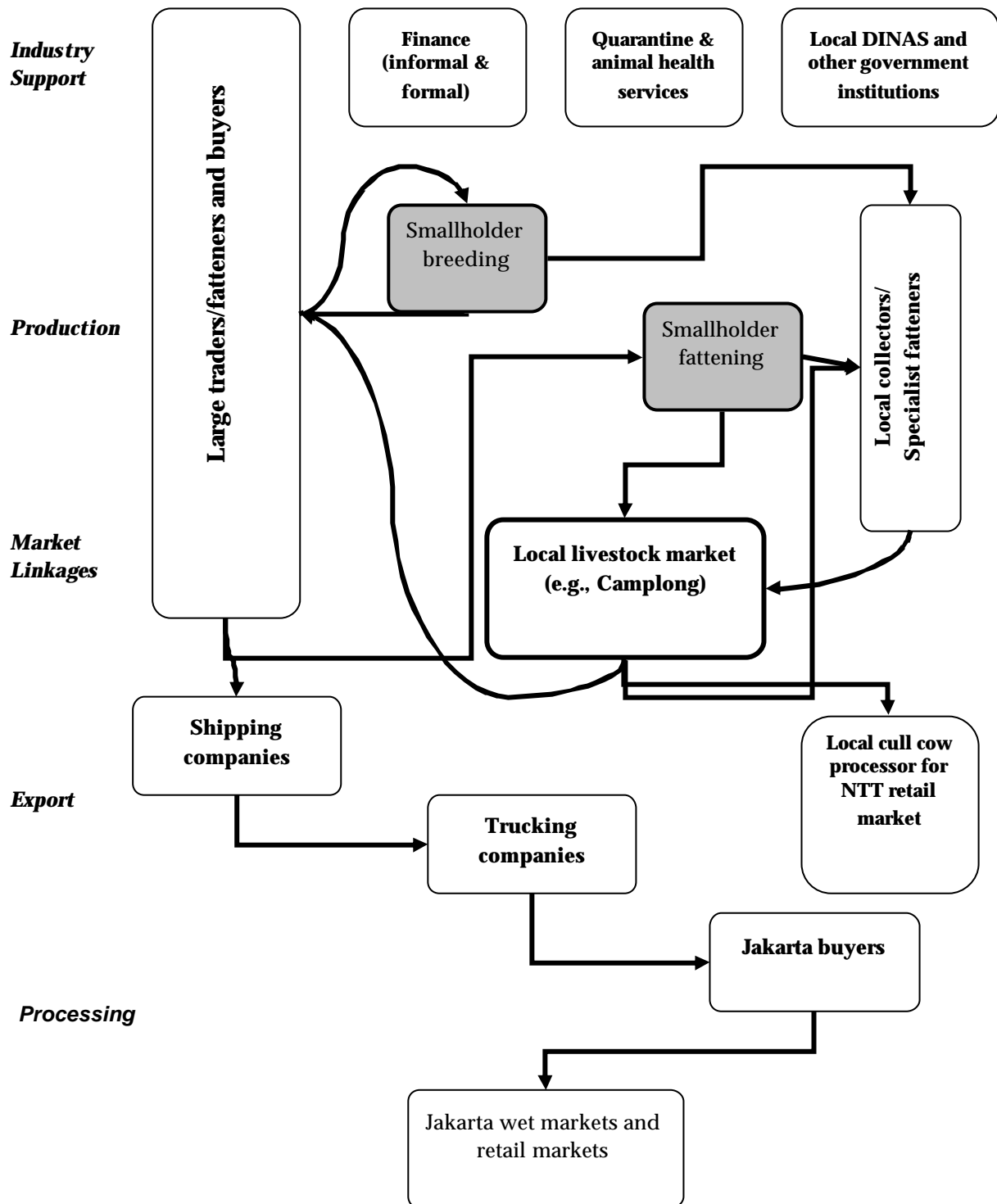
The diagram depicts how traders and buyers act not only as a market for smallholders selling weaner, store and fattened cattle but also as providers of smallholder finance. In addition, traders have their own fattening operations for cattle needing additional weight gain prior to export to Java. The dashed lines show the flow of industry support such as finance, quarantine and extension services. The solids lines (on the next page) show the flow of cattle from breeders to fatteners and through market intermediaries to the end market in Java.

The multifaceted role adopted by large traders and buyers in the NTT beef industry leave smallholders in a weak bargaining position and vulnerable to unfair trading practices.

² “Store” cattle is a term used in this report to define cattle of six months to two years of age that need further feeding to reach acceptable slaughter weights for the Java bull market (minimum of 250kg LW)

Figure 2: NTT Beef Industry Value Chain





3. NTT Beef Cattle Production and Sector Performance

Bali cattle are well adapted to NTT conditions

Bali cattle are well suited to the farming conditions in NTT. Despite overall poor productivity compared with other beef producing countries, a number of previous studies confirm that Bali cattle grow well compared to exotic breeds under harsh climatic and low nutrition environments. Bali cattle have also been found to have high natural fertility.

Depending on the terrain, availability of land, soil fertility and access to labour, smallholders in NTT manage cattle in either intensive cut and carry systems or under extensive pasture grazing systems. Other systems include tethering cattle to trees during the day and a mix of free grazing and night housing. In general, highland areas tend to be dominated by extensive grazing systems with pockets of subsistence crops and more fertile lowlands used for cattle and integrated cropping. While cattle are an important source of income in traditional cattle areas of NTT, cattle management is of secondary importance to subsistence crops.

Smallholders fattening cattle on the lower country usually use a “cut and carry” system integrating beef with cropping and feed cattle with grass and surplus plant material (e.g., corn, cassava, banana stems and tree branches- e.g., lequina).

Smallholders rely on family labour for cattle farming

Smallholders rely on family labour for feeding and caring for cattle at the village level. There is very little other paid employment and most families share farming tasks with other families. Therefore social structures are important for village level farming knowledge, productivity and cash income.

Cattle fattening provides improved cash flow over breeding

Fattening cattle improves cash flow for farmers over breeding and selling calves. Smallholders usually either purchase store cattle or enter into “wage only” contracts with traders. This type of arrangement often results in a weak bargaining position for the smallholder, especially if traders provide advance cash payments prior to sale.

Smallholders usually fatten store cattle (ranging from 12 to 24 months) for three to nine months before they are either sold to another fattener (smallholder or trader) or are exported at slaughter weights (minimum of 250kgLW). Fattening cattle for longer than nine months creates cashflow problems for smallholders. While the profitability of breeding can be higher than fattening, smallholders must also bare the increased risk of calf and cow mortality and have capital invested in breeding cows.

Smallholder farms are usually around one hectare in size and the number of cattle farmers are able to fatten is limited by the availability of grazing area, natural feed sources and surplus crops. The most common feed crops for fattening in NTT include king grass (rumpot gajah), lequina (lamtoro), gala-gala (caliandra sp.), banana and cassava or sweet potato.

In contrast to other extensive tropical cattle farming systems that rely on the *Bos indicus* breed and their crossbreds, the NTT cattle industry is mainly dependent on the availability of natural feed resources and on the survivability of the Bali cattle breed. The resilience of

Bali cattle is important in the frequently harsh and low-input/low-output management systems of the region.

Harsh growing conditions and overgrazing reduces productivity

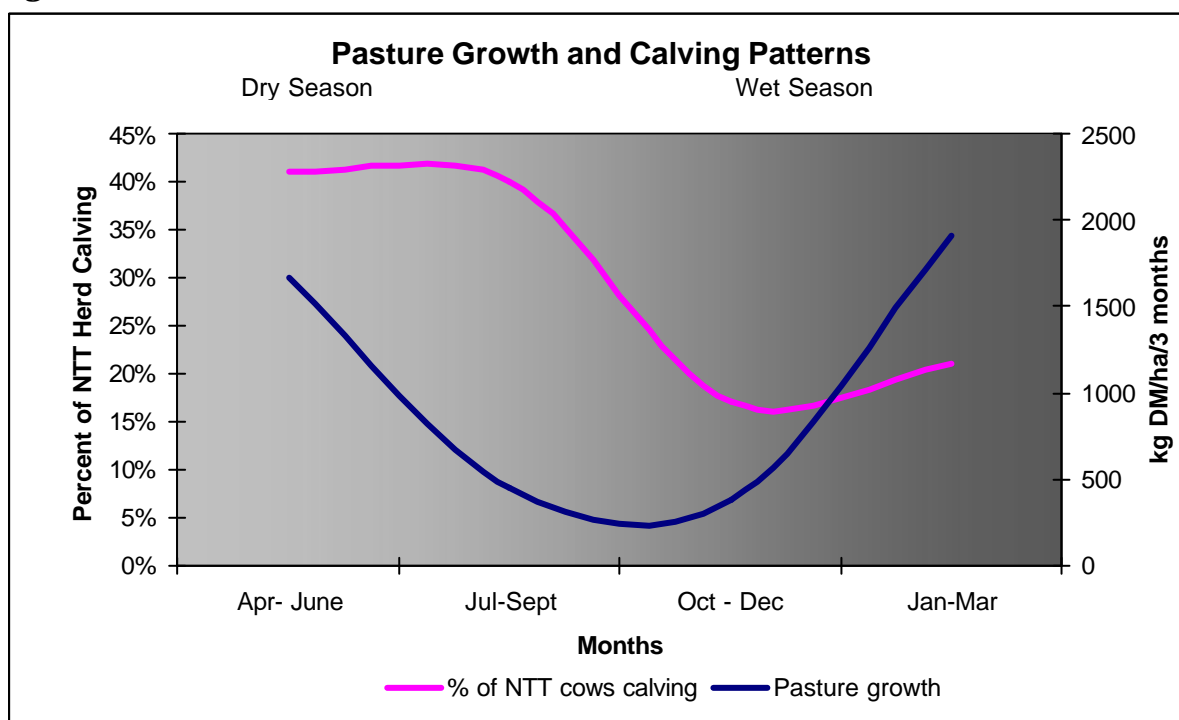
In remote areas breeders typically own one or two breeding cows and cluster cows together with other farmers to graze cattle on open highland pastures. This system often results in overstocked and over grazed pastures, poor growth rates and high calf mortality.

Overgrazing reduces the productivity of both cattle and of native grass pastures and has long-term consequences for the control of soil erosion. Other studies have also noted soil nutrient deficiencies with low phosphorous particularly reducing pasture growth. Under extensive grazing systems seasonal rainfall patterns have a significant impact on nutrition with a deficit usually occurring from the end of the wet seasons through to mid dry season (December to May).

Breeding cow management is poor

Productivity data from other studies shows that there is wide range in Indonesian cattle productivity. An intensive monitoring program in NTT (Hadi *et al.*, 2002) has shown that farmers do not actively seek to (and face challenges to synchronise mating and calving to fit with optimum pasture growth periods, although this appears to occur naturally to some extent. The following graph shows the average timing of calving patterns in NTT.

Figure 3



Source: IFC SADI field research

The graph above shows that most cows are calving during the dry season when there is low feed available for milk production, calf rearing and restoring cow condition for mating. The work undertaken by ACIAR concluded that in these harsh farming environments, the key difference between high and low cattle productivity is the ability of smallholders to offer supplementary feed during the dry season, often in the form of tree branches, to minimize live weight loss, calf mortality and improve cow conception rates for subsequent matings.

Matching calving periods to pasture growth makes this goal more achievable so long as supplementary feed is offered prior to mating.

West Timor growing conditions are harsher than other areas of NTT

Very low rainfall during the dry season in West Timor results in very low pasture growth and a more defined wet-dry season than other parts of Eastern Indonesia. Due to the harsh growing conditions in West Timor cattle productivity (cow conception rates, calf mortality, nutrition and growth rates) are poorer for West Timor than in other areas of NTT such as Flores and Sumba. This finding is also supported by previous literature (ACIAR, 2003). Smallholders in West Timor are however, more reliant on cattle for cash income than in other areas that are able to grow a wider range of crops.

The table below compares productivity traits of Bali cattle from various regions of Eastern Indonesia. Other data shows that breeding cows and cattle from NTT are generally smaller than those in other regions due mainly to poorer nutrition and genetic factors.

Table 8 Reproductive performance and milk production data in Bali cattle.

Province	Age at puberty (years)	Calving age (months)	ICI* (months)	Calving rate (%)	Calf Mortality (%)	Milk Prod (kg/6 months)
NTT	2.5	41	15.4 ± 2.0	66.6	48	164.7
NTB	2.0	36	16	51.7	15	No data
Bali	2.0	32	14	66.3	8.5	274.5
S.Sulawesi	2.5	36	15.7 ± 1.8	60.4	8.0	164

*Inter-calving interval

Table 9 Liveweight Comparisons (kg LW)

Province	Birth weight	Weaning weight	Yearling weight	Puberty weight	Mature cow weight
NTT	11.9	79.2	100.3	179.8	221.5
NTB	12.7	83.9	129.7	182.6	241.9
Bali	16.8	82.9	127.5	170.4	303.3
S.Sulawesi	12.3	64.4	99.2	225.2	211

Source : Talib., C ., K.Enwistle *et al.*, 2003

Previous work by ACIAR³ has shown that calving percentages range from 65 percent to 85 percent across NTT with cattle farmed in Flores being higher than average and productivity in Timor being at the lower end of the range. Fieldwork in Timor indicated that intensively managed breeding cows achieved over 80 percent calving. Calf mortality can be high however ranging from five percent to 45 percent.

A number of previous studies⁴ also indicate that under conditions of poor nutrition and low management Bali cattle outperform other breeds (e.g., *Bos indicus* and others with higher genetic potential). These studies also showed that with improved nutrition and management calving mortality can be reduced.

³ Strategies to Improve Bali Cattle in Eastern Indonesia edited by K. Entwistle and D.R. Lindsay ACIAR Proceedings No. 110 (printed version published in 2003)

⁴ Reviewed in Strategies to Improve Bali Cattle in Eastern Indonesia edited by K. Entwistle and D.R. Lindsay ACIAR Proceedings No. 110 (printed version published in 2003)

The current poor productivity of Bali cattle in NTT, in combination with unsustainable slaughter practices, increased weed infestation and increased pressure on grazing land for horticulture crops, is exacerbating the current trend of a declining regional herd.

AI is used for breed improvement although the service in NTT is poor

A number of studies indicate that the average weight of exported bulls is decreasing (Talib et al. 2001) therefore both the size and quality of the genetic pool may be decreasing. In some areas, the shortage of mature bulls also appears to be an impediment to herd improvement (Wirdahayati and Bamualim 1990; Siregar et al. 2001). Artificial Insemination (AI) is promoted widely in NTT although the application of this technology by DINAS and other technical experts appears low. There are a number of impediments to improving the uptake of AI in the NTT beef industry.

Current low farmer knowledge in nutrition constrains productivity improvements

Smallholders in NTT have a low level of education and rely on traditional methods of farming cattle. Knowledge on improved feed crops is not widespread and this situation is a major limiting factor to increased cattle productivity and improved smallholder returns. Supplementary feed is especially important in highland areas where farmers use grazing systems and cattle face a feed shortage during the dry season. Smallholders in Indonesia that are able to provide cattle supplementary feed during the dry season increase cow milk production, calf survival, shorten the post calving anoestrus interval and are able to raise and sell one calf per cow per year (Mastika, 2003).

NTT is still a significant provincial exporter of Bali cattle

The export figures below show that the traders responded to increasing prices by selling higher volumes of cattle. The wide range of estimates on herd structure and slaughter levels makes it difficult to assess whether these slaughter levels are sustainable. Field research and anecdotal evidence suggests that stocking rates are too high and with low cow productivity, high calf mortality and a high number of heifers being slaughtered these levels are not sustainable.

Table 10 Provincial beef cattle exports, 2002-2006 (head)

Province	2002	2003	2004	2005	2006*
NAD	2,031	1,242	196,000	-	-
West Sumatera	22,500	21,250	22,500	169,535	-
South Sumatera	40,275	35,190	-	25,462	-
Lampung	144,291	-	-	160,925	-
DKI Jakarta	-	-	-	-	-
West Java	52,606	74,802	-	94,033	-
Central Java	16,730	26,348	140,038	110,228	112,273
East Java	122,555	8,712	9,497	12,094	13,502
Bali	44,079	-	-	74,042	75,000
NTB	14,551	11,050	18,251	26,158	27,466
NTT	42,410	35,061	44,901	48,519	49,338
South Sulawesi	-	-	-	1,693	1,744

Sources : Livestock Statistics, 2006 (DGLS)

Note : Exported means exported outside province into major consumption provinces.

* preliminary numbers

4. Market Conditions

Strong demand and prices for beef in Indonesia follows global trends

The growing demand for beef from middle class Indonesians has increased the level of imported beef in Indonesia as well as increased prices for local beef. Beef consumption is forecast⁵ to continue increasing as in many other developing economies. A preference for higher value meats over traditional meats and sources of protein are driving this trend. Increasing consumption in Asia and Central America without corresponding increases in domestic production from these regions is expected to continue driving the growth in world beef trade and prices. In addition, increasing demand for corn and grains for bio-fuel production is increasing beef production costs and may slow production growth.

The Jakarta live bull market is the main market for NTT bull traders

The main market for smallholder cattle farmers from NTT is the live bull trade in Jakarta. Each year around 50,000 to 60,000 cattle are transported live from Tenau port in Kupang to Tanjung Perak Port in Surabaya, and continue by truck to Jakarta, the majority of these are bulls. Field research and consultation with industry stakeholders (inter-island traders, Tanjung Perak quarantine staff) and other industry experts (SMERU personnel) indicates that Bali cattle are predominantly (over 80 percent) transported by road to Jakarta with only a small number slaughtered in Surabaya. The local wet market meat trade in Jakarta, Bogor and Bandung are the major buyers of Bali cattle from NTT. After the four day journey from Kupang the cattle are “replenished” at a holding feedlot, such as Andini Sakti Holding Ground in Cibitung Bekasi.

Traditional celebrations and NTT supply affect cattle prices

Live cattle prices for NTT traders and smallholders are largely determined by prices in the Jakarta market, and there is strong demand for Bali cattle in this market. Beef prices peak during traditional celebrations such as Lebaran (Hari Raya Idul Fitri), Christmas and Idul Adha (or Idul Qurban) when bulls and goats are slaughtered in traditional Muslim ceremonies. During these peaks prices in Jakarta are around 10 to 20 percent higher than in off peak times i.e., can rise from Rp22,000 per kg to 25,000 per kg (carcass weight).

Prices during the wet season are affected by a reduction in supply of cattle to markets. NTT’s roading infrastructure is usually affected by slips and floods making it difficult for traders to get cattle to the market at Camplong. The table below shows what affect this has on prices.

Table 11: The effect of wet season on cattle sale prices at main market

Period	Live weight	Price per kg (rupiah)		Wet season premium
		Mar-07	Oct-06	
Mar-07	200 - 224kg	12600	11,900	6%
	225 - 249kg	12800	12,100	6%
	250 - 274kg	13000	12,500	4%
	275 - 299kg	13200	12,500	6%
	300 - 324kg	13400	12,700	6%
	325 - 349kg	13600	12,900	5%
	350 - 374kg	13800	13,000	6%
	375 - 399kg	14000	13,300	5%

Source : TLM , 2007

⁵ FAPRI, USDA

Inflation and the increasing demand of beef meat are other factors that affect prices between seasons.

With the fragmented nature of the beef breeding sector in NTT, the industry relies on collectors and traders to move cattle from breeding to cattle fatteners and via the live cattle trade to major markets in Java (Jakarta and Surabaya). Many of the existing cattle traders in NTT have been able to trade profitably and have the resources to buy, finish and export large numbers of cattle. For example, a Kupang based trader interviewed during the fieldwork exports approximately 1,000 head of cattle from Tenau Port (Kupang) per month with gross revenue of five to six billion Rupiah per month.

Traditionally, successful trading in the beef industry relies on:

- strong social networks (collectors, shippers, local authorities and especially buyers in end markets);
- financial resources to purchase live cattle and bare the risk of losing cattle during shipment; and
- access to a reliable supply of store cattle in the breeding districts; and
- the inability of smallholders to purchase their own cattle or supply cattle in large numbers (gaining bargaining power).

With existing cattle traders generating profitable returns from trading cattle it can be difficult for new entrants to supply beef to the Java market due to the strong networks that exist.

Smallholders are very reliant on Jakarta market for returns

Beef markets in NTT are restricted to cull cows as local consumers cannot afford to pay premium prices for bull beef. Cull cows are slaughtered in basic abattoirs and meat is sold in local wet markets.

NTT no longer has a functioning abattoir that can slaughter bulls and ship frozen or chilled beef to Jakarta markets. The industry lacks investment in slaughter and freezing facilities and downstream cold chain facilities and therefore market outlets are restricted to the live cattle trade.

Smallholders in NTT, and other parts of Eastern Indonesia, compete in the Jakarta bull market with producers from Java. With a high level of poverty in NTT and no local market for bull beef, smallholder returns are heavily reliant on conditions in the Jakarta market. The cost of transport to Jakarta and the physical condition that cattle arrive impact on returns for the NTT industry. With such a reliance on cattle as a farm enterprise and a single market for smallholder income, any change to cost structures and/or final price has a significant impact on smallholder returns.

The table below shows the difference in beef prices between NTT and the major market in Jakarta. The higher prices in Central Jakarta are a factor of both higher quality cuts and also reflect the costs of transporting cattle from producing regions such as NTT.

Table 12 Difference in Indonesian market prices

Product	Province						
	Lampung	Central Java	Yogyakarta	East Java	NTB	NTT	South Sulawesi
Live cattle	13,360	12,167	16,417	12,883	10,300	9,500	13,292
Live buffalo	8,078		8,627	7,620	6,642	5,625	4,467
Live goat/sheep	10,600	11,500	14,667	12,544	10,542	7,000	13,000
Live pig	8,900	8,833	8,500	10,850		-	9,222
Live broiler	7,596	7,791	9,250	7,505	9,230	12,500	8,713
Live native chicken	12,813		13,580	17,821	16,434	19,863	20,000
Bovine	30,000	35,000	n.a	32,281	31,500	22,300	29,500
Mutton	25,950	22,500	n.a	21,339	23,300	25,000	23,000
Pork	20,200	25,667	n.a	27,730		18,000	21,000
Broiler meat	12,800	12,167	n.a	11,516	13,300	14,000	12,292
Egg layer	7,548	7,800	7,475	7,438	11,191	12,400	9,175
Fresh milk	2,750	1,600	1,835	1,886			2,000

Competition for supply from buyers

Current studies show that the most reliable sources of beef cattle are East Java, Central Java, Yogyakarta and Lampung provinces. Other important sources are South Sulawesi, West Nusa Tenggara and East Nusa Tenggara (Hadi, et al, 2002). These provinces are the major suppliers to the largest beef market in Jakarta and West Java. The table shows that, while NTT is still a major producer, the decline in herd numbers has been more rapid than in other beef producing provinces.

Table 13 Average cattle number in major producing provinces, 1990 – 2005

Provinces	Average provincial herd size		
	1990 – 1995	1996 - 2000	2001 - 2005
Aceh	498,990	674,764	676,807
West Sumatera	386,906	421,004	529,743
South Sumatera	410,397	476,313	428,569
Lampung	358,803	440,280	390,111
Central Java	1,205,163	1,264,428	1,352,309
DI. Yogyakarta	192,048	200,817	227,412
East Java	3,169,742	3,327,509	2,383,843
Bali	476,865	528,731	550,490
West Nusa Tenggara	398,613	420,660	419,237
East Nusa Tenggara	737,087	672,401	513,456
South Sulawesi	985,805	792,994	686,713

sources : DGLS, 2006

With the majority of beef sold live, NTT beef has little differentiation

With a lack of investment in slaughter facilities and marketing of NTT beef, bulls are sold in Jakarta alongside Bali bulls from other regions. Anecdotal evidence suggests that NTT Bali bulls have a strong demand although it is very difficult to differentiate NTT beef from other suppliers.

High transportation costs also make it difficult for NTT producers to compete with other regions with more efficient transport channels to Jakarta. Any marketing effort to improve smallholder prices would require transparency along the value chain and this is very

difficult to achieve in the NTT industry. With the current low use of inputs, opportunities may exist for small volumes of organic beef in Jakarta high value retail markets.

Bali cattle is favoured by Jakarta consumers

Demand for meat in Indonesia is growing at 6–8 percent per annum, with demand greatest in the densely populated and more urbanised areas of Java. In a survey of seven provinces (Lampung, West Java, Central Java, Yogyakarta, East Java, South Sulawesi and West Nusa Tenggara) most consumers prefer Bali beef with its low fat content and strong flavour over imported and cross-bred beef (Hadi, *et al*, 2002). However, the high demand for beef is increasing domestic prices and encouraging unsustainable slaughter levels.

Consumers in these markets also prefer to purchase beef that it freshly killed rather than frozen or chilled beef. This preference creates a barrier to NTT slaughter and shipment to Jakarta markets. The demand for frozen or imported beef in Jakarta is dominated by hotel, restaurant, and supermarket or hypermarket outlets. Research conducted by Hadi, *et al* (2002) also found that meatball peddlers are major buyers for Bali cattle in Jakarta. Meatball soup is a popular local dish in Java and Lampung with Bali cattle being the preferred beef. Profitable meatball stalls (e.g., Bakso Cak Man) are emerging in and around Jakarta.

Cattle shipment methods are crude

Cattle shipment occurs every week with average capacity of about 250 head per boat. Average transport costs are around Rp 500,000/head, made up of Rp 275,000/head (Kupang-Surabaya) and Rp 225,000/head (Surabaya-Jakarta) including seaport retribution payments. Traders use bamboo poles trussed together as temporary pens for each journey with cattle tied to the bamboo. The make shift pens lack shade and easy access to drinking water although cattle are fed grass over the three day journey. Average cattle mortality is around 0.5 percent and live-weight loss of around 12-15 percent is common. Traders note problems with “shipping fever” which is most likely related to heat exhaustion or dehydration. The number of cattle shipped from NTT can be seen in the table below.

Table 14 Cattle exports from NTT, 2004-2006 (head)

Month	Bulls			Breeding cows		
	2004	2005	2006	2004	2005	2006
January	n.a.	n.a.	1,933	n.a.	n.a.	0
February	n.a.	n.a.	2,430	n.a.	n.a.	0
March	n.a.	n.a.	3,231	n.a.	n.a.	0
April	n.a.	n.a.	4,886	n.a.	n.a.	119
May	n.a.	n.a.	5,292	n.a.	n.a.	0
June	n.a.	n.a.	4,926	n.a.	n.a.	20
July	n.a.	n.a.	7,235	n.a.	n.a.	0
August	n.a.	n.a.	7,005	n.a.	n.a.	75
September	n.a.	n.a.	6,295	n.a.	n.a.	1
October	n.a.	n.a.	8,205	n.a.	n.a.	40
November	n.a.	n.a.	6,229	n.a.	n.a.	172
December	n.a.	n.a.	4,854	n.a.	n.a.	70
Total	65,310	64,123	62,521	550	978	517

Note: n.a. (not available)

Source : Livestock Quarantine Office of Tenau, Kupang, NTT

Local taxes (retribution) and charges make trading difficult

The business operation environment in NTT is challenging with a number of charges incurred at various stages of buying, selling and transporting cattle. The table below outlines the local government retribution charges incurred for smallholders and traders in West Timor.

Table 15 Cattle's Trade Retribution in the Districts of Kupang, Timor Tengan Selatan, Timor Tengah Utara, and Belu, NTT, 2005

Retribution Type	Value of Retribution (Rp per head)
Village retribution (<i>leges</i>)	17,500
Sub-District retribution	2,500
Slaughtered house (RPH retribution)	30,000
Traditional market retribution	12,000
Holding ground retribution	10,000
Cattle's Physical condition check-up	10,000
Send-out permit	15,000
Free disease authorization letter	10,000
Quarantine	10,000
Port handling and services	25,000
Total	142,000

Source : SMERU, 2006

5. Related industries and supporting structures

With the main market for Bali cattle being the Java live cattle markets (mainly Jakarta) the NTT beef industry needs a well functioning collection, market, quarantine and shipping sector. The port and quarantine and station at Tenau (Kupang) appear to function well although transport methods are crude. This form of shipping means that shippers are able to backload with containers from Java.

The Quarantine Office of NTT (Tenau Seaport, Kupang) has an installation facility of about 3.5 hectares for holding livestock before export. Bali bulls and breeding cattle usually spend one to two weeks in quarantine.

The Quarantine Office has the capacity to administer the following treatments during quarantine: physical checks and documentation; clinical observation for disease; isolation for sick cattle; antibiotics, mineral supplementation and vaccinations; total rejection of sick animals; confiscating livestock without the correct documents; slaughter of animals carrying highly infectious diseases; and provision of exit permit.

Quarantine charges are included below and represent a minor component of traders' total costs of buying, transporting and selling bulls from NTT in the Jakarta markets.

Table 16. Quarantine Cost in Quarantine Office of Tenau Seaport, Kupang, NTT, 2006

Item	Cost
Check-up service	Rp 2,500/head
Water transportation service	Rp 10,000/trip
Disinfections/fumigations	Rp 500/head
Vaccination	Rp 50/head
Curative/medical treatment	Rp 50/head
Diagnostic test	Rp 1,000/head
Weighting	Rp 50/head
Facility used service	Rp 500/head
Total	Rp 14,650/head

Source : Quarantine Office of Tenau Seaport, Kupang, NTT, 2006

Smallholder cattle production in NTT lacks a number of supporting structures and services that prevent improved returns. The most important of these are described below.

Poor access to finance from organised transparent finance providers

Smallholder farmers in NTT have little access to working capital for the purchase of store cattle for fattening, animal health products or crop inputs to grow feed (such as fertiliser, seeds and agri-chemicals). Without cash farmers rely on traders for the supply of store cattle and grow cattle on a “contract” or wage only basis. Cattle weights and prices are estimated at the time of purchase by the trader on collection from the farmer. In 2007 the price for a yearling bull (live weight 140 kg) was around 1.9 million rupiah. Traders can provide cash to smallholders if cash is required before cattle are ready to be sold. In this situation the “cost” of the advance can be very hard to determine for the smallholder and leaves them vulnerable to unreasonable terms.

Local banks are reluctant to lend to farmers due to the difficulty in determining ownership on family land with multiple owners therefore loan security is difficult to obtain. Farmers have also had a poor record of servicing loans in the past, exacerbated by government schemes that have allowed farmers to default easily on loans.

Local banks also lack an understanding of rural finance requirements and alternative approaches of providing farmers with finance and securing loans with assets other than land. A new model for cattle finance is being used with a local NGO (TLM Foundation, Kupang) and proving to be successful (see below).

TLM Foundation- Kupang

New trading arrangements have been used for the past three years by a number of NGOs. One such program, established by Tanaoba Lois Marekat (TLM Foundation), has a commercial cattle financing and trading enterprise that purchases cattle on behalf of smallholders from local markets, in effect providing secured finance to smallholders.

TLM work with clustered groups of farmers (each group consist of 10 – 20 small holders) at the village level with each member choosing a bull to be fattened based on their own preferences. All cattle have a seven to 10 day “replenishment” period at the TLM servicing post where the cattle are fed, watered and treated for any animal health problems. A three percent service charge is included and cattle are weighed at the time of purchase and sale at each location providing farmers with full information. The three percent charge covers the loan administration costs. The profits (sale less purchase price) are split 60/40 percent between the smallholder and TLM after six months and the process is repeated.

Smallholders usually receive around Rp 400,000 per animal. The share of the profit retained by TLM covers the cost of finance, transport of cattle from market to the client’s farm, health and veterinary services and cattle service posts expenses.

In 2007 TLM had an average 94 percent loan repayment for all TLM loan’s products (100 percent repayment on the cattle operation) after the first three years and is operating from ten locations across West Timor. Cattle loans are co-guaranteed by all members of the farmer group which means that in the unlikely case of a loss, the loss is shared by the other members of the group. Cattle are bought weekly from the main local market near Kupang and around 4,000 cattle are being traded through TLM per year. The objective for 2007 is to make the operation profitable so that it is economically sustainable.

TLM is also linked to a local church and 10 percent of the profit (from the bull sale) is donated to the church. The pattern to involve a local institution (religious institution) has proved to be a successful aspect of the program and has also worked well for other programs e.g., P4K Project (Credit Scheme for Smallholders Farmers and Fisheries) funded by IFAD in Bali.

Smallholders lack access to village based weigh stations.

All trading with smallholders is based on eye evaluated live-weights. Kupang fieldwork confirmed a lack of cattle scales at the main NTT cattle market in Camplong⁶. Due to the poor bargaining power of smallholders in the sale and purchase of cattle, smallholders are at risk of losing out to traders when these estimates are used.

A lack of weigh scales also prevents any accurate evaluation of feed types or farming practices that improve growth rates (apart from eye evaluations). Accurate cattle scales would be essential for a demonstration farm trialling improved feed types and encouraging the adoption of best practice.

Traders also need to cover the risk of inaccurate weight estimates and weight loss during shipment by ensuring profitable margins are secured at the buying end of the supply chain.

⁶ Weigh scales are located at the Tenau port quarantine station.

Village and market cattle scales may reduce this risk being factored into smallholder transactions.

A lack of coordinated breed improvement and genetic erosion

The beef industry in NTT lacks a beef cattle breeding sub-sector (stud breeders) that sell bulls for breeding purposes and instead the industry relies on smallholders selecting their own bulls for breeding. With the high demand and strong prices for Bali bulls in Java markets, the heaviest bulls tend to be sold and slaughtered before they have a chance to breed. Smaller bulls tend to be kept for breeding and therefore current marketing practices are eroding the genetic base of the breed in NTT. Farmers slaughtering animals as a gift for traditional celebrations also tend to select the largest youngest bulls.

Limited use of AI for breed improvement

Despite AI being in use in Indonesia since the 1970s there has been very low uptake of this technology. The main barriers with improving the level of uptake of AI by smallholders are:

- The low number of trained inseminators and low cow density in rural areas;
- Poor transport infrastructure making it difficult for inseminators to make timely visits to smallholders with cycling cows;
- The difficulty in handling cows that are farmed using extensive grazing systems;
- Calving problems with Bali cattle when larger farmed *Bos indicus* are used;
- The poor conception rates achieved through AI due to the problems above.
- The cost of using AI.

Usually, in country areas one inseminator would serve only one cow per day, though in communal animal housing the rate would be higher because of easier access to the cattle. Litik (2001) reported that AI is easier to introduce in cases of intensive management because the cows are housed and more manageable; in pastoral areas it is very difficult to apply because of untamed animals.

The semen of AI in Bali cattle is produced at the AI Centre in Singosari (Malang area in East Java Province) and distributed throughout the Eastern Island, but the genetic source of bulls for producing it is unknown.

There are two AI centres in Indonesia managing the country's entire supply of frozen semen for smallholders – Lembang (near Bandung) and Singosari East Java. In 2000 they produced 1.5 million doses of distributed frozen semen, including 50,000 doses of Bali cattle semen.

A low understanding of improved animal nutritional and poor extension services

Smallholders fattening cattle using a cut and carry system tend to rely on feed left over from crops and other feed sources such as tree branches (lequina) and native grasses (king grass and gala gala). There is a lack of on-farm research conducted on feed sources and farming practices that improve returns for NTT smallholders. Any research that is conducted is not well disseminated out to farmers through the local DINAS extension officers.

Current breeding practices are breeding cows randomly mated to bulls that aren't sold for slaughter. Typically the best/heaviest are slaughtered before being fully utilised as breeding bulls and their genetic merit is lost.

A lack of veterinarian services

Smallholders also lack animal health support from veterinarians and depend on traders (owners) and local NGOs to assist with sick cattle. In their cattle financing operation with smallholders, TLM has improved smallholder access to animal health remedies as a part of the three percent service charge to farmers.

A lack of support from research providers and training institutions

While there has been a number of national and internationally funded research trials into improving Bali cattle productivity, there is a considerable gap between the current level of knowledge and technology existing in research centres and knowledge being applied by smallholders. Bridging this gap requires closer coordination between science providers through the regional network of DINAS offices to improve extension services to smallholders. Analysis contained in the following section demonstrates that there are considerable economic benefits for improving extension services to farmers.

Poor infrastructure affects cattle trading

Section 4 includes a table showing the effect of high rainfall events on the supply of cattle and prices at Camplong market. Improved road infrastructure would improve smallholder options for the timing of cattle sales and reduce price fluctuations during the dry season when most farmers need to sell cattle. Poor road infrastructure reduces the supply of cattle to markets during the wet season. Farmers tend to sell during the dry season due to better access to markets and difficulties in feeding cattle through the dry period, the increased supply of cattle can depress prices. Improved road infrastructure would smooth out supply and price fluctuations.

A lack of marketing options for smallholders and traders

Unreliable electricity and water supplies are barriers to further investment in abattoirs and cold chain facilities in Kupang. One local beef processor estimated that the investment required to build a modern abattoir is around 100 million Rupiah. For local wet market and retail supply the most common practice is to slaughter cattle in simple abattoirs without power or water supply (e.g., Pak Albert (Aldia) and Pak Lambertus Samadara). These processors estimated that the cost for transporting meat using cold storage from Kupang to Jakarta is around 12 million Rupiah for a 20 foot container (18 tonnes) or around Rp700 per kilo which is a relatively low cost for beef that sells for over 30,000 per kilo in Jakarta wet markets. Local processors also believe that local taxes and local government regulations prevent them from investing in cold chain facilities.

Local government taxes may inhibit investment

The retribution charges demonstrate the number of charges incurred in the NTT cattle industry. Investment in improved infrastructure, abattoir and cold chains for improved marketing options has potential to increase returns to smallholders. Further work is required to test the financial feasibility of cold chain investment and evaluate whether the current tax structure is a significant barrier to investment.

6. Value Chain Costs Analysis

The following tables allocate costs and returns for smallholder farmers and traders. The estimates of value are based on a survey of industry stakeholders at the various steps in the

chain and verified with previous research undertaken in the sector. Assumptions have also been verified by industry stakeholders and experts working in the related sector.

The estimates of economic returns are shown below. Gross margins can be used as the first step involved in comparing the profitability of the different enterprises. The mathematics is simple – the direct or variable costs incurred in production are subtracted from the total income of the enterprise. They represent an indicative average, in reality weights and costs vary between regions and management. Gross margins are a simple means of comparing enterprises but care must be taken in interpreting the results, due to the following assumptions:

- That each enterprise is independent of all other related smallholder activities (in reality they're not);
- That each additional unit of production is worth as much, and costs as much, as the preceding unit;
- No account of interest or overhead expenses are accounted for.

6.1. Farming Returns

The tables below have been developed by surveying smallholder farmers and traders in West Timor. There can be variation in growth rates, prices and costs although the research team believe the figures to be indicative of beef cattle returns. The tables show that smallholders fattening cattle under traditional “wage only” arrangements generate a very low income. This situation can be exacerbated when traders provide forward payments prior to the sale and unknown interest deductions are made.

Table 17 Average Smallholder on traditional labour only fattening contract (six months)

Income (per head)	Unit	Volume	IDR/Unit	IDR	USD
2yr bull	kg	90	4,000	400,000	44
Total Income				400,000	44
Production Costs (per head)					
Labour feeding	days	180	15,000	2,700,000	300
Opportunity cost of hort crops	50% of feed area			75,000	8
Total Production Costs				2,775,000	308
Gross Profit/Margin per head				-	264
Gross Profit/Margin without labour				325,000	36

The table below shows that under more transparent trading/ farmer ownership arrangements with TLM, smallholders can earn around Rp 100,000 (25 percent) more from the fattening enterprise.

Table 18
Average Smallholder buying and fattening cattle through TLM finance (six months)

Smallholder farmer buying and fattening cattle for 6 months (selling at farm gate- TLM model)						
Income (per head)	Unit	Volume	IDR/Unit	IDR	USD	
2yr bull	kg	230	12,500	2,875,000	319	
Total Income				2,875,000	319	
Production Costs (per head)						
Purchase 18mth bull	kg	140	14,000	1,960,000	218	
Service charge TLM	3% of sale price		3%	58,800	7	
TLM margin share (debt repayment and servicing)			30%	256,860	29	
TLM donation to church			10%	85,620	10	
Transport	head	-	(paid by TLM)		-	
Village retribution	head	1	12,000	12,000	1	
Local market retribution	head	-	12,000	-	-	
Local market services	head		2,000	-	-	
Labour feeding	days	180	15,000	2,700,000	300	
Opportunity cost of hort crops	50% of feed area			75,000	8	
Total Production Costs				5,148,280	572	
Gross Profit/Margin per head (% Net Profit)				-	253	-79%
Gross Profit/Margin without imputed cost of labour (% Net Profit)				426,720	47	15%

Assumptions

1. The average smallholder has 1 hectare and uses 20% of farm area for cattle feed 50% of this area could be used for hort crops
2. The average gross margin from horticulture crops sold at local markets (e.g., sweet potato, carrot) is Rp75,000 on 0.1ha

Smallholder returns suffer from low cattle growth rates, especially during the dry season when feed availability is low. Knowledge on best management practices exist in research centres although extension work and uptake is low. Improved forage sources and crops are able to maintain cattle growth rates, or at least prevent live-weight loss. Table 5.9 also shows that heavier cattle are sold at higher prices per kilo. The table below demonstrates the improved returns available with best practice management.

Table 19
Impact of improved growth rates on smallholder returns (TLM model)

Liveweight gain (kg/day)	0.40	0.50	0.60	0.70
Days feeding	180	180	180	180
Purchase weight	140	140	140	140
Purchase price	1,750,000	1,750,000	1,750,000	1,750,000
Change in cattle liveweight	72	90	108	126
Sale weight	212	230	248	266
Price per kg LW	12,600	12,700	12,800	12,900
Sale price	2,671,200	2,921,000	3,174,400	3,431,400
Production Costs (excl.labour)	150,000	180,000	210,000	240,000
Profit Share/finance cost (40%)	368,480	468,400	569,760	672,560
Gross Margin per head (Rupiah)	402,720	522,600	644,640	768,840

The table below shows the average returns achieved from smallholders clustering breeding cows together and selling weaned calves. Breeding appears to be more profitable than fattening although incurs more risk with cow ownership (of cow or calf mortality), requires capital investment from farmers and requires more careful management to ensure cows calve each year.

Table 20 Smallholder farmers clustering breeding cows and selling weaned calves

Income	Unit	Volume	IDR/Unit	IDR	USD	
Breeding cows	10					
Breeding bull	1					
Calving rate	70%					
Mortality	20%					
Weaned calves	Bulls	2.8			-	
	Heifers	2.8				
Bull calves	kg	150	3	1,800,000	5,040,000	
Heifer calves	kg	135	3	1,620,000	4,536,000	
Total Income				9,576,000	1,064	
Production Costs						
Labour feeding	days	365	15,000	5,475,000	608	
Feed costs	days	3,650	1,000	3,650,000		
Total Production Costs				9,125,000	608	
Gross Profit/Margin without imputed cost of labour (% Net Profit)				5,926,000	658	62%
Gross Profit/Margin per head (% Net Profit)				592,600	66	62%

A number of previous studies have identified poor nutrition as a major barrier to improved breeding cow productivity. The table below uses the estimate of smallholder economic returns (above) to demonstrate the economic benefits possible with improved calving rates and reduced calf mortality. Both of these production parameters can be improved through improved nutrition.

Table 21 Impact of improved calving and survival on smallholder breeding returns

	Average Smallholder	Improved Smallholder
Breeding cows	10	10
Calving rate	70%	85%
Calf mortality	20%	10%
Weaned calves	6	8
Total Income	9,576,000	13,081,500
Total Costs (excl. labour)	3,650,000	4,986,161
Gross Profit/Margin (without labour)	5,926,000	8,095,339
Gross Profit/Margin per head	592,600	809,534
Increase in GM per head		37%

6.2. Trading Returns

Like many agribusiness value chains, much of the value of the product is often captured by the downstream middlemen and processors. The tables below show estimates of cattle trader margins at various levels.

The table below shows trading for small traders buying bulls at local markets, feeding them for a three week period and selling them on to larger traders that continue to fatten for shipment to Jakarta. These small traders act as highland village collectors and feed cattle on small farms closer to the Camplong market.

Table 22

Local trader/cattle finisher transporting cattle from farmers to large trader (Returns per head)

Income	Unit	Volume	IDR/Unit	IDR	USD
Bull sale at local market	kg	230	13,500	3,105,000	345
Total Income				3,105,000	345.00
Production Costs					
Bull purchase	kg	220	12,000	2,640,000	293.33
Transport from SH to trader farm	head	1	75,000	75,000	8.33
Feed costs	days	14	2,500	35,000	3.89
Mineral supplement	doses	2	5,000	10,000	1.11
Transport trader farm to large trader	head	1	40,000	40,000	4.44
Illegal retribution from trader farm to	head	1	2,000	2,000	0.22
Total Costs				2,802,000	311.33
Gross Profit/Margin (per head)				303,000	33.67

10%

The table below shows trader buying from the local markets on-behalf of larger traders/exporters and feeding cattle up to exportable weights. Exporters provide the finance for bull purchase, small traders purchase and feed the cattle, and the profits from bull finishing are split 50/50.

Table 23

Local cattle collector/finisher buying from local market selling to large trader (Returns per head)

Income	Unit	Volume	IDR/Unit	IDR	USD
50/50 split of value of weight gain	kg	60	13,500		
Share of profit		50%			
Share of profit	kg	30	13,500	405,000	45.00
Total Income				405,000	45.00
Production Costs					
Transport- market to trader farm	head	1	50,000	50,000	5.56
Parking fee	head	1	200	200	0.02
Feed costs	days	120	1,500	180,000	20.00
Mineral supplement	doses		3,000	-	0.00
Antibiotic	doses		5,000	-	0.00
Rope	head		5,000	-	0.00
Transport trader farm to Quarantine	head		40,000	-	0.00
Illegal retribution from trader farm to l:	head		2,000	-	0.00
Transport to Jakarta					
Total Costs				230,200	25.58
Gross Profit/Margin (per head)				174,800	19.42

43%

The estimate of returns shown below demonstrates that if large traders can finance full shipments of Bali cattle (usually 42 per shipment, and around 250 per ship) then the trading business can be very profitable. Larger traders can ship up to 1,000 cattle per month.

Table 24

Local cattle traders buying bulls for Java market (Returns per shipment)					
Income	Unit	Volume	IDR/Unit	IDR	USD
Liveweight loss- shipping (10%)	kg	28			
Sale of live bull in Jakarta	kg	252	18,000	4,536,000	504
Total Income				4,536,000	504.00
Production Costs					
Bull purchase	kg	280	13,000	3,640,000	404.44
Loss on sale weight estimate 5%	kg	14	13,000	182,000	20.22
Market retribution	head	1	12,000	12,000	1.33
Service fee (handling)	head	1	2,000	2,000	0.22
Illegal retribution (7 posts)	head	1	7,000	7,000	0.78
Transport to quarantine from camp lo	head	1	25,000	25,000	2.78
Quarantine service	head	1	10,500	10,500	1.17
Transport to Surabaya	head	1	264,500	264,500	29.39
Transport to Jakarta	head	1	225,000	225,000	25.00
Bonus for safe delivery- Sby	hd/shipment	42	200,000	4,762	0.53
Bonus for safe delivery- Jkt	hd/shipment	42	1,160,000	27,619	3.07
Total Costs				4,400,381	488.93
Gross Profit/Margin (per head)				135,619	15.07
Gross Profit/Margin (per weekly shipment of 42 bulls)				5,696,000	632.89

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The final table is an estimate of returns for a local Kupang processor buying cull cows and slaughtering for local retailers and wet markets in the small Kupang market.

Table 25

Local beef processor slaughtering cull cows for Kupang market					
Income	Unit	Volume	IDR/Unit	IDR	USD
Value of finished processed meat products		1.00			
Deng deng, Sei, Primal cuts, lower value cuts and small goods and offal					
Fermented Cocoa Beans (12%)	Per cow	1.00	2,100,000	2,100,000	233.33
Total Income				2,100,000	233.33
Processing and Marketing Costs					
Cull cow purchase at local market	kgLW	150	10,000	1,500,000	166.67
Transport to slaughterhouse	Per cow	1	20,000	20,000	2.22
Retribution- marketplace	Per cow	1	14,000	14,000	1.56
Retribution- slaughter	Per cow	1	10,000	10,000	1.11
Retribution- illegal	Per cow	1	8,000	8,000	0.89
Slaughter labour	Per cow	1	8,000	8,000	0.89
Halal slaughter service fee	Per cow	1	2,500	2,500	0.28
Processing (butchering)	Per cow	1	250,000	200,000	22.22
Marketing and transport	Per cow	1	220,000	180,000	20.00
Total Costs				1,942,500	215.83
Gross Profit/Margin				157,500	17.50
Cows slaughtered per year	1,872				
Total Gross profit/margin				294,840,000	32,760.00

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7. NTT Beef Cattle Value Chain Table – From Smallholder Perspective

This section uses the approach to value chain analysis outlined in the previous section to define the main observations and issues that exist in the palm oil industry. These issues are considered the main barriers to improving smallholder returns. The table includes recommended strategies to address the issues with IFC TA intervention. These strategies are expanded in a later section.

Table 26 Beef Cattle Value Chain Table

INBOUND LOGISTICS		
Observations	Issues	Recommended Strategies
HUMAN RESOURCE MANAGEMENT		
<p>Smallholders have traditional experience in breeding and fattening Bali's cattle.</p> <p>Smallholder farmers live in subsistence conditions and have poor business/cash flow management skills resulting in low savings and farm working capital.</p> <p>As well as pastoral grazing smallholders feed cattle cultivated King Grass, Gala-gala, Lequina tree branches, Sweet Potato and Cassava.</p> <p>Smallholders utilise family and other villagers for labour to feed cattle and cultivate feed crops.</p>	<p>The purchase of fattening cattle breeding stock require high levels of capital increased exposure to risk (calf mortality).</p> <p>Smallholders received low level of income from beef cattle and a lack of budgeting skills exacerbates poor access to finance.</p> <p>There is very limited other employment opportunities in remote areas where families rely on cattle as their sole source of income.</p>	<p>Engage ACIAR to identify specific production and animal health issues and constraints to production.</p> <p>Investigate TLM's model of farm finance and survey other NGO's that maybe able to access and develop other schemes.</p> <p>Investigate with ACIAR opportunities for farmers to diversify the feed crops in order to increase the weight of the cattle (fattening activities). Design a demonstration farm with farmer groups to trial improved feed and integrated cropping systems.</p> <p>Assist the farmers to maximize their allocation of time not only for raising cattle but also producing high value commodity crops to support their income and diversify the risk.</p>

TECHNOLOGY AND DEVELOPMENT		
<p>Local government regulations make it illegal to slaughter productive female cattle. Farmers and traders often maim cows so that they have cull cow status.</p> <p>The industry lacks a breeding sector or a functioning AI service</p> <p>Inferior bulls are used for breeding as the heaviest (and often genetically best) bulls are sold for high prices.</p>	<p>Anecdotal and secondary data suggests that the totals NTT cattle herd is declining reducing the ability of the region to supply the traditional market with Bali bulls.</p> <p>The use of inferior bulls for breeding is eroding the genetic base of the NTT cattle herd.</p>	<p>Engage ACIAR and the local DINAS to investigate in more depth the long-term impacts (including economic analysis) of the current regulation against heifer slaughter (i.e., What incentives does it create? Is it actually beneficial for the industry in the long-run?)</p> <p>Work with DINAS, AI research centre in Singosari and ACIAR to investigate the establishment of a nucleus of intensive stud breeding farmers (select groups of current farmer associations with breeding cows) to use AI and improve the genetic merit of Bali breeding bulls. Establish premium sale prices for stud bulls, demonstrate the benefits of improved genetics to smallholders, and work with A2F program and existing finance providers to finance farm groups into bull purchase.</p>
PROCUREMENT		
<p>Farmers lack cash to purchase calves and agri-inputs for forage crops.</p> <p>Existing breeding cow herds appear to have relatively high fertility with around 65-80 percent calving rate per year.</p>	<p>Traders provide finance for cattle and smallholder wage-only agreements put smallholders in weak selling position and low finance cost transparency.</p>	<p>Work with A2F to improve effectiveness of existing farmer finance organisations.</p>

OPERATIONS (Production)		
Observations	Issues	Recommended Strategies
HUMAN RESOURCE MANAGEMENT		
<p>Small holders use traditional patterns of grazing and fattening cattle with very poor growth rates, especially during the dry season.</p> <p>Farmers lack knowledge of best practices for cultivating the best feed crops.</p> <p>Most NTT smallholders are heavily reliant (over 80 percent) on cattle for cash income.</p>	<p>A lack of knowledge of best practice and new technology constrains productivity growth.</p> <p>Heavy reliance on cattle and poor cashflow leaves farming families vulnerable to risk.</p>	<p>Farm demonstration program in collaboration with ACIAR to trial crops and feed types to improve dry season nutrition, farmer knowledge and adoption of best practice.</p> <p>Work with ACIAR on demonstration farm to investigate (including economic analysis of marketing options) and develop integrated cropping and cattle systems to improve smallholder cash income over the entire year.</p>
TECHNOLOGY AND DEVELOPMENT		
<p>Cattle feeding systems rely on traditional cropping and grazing systems with the lack of information about nutritional value.</p> <p>The current breeding sector relies on a narrow genetic base for breed improvement. Narrow breed lines and interbreeding is common.</p>	<p>Existing research and best practice on feed crops and animal husbandry practices constrain productivity growth.</p> <p>A lack of selection for productivity and liveweight gain and limited or no access for farmers to new breedlines through AI (artificial insemination) is a constraint to productivity growth and improved smallholder returns.</p>	<p>Link with ACIAR to disseminate best practice cultivation and management of feed crops and pasture management.</p>

OPERATIONS (Production)		
Observations	Issues	Recommended Strategies
PROCUREMENT		
<p>In NTT's climate the soils are well suited to producing Bali beef cattle and with traditional knowledge and experience the quality of cattle in NTT is very high.</p> <p>Small holder's lack access to finance for procurement for fattening cattle.</p>	<p>Small holder farmers rely on traders and large buyers to purchase the fattening cattle on their behalf which leaves them exposed to weak bargaining position and agreement on prices (typically profit are split 50 : 50 between small holders and traders)</p>	<p>Consult to the existing stakeholders and NGO's to expand existing cattle credit scheme (e.g., BRI).</p>

OUTBOUND LOGISTICS		
Observations	Issues	Recommended Strategies
HUMAN RESOURCE MANAGEMENT		
There is a lack of skills within the industry for slaughter and processed meat.	Only few local slaughtering and processing meat companies in NTT.	Work with existing slaughtering company to improve slaughter and processing skills and investigate whether direct buying linkages can be made with farmer groups to improve information flow and prices to smallholders.
TECHNOLOGY AND DEVELOPMENT		
Lack of investment and improve slaughtering facilities such as water, electricity and buildings. No cold chain marketing channels from NTT to the market in Jakarta. Lack of weigh scale facilities for small holder farmers at the village level.	Lack of technology and limited investment in cold chain facilities limit NTT's beef industry to supplying Jakarta's live beef market. Cattle sales from the smallholders to buyer based on eye evaluation of liveweights which requires trust and skills. This trust does not always exist.	Economic analysis of investing in the cold chain supply for chilled and frozen meat to traditional and non traditional markets. Work with existing NGO's to provide village based weighing scales in major fattening areas (TTS, TTU, Kupang and Belu). Funding through Sub Program 1 (KDP's projects).
PROCUREMENT		
Smallholders lack alternative sources of income for cash and forced to sell cattle when they need cash for family routine expenses.	Cattle are not sold at optimal weights reducing returns to smallholders.	Collaborate with existing NGOs and ACIAR SP3 to develop alternative sources of income for smallholder farmers and improve timing of cattle sales.

MARKETING AND SALES		
Observations	Issues	Recommended Strategies
HUMAN RESOURCE MANAGEMENT		
<p>Current large scale buyers and traders have strong networks with Jakarta buyers and long experience in trading cattle.</p> <p>Traditional experience with growing and trading cattle means that intermediaries have high skills and knowledge of trading industry.</p>	<p>Established players and existence of strong networks makes it difficult for new entrants to enter the industry.</p> <p>Jakarta live cattle buyers have strong networks and can collaborate on price and access to markets.</p>	<p>Establish a training program with ACIAR, BDS providers, farm associations and groups and DINAS to train farmers in farm budgeting and savings so that they can choose to sell cattle at optimal times rather than when cash is required.</p>
TECHNOLOGY AND DEVELOPMENT		
<p>Current slaughtering and processing facilities are very crude with poor hygiene and butchery standards.</p>	<p>A lack of investment to improve slaughtering in cold chain results in limited marketing option for the industry.</p>	<p>Investigate feasibility of working with BEE and an existing local processor (see list of contacts) to invest in improved slaughter facilities and cold chain for chilled or frozen beef to Jakarta retail markets. Ensure that beef export business includes traceability to villages and involve farmer groups in supply channels. New business will improve returns for supplying farmers (providing animal specs are met) and create local employment).</p>
PROCUREMENT		
<p>There is strong demand for traditional Bali beef cattle in Jakarta retail and wet markets.</p> <p>Consumers in Jakarta markets prefer fresh Bali cattle beef than frozen beef.</p>	<p>Producers supply products relative to what they receive at the farm gate.</p> <p>Consumer perceptions on fresh versus frozen beef is viewed as a barrier to developing frozen or chilled trade to Jakarta.</p>	

SERVICE		
Observations	Issues	Recommended Strategies
HUMAN RESOURCE MANAGEMENT		
<p>Business environment is not conducive to encouraging new investment in slaughtering and processing facilities.</p> <p>A lack of support from local government and bureaucratic rules and policy of redistribution (multi-level informal and formal taxes) makes the business operating environments very difficult.</p>	<p>A lack of investment inhibits further market development (or more profitable markets) and investment in R&D reducing industry development and returns to smallholders.</p>	<p>Investigates avenue to improve industry related local government policies through other SADI Sub Program's by capacity building of local government to develop sound agricultural policy.</p>
TECHNOLOGY AND DEVELOPMENT		
<p>Crude transportation system of live shipment cattle to Jakarta.</p>	<p>Crude shipment method cause significant live weight losses during transportation (10 – 15 percent)</p>	<p>Collaborate with ACIAR to develop recommendation on best practice management of cattle during shipment from NTT to Jakarta.</p>
PROCUREMENT		
<p>Farmers have limited (no access) to purchase cattle and inputs for feed crops and pastures.</p>	<p>The farmers rely on trader for credit and supply of fattening cattle and are exposed to unfair transactions.</p>	<p>Consult with existing stakeholders and NGO's to expand existing cattle credit scheme.</p>

8. Summary of Industry Potential, Issues and Recommendations

8.1. Industry Potential

The sector profile and value chain cost analysis outlined in previous sections have identified the potential for improved smallholder returns in the NTT beef industry. The main factors that create this potential for NTT smallholders are summarised below.

- Beef cattle are a traditional farming enterprise for smallholders in NTT with a well established system of buying and selling cattle and established marketing networks in major markets.
- There is current strong demand for NTT beef in Jakarta and market trends indicate that demand for beef is increasing as a growing middle class prefer beef over alternative and traditional sources of protein.
- In addition to favourable market conditions, beef from Bali cattle are favoured over cross bred and imported boxed beef in Jakarta markets. NTT has the right genetic base for increasing Bali cattle production.
- New forms of finance for smallholder cattle purchase have been tested and have potential for further expansion providing farmers the opportunity to improve returns and remove them from unfair trading practices with traders.
- With improved knowledge and access to inputs for increased forage production and/or improved use of integrated cropping systems, smallholders have the potential to improve dry season nutrition for cattle and improve productivity.
- Local DINAS estimate that there are large areas (over 750,000 hectares) of undeveloped land that have potential for cattle grazing, although this land should only be developed if sustainable land management practices are employed and additional indigenous forest is not cleared.
- Continued strong demand for Bali cattle in Java will be important for smallholder returns. Current exchange rate and market conditions are favourable for producer prices. Supplies and the landed price (dependent on world beef prices and IDR exchange rate) of imported beef will affect returns in the future.

8.2 Industry Issues and Value Chain Analysis

The following points summarise the main issues for the NTT beef cattle industry, as they relate to the needs of smallholders.

- Traditional cattle ownership and a lack of access to finance for cattle purchase leave smallholders vulnerable to unfair trading practices. Current selling arrangements do not facilitate the flow of price/weight market information.
- A challenge to making an assessment of industry potential in NTT is that the information found in secondary data and previous reports is not always congruent with the information collected in field research. However, the field work and review of previous studies on Bali cattle would suggest that smallholders in NTT do not hold comparative advantage in producing beef for export to Java over producers from other regions. This conclusion is based on the following:
 - h. poor productivity, poor nutrition, low growth rates and high calf mortality, although Bali breeding cows have high natural fertility;
 - i. poor access to finance for smallholders to purchase cattle and inputs for forage production;
 - j. low feed growth, poor pasture management and low liveweight gains during the dry season;
 - k. poor roading infrastructure and proximity to end markets;
 - l. a lack of processing capacity for added value activities and cold chain facilities to provide smallholders and traders with alternative marketing options;
 - m. unattractive investment climate due to high local taxes and opaque cost structures; and
 - n. heavy reliance on Jakarta for beef returns and high transportation costs to this important market.
- A lack of weighing stations at village level leaves farmers with a lack of information on cattle purchase/sale weights and prices, rate of weight gain and results in a high degree of mistrust within the industry.
- A lack of a breeding subsector results in poor understanding and development of improved cattle genetics and the use of inferior bulls and dams for breeding. The industry requires a cohesive strategic direction for breeding and dissemination of improved Bali cattle genetics to maintain current gene pool and prevent further erosion of the breed.
- Cattle productivity is very low resulting in poor returns to farmers and risk of further unsustainable herd off-take.

- Training and extension services to smallholders are very limited. Traders also need to be engaged in improving the quality and productivity of local cattle. The economic benefits for all industry players need to be clearly identified in this process to create buy-in. The network of regional DINAS offices have a crucial role to play in extension and do not currently engage with research providers.
- Cultural obligations to provide cattle for traditional celebrations can inhibit development of the breed and limit returns to smallholders.
- A decreasing NTT herd size caused by unsustainable slaughter rates, poor productivity and increasing use of traditional cattle land being used for horticultural crops.
- With existing cattle traders generating profitable returns from trading cattle it can be difficult for new entrants to supply beef to the Java market due to the strong networks that exist.

8.3 Recommendations for IFC TA

The following points summarise the key recommendations made in the value chain analysis. The recommendations are aimed at establishing a TA program that can improve smallholder returns over a ten year period. The recommendations focus on the following general areas so as to improve:

smallholder credit conditions;

- smallholder trading conditions and bargaining position;
 - animal nutrition, cattle productivity and farm management practices;
 - smallholder management of crops; to be grown with beef to improve ability of the whole farm system to generate cash for smallholders;
 - the genetic base of the industry and reduce the decline in regional herd numbers.
- The NTT beef industry does not contain a “lead firm” of significance with which IFC SADI could investigate developing a partnership to implement TA interventions. IFC SADI should collaborate with the BEE program to investigate the needs and requirements of existing beef processors and traders. Investigate opportunities to work with existing SME’s involved in trading and local processing to test the economics and feasibility of investing in cold chain facilities for added value export to Jakarta.

This process may identify opportunities to improve supply chain channels, provide opportunities to link smallholder farmer groups to traders and processors and provide improved insight on industry issues and the social networks that the industry relies upon for successful trading.

- Conduct a detailed study of NTT social structures and how this affects the growing and trading of cattle in the province. Incorporate the new knowledge of social structures into project planning and implementation and develop methods

of utilising the favourable aspects of this structure for the benefit of smallholder beef farmers.

- Investigate new models of smallholder cattle finance and investigate opportunities to partner and develop commercial livestock financing operations with new and existing finance providers. For example:
 - Engage BDS providers to train loan appraisers and improve operating procedures for the TLM Foundation to move the lending operation from an aid program into commercial and financially sustainable livestock financing operation.
 - Work with farmer groups and associations to explore joint security credit schemes.
 - Explore the feasibility of tripartite lending operation with farmer groups, a local bank and a large cattle exporter (e.g., Pak Daniel of Kupang). Use farmer groups to implement a demonstration farm and a program for improved farm management.
- Collaborate with ACIAR and BPTP to establish a demonstration farm with selected farmer associations or groups to identify key on-farm productivity barriers to improving smallholder returns : e.g.,
 - Explore improved dry season forages to improve cattle growth rates and breeding cow milk production, calf survival and cow conception rates.
 - Investigate animal health requirements for breeding cows.
 - Improved pasture, grazing management and better.
 - Improved breeding and fattening practices.
 - Implement farmer training on budgeting
 - Investigate integrated cropping systems where farmers can utilise crops (including tree crops) that can be grown well with cattle grazing or used for forage.
- Collaborate with BEE to verify whether current regulations and taxes are in-fact a barrier to further investment in the industry (i.e., processing and cold chain).
- Evaluate the impact of local taxes (retribution) on internal trade (trade being essential for generating wealth) explore more efficient means of raising government revenue through BEE.
- Conduct a feasibility study, including market analysis and capacity study, for an investment in a Kupang abattoir and cold chain to the Jakarta market for chilled and frozen meat trade.
- Collaborate with KDP Sub-program 1 to improve NTT road infrastructure to overcome wet season supply constraints and provide technology to clustered farmers (e.g., village based weigh stations, AI services). Any central or village

based cattle scales should be provided as a service on a commercial basis – utilise existing cattle buying and trading companies e.g., local traders and NGOs would provide the best avenue for a sustainable TA intervention of this type.

- Conduct a survey of Jakarta based live cattle buyers to identify key requirements for NTT beef industry to improve bull prices and returns to smallholders.
- Collaborate with ACIAR to evaluate current practices for live shipment of cattle to Surabaya and handling of cattle at central markets to develop improved practices for shippers to reduce live-weight losses and minimise animal welfare issues.
- Engage local DINAS to review current services to smallholders and encourage DINAS extension workers to become involved in demonstration farm trials to develop improved extension services to smallholders and improved local policy development.
- Establish a nucleus breeding operation that can access superior Bali genetics and encourage farmers to become involved in commercial beef breeding enterprises. Work with ACIAR and existing NGOs that are working with farmer groups to establish an nucleus herd and begin progeny testing bulls to identify superior genetics.

Any work to improve the utilisation of AI should focus on a nucleus breeding herd with farmers interested in breeding stud bulls rather than as a technology for widespread adoption amongst smallholders. The challenges of increased adoption of the technology by smallholders are too great to justify inclusion in an IFC SADI TA program.

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