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Final report

Contents

1 Acknowledgments

The authors would like to acknowledge the contributions made by the various organisations involved both the private sector and the public in Australia and Indonesia. Without their valuable contribution the findings in this report would not have been possible. These organizations, among others are: MLA, AFPINDO, PPSKI, NAMPA, ASPIDI, Ministry of Agriculture, I-CARD and YLKI.

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We are also appreciative of the cattle farmers, traders, importers, supermarkets' managers, beef processors, and abattoirs managers who generously gave up their time and knowledge when participating in our interviews, surveys and workshops.

The regional data was collected and analysed by the regional BPTPs and ICASEPS in cooperation with the CSU staff. The data were crosschecked and where necessary adjusted and improved to reflect as closely as possible the reality in the project regions. The final responsibility for the accuracy of the data remains with the regional experts.

2 Executive summary

The beef industry is critical in Eastern Indonesia. The recent past was characterised by increasing beef prices and demand for cattle, a decrease in cattle inventories, increased competition with imports, especially in the traditional target market Jakarta. The project aims at understanding the supply chain of beef products and being able to make a comparative analysis through benchmarking as a basis for effective engagement of future activities. The project covers the complete supply chain from on-farm beef cattle production to the consumer as well as five project regions: NTT, NTB, South Sulawesi, East Java and Jakarta as the main market.

A *farm level* data set of 23 typical cow-calf and beef finishing enterprises was generated and analysed. A detailed comparative insight into productivity and economic performance and their differences was obtained and gaps in farm data and production information were identified. Further, the project partners and the data sets generated became part of the global network agri benchmark.

A *beyond-farm* supply chain survey on nine levels comprising a total of 131 interviews with key decision makers and businesses – aiming to cover at least 75 percent of the produce on each level – as well as 216 consumers was conducted and information and data analysed in the first step, including legal and economic framework conditions. In a second step, this overview information was complemented by detailed analysis of eight typical supply chains in the project regions, identifying costs, returns and profitability on each level. Methods, working steps, training in benchmark tools and results were discussed and presented in five project workshops, parts of which were public and involving the stakeholders of the beef sector.

The *results* show that the beef sector is characterised by strong demand for beef, driving prices up and in some areas stripping the productive basis where herd and productivity growth cannot keep pace with demand. Present policy is rather cattle-supply oriented than targeting the drivers like cash requirements of farmers or improving efficiency throughout the supply chain. Small farms around five cattle dominate, farm level productivity is below potential and low when compared internationally. Beef prices, sometimes costs and in most cases profitability are high throughout the supply chain, beef production and trade is presently considered good business by the majority of the actors. Supply shortages – not just seasonal – are reported and compensated for by increasing imports of beef and live cattle (for finishing in feedlots) mainly coming from Australia, especially in the Jakarta market which becomes less important for beef from eastern Indonesian origin. Future improvement of hygienic conditions appears crucial to consumers as well as for beef sellers and traders in the supply chain.

Due to the character of the project, its *impacts* are mainly on the market intelligence side and appear on various levels: a) project partners and actors through the supply chain: improved understanding of the big picture, driving forces and functionalities of the beef supply chain as well as its international context, b) policy makers: initiation of ideas of how to better target beef policies in Indonesia and c) farmers: ideas about their farm performance (compared to others) and market implications of their activities, d) domestic traders of beef and live cattle, importers, processors and supermarkets: market drivers, directions and options. Further, future impacts can be expected in case the recommendations below are taken into account.

Future *action* and *recommendations* comprise: a) the improvement of herd, production and trade statistics as well as the establishment of a market information system based at a research institution, b) to target policies and projects towards incentives and driving forces, c) the development of local markets instead of focusing on the Jakarta market, d) the creation of a national Beef Forum as a platform for professional exchange of information, expertise and technologies, and e) the implementation of economic analysis in production-oriented research and development projects.

3 Background

The eastern Indonesian beef supply chain is comprehensive and complex on various levels:

1. The spatial extension of the country. Live cattle and beef is traded throughout vast spaces, mainly from East to West and North of the country.

2. The lack of infrastructure in terms of suitable roads, boats and trucks for live cattle transport as well as cool chains for beef transports.

3. The bi-polarity of supply, characterised by a large number of small-scale farmers with less than five cattle on the one side and large-scale feedlots with thousands of animals, mainly in the regions of West Java and South Sumatra (Lampung).

4. Various value chain components are intertwined with different markets (urban, rural, wet markets, retailers), different logistics (road, rail, boat), and a variety of inter-mediatory partners (traders, collectors).

The following section identifies four key components to provide the background of the study.

3.1 Inventory and production

Cattle are produced in all provinces in Indonesia except in the capital, DKI Jakarta. Figure 3.1 shows the top 10 cattle production provinces in Indonesia in 2009, their share in national production and their growth compared to 2005 figures. East Java, Central Java and South Sulawesi have a share of 27 percent, 12 percent and 6 percent, respectively. According to the DG Livestock figures, the greatest growth for the period 2005 to 2009 was achieved by East Java, North Sumatra and NTB.

Figure 3.1   **Top 10 cattle inventory provinces in Indonesia in 2009**

Province / region	2002	2003	2004	2005	2006	2007	2008	2009*	% to national inventory	2009 vs 2005
East Java	3,312,015	2,516,777	2,519,030	2,524,476	2,584,441	2,705,605	3,384,902	3,394,089	27%	34%
Central Java	1,337,758	1,345,153	1,357,125	1,390,408	1,392,590	1,416,464	1,442,033	1,529,991	12%	10%
South Sulawesi	751,277	737,538	627,981	594,316	637,128	696,615	703,303	703,965	6%	18%
Bali	523,870	539,781	576,586	590,949	613,241	633,789	668,065	688,373	5%	16%
Aceh	701,356	701,777	655,811	625,134	718,623	784,053	641,093	688,118	5%	10%
NTT	502,589	512,999	522,929	533,710	544,482	555,383	573,461	584,620	5%	10%
NTB	403,666	419,569	426,033	451,165	481,376	507,836	546,114	567,219	5%	26%
West Sumatra	546,864	583,850	597,294	419,353	440,641	450,823	469,859	476,263	4%	14%
Lampung	380,697	387,350	391,846	417,129	401,636	410,165	425,526	436,164	3%	5%
North Sumatra	248,375	248,673	248,971	288,931	251,488	384,577	388,240	394,064	3%	36%
Total to 10 provinces	8,708,467	7,993,467	7,923,606	7,835,571	8,065,646	8,545,310	9,242,596	9,462,866	75%	21%
Other provinces	2,589,158	2,510,661	2,609,283	2,733,741	2,809,479	2,969,561	3,014,008	3,140,294	25%	15%
Total	**11,297,625**	**10,504,128**	**10,532,889**	**10,569,312**	**10,875,125**	**11,514,871**	**12,256,604**	**12,603,160**		**19%**

Source: DG Livestock, 2010. 2009 figures are preliminary. (http://ditjennak.go.id)

3.2 Consumption

According to Rabobank (2008), beef consumption per capita per year in Indonesia is at 1.71 kg for 2004-2006, a very low consumption rate that is equivalent to a three week average Australian consumption. Though per capita consumption per year figure appears very low, given Indonesia's huge population (around 230 million in 2008), the national figure for beef consumption is relatively high. This and the growth potential makes the country interesting for exporters like Australia. Total beef consumption is around 380,000 tons while beef imports including imported live cattle accounted for 107,000 tons or 28 percent, mostly from Australia and New Zealand (Jakarta Post, 12 March 2009).

Among south-eastern Asia countries, Indonesia's beef per capita consumption is the lowest (Figure 3.2).

Figure 3.2   **Per capita consumption of beef in SE Asia countries**

Country	Food supply quantity Bovine Meat (kg/capita/yr) (2005)	Yield/Carcass Weight (kg per animal) (2008)	Production (tonnes) (2008)	Producing Animals/ Slaughtered (Head) (2008)
Indonesia	**1.89**	**176**	**352,413**	**2,000,000**
Brunei Darussalam	8.19	150	2,400	16,000
Cambodia	4.82	120	62,400	520,000
Lao People's Democratic Republic	7.08	135	26,000	193,000
Malaysia	6.57	113	22,453	198,000
Myanmar	2.70	147	139,603	950,299
Philippines	3.42	234	180,035	767,935
Singapore		292	35	120
Thailand	4.89	200	241,995	1,209,977
Timor-Leste	1.99	100	1,100	11,000
Vietnam	2.89	172	206,145	1,200,000
South-Eastern Asia		**175**	**1,234,579**	**7,066,331**

Source: http://faostat.fao.org

Production growth was around 5.5 percent during that period. According to the Ministry of Agriculture, production is expected to further increase by as much as 7.3 percent per year by 2014 and thus serve the government's goal to be self-sufficient by 2014. Figure 3.3 shows the growth of beef production, imports and the population during the period 2005 to 2008 as well as the government's prediction until 2014.

Figure 3.3   **Beef production, imports and population growth in Indonesia 2005 – 2014**

	2005	2006	2007	2008	2009	2010	2014
Indonesia Population (000)*	219,852	222,747	225,642	228,523	231,370	234,181	245,021
Beef - Local Production (000 ton)**	217.4	259.5	210.8	233.6	250.8	411	546
Imported Live cattle (beef equivalent)**	55.1	57.1	60.8	80.4	72.8	n/a	n/a
Imported Beef **	21.5	25.9	50.2	57.2	64.1	n/a	n/a
Imported Offal**	34.7	36.5	13.8	12.9	10.6	n/a	n/a

Sources: * *BPS, 2009. Revised figures based on population projection of Indonesia, 2005-2014 (http://demografi.bps.go.id/)*

        ** *2005 - 2009: DG Livestock, 2010. 2009 figures are preliminary. (http://ditjennak.go.id) 2010 - 2014: Ministry of Agriculture, 2009. Rancangan Rencana Strategis Kementrian Pertanian 2010-2014*

3.3 Prices

The price developments shown below are for rice and beef (Figure 3.4). Other than beef, rice is a staple food for which a self-sufficient policy was introduced before the beef sector. However, the conditions in both sectors are different. Despite the self-sufficiency policy for rice production, the annual rice price increase was above the beef price increase. During the period 2001 to 2010 the beef price increase was approximately 9 percent per year but 12 percent per year for rice. The highest annual beef increase of 15 percent took place in 2006 while rice prices soared by 28 percent compared to 2005.

Figure 3.4   Price development

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010***
Beef (Rp/kg)	29,495	34,212	34,704	35,781	39,843	45,838	49,877	57,259	64,405	65,236
Rice (Rp/kg)	2,449	2,842	2,759	2,795	3,394	4,360	5,062	5,444	5,712	6,322

2010   Average monthly price up to July 2010*
Source: Ministry of Trade, cited in Kompas 12 Agustus 2010

Compared to its neighbouring countries and in a south-eastern Asia context, Indonesia has a relatively high producer price for live cattle and cattle meat (Figure 3.5). Its prices are in the top three after Singapore and Brunei Darussalam while its GDP is rather at the bottom of the league, less than 10 percent of the GDP of Singapore and Brunei Darussalam.

Figure 3.5   Producer price of meat and live cattle in Indonesia and other SE Asia countries

Country	Producer Price Cattle Live Weight (US$/tonne) (2007)	Producer Price Cattle meat (US$/tonne) (2007)	Population (2009)	GDP per capita (2009)
Indonesia	**2,725**	**5,450**	**240.27**	**2,200**
Brunei Darussalam	3,705	7,410	0.40	36,700
Cambodia	896	1,629	14.81	800
Lao People's Democratic Republic	532	1,063	6.32	900
Malaysia	1,821	4,791	28.32	6,800
Myanmar			50.02	500
Philippines	1,437	2,873	91.98	1,700
Singapore	5,058	10,761	4.99	35,500
Thailand	1,627	2,169	67.76	3,900
Timor-Leste			1.13	500
Vietnam			88.07	1,100

Source: http://faostat.fao.org/

It should be noted that there is substantial seasonal price variation. Beef prices usually increase during the religious holidays and festivals, in particular during the fasting season of Ramadan. As Indonesia is an archipelago country, to manage beef supply distribution across the country is not an easy task. It is common that during the festival period the beef supply in certain region cannot response quickly to the increasing demand.

3.4 Self sufficiency policy

The Indonesian government is aware of the country's dependence from beef imports. Its policy aims to increase the domestic beef supply and lower the price of medium-quality beef. Aiming for self-sufficiency by 2014, the government launched a Rp 2 trillion (USD 214 million) plan to increase domestic beef production (Jakarta Post, 2010).

It is not clear what the main drivers are that lead Indonesian government to pursue self sufficiency in the beef sector. According to Ilham (2006), reasons to improve beef supply and achieve self-sufficiency are (1) the livestock subsector growing faster than the average agriculture production (3.2 percent per annum versus 2 percent per annum), (2) more than 6.5 million households are involved in the sector, (3) cattle production is important for the regional economy in both urban and rural areas, and (4) to support the national food security system. The regulation of the Minister of Agriculture no 59 (Peraturan Menteri Pertanian Nomor: 59/PERMENTAN/hk.060/8/ 2007) mentions the following motives to promote self-sufficiency in the beef sector:

- To strengthen and optimise smallholder beef production

- To reduce import of beef and live cattle

- To save foreign exchange reserves

The document raised some doubts. According to Patunru and von Luebke (2010, p.27), the concept of food self-sufficiency has limited economic rationality and not sensible in the context of beef sector in Indonesia due to Indonesia's limited land resources. Further, part of the self-sufficiency program is to provide subsidised bank loans for domestic cattle farmers and breeders. There are some controversies about this credit scheme. The Indonesian Cattle and Buffalo Farmers Association argue that even with the credit subsidy, the goal is not realistic and contradicts with the current government import policy (Kompas, 2010). This view is shared by Tawaf (Pikiran Rakyat, 2010) and Muladno (Trobos, 2010).

The present **trade policy** is addressed in Section 7.1.3 together with some trade statistics.

4 Objectives

The beef industry is critical in eastern Indonesia. Understanding the supply chain of beef products and being able to make a comparative analysis through effective benchmarking will provide valuable knowledge, enabling more effective engagement of future activities.

Main objectives of the project are:

1. To draw comprehensive picture about the stakeholders, product, finance and information flow as well as the competitiveness in the eastern Indonesian supply chain and their main domestic and foreign competitors.
2. To analyse the incentives, driving forces and decision making of main actors in the beef supply chain.
3. To improve farmers' and agribusiness' access to knowledge about the beef supply chain in eastern Indonesia.
4. To develop strategies for making the Indonesian supply chain more effective and competitive and provide farmers with higher incomes.
5. Develop appropriate strategies to reduce weight loss during inter-island transportation.
6. To develop a methodological framework to extend analysis to other products and/or regions and countries and to create a sustainable link between the Indonesian project partners and the project agri benchmark.

5 Methodology

This section describes the methodology and data used for the generation of information in the project. It is divided in two parts: Farm level and Beyond farm level.

5.1 Farm level methodology

As outlined in the project proposal, for the farm level analysis the methods and tools used in the world-wide network agri benchmark Beef were made available for the project.

The methodology consists of the following parts:

1. The typical farm approach

2. Whole farm and enterprise analysis

3. Per unit output calculations

The definition of typical farms followed the standard operating procedure established and applied within the agri benchmark Beef Network (download available at http://www.agribenchmark.org/beef_typical_farms_definitions.html). The procedure consists of the following steps:

I. IDENTIFICATION PHASE

Go strictly branchwise
Select important regions
Analyse regional farm structure
Define features of two or three typical farms
Crosscheck with population and/or survey data

II. DATA COLLECTION PHASE (SCIENTIST, ADVISOR, FARMERS)

Contact farmers who operate such farms („panel")
Collect full set of economic and physical farm data

III. PROCESSING AND CROSSCHECKING PHASE

Compute results for the virtual typical farms
Crosscheck with panel

In the following sections the main steps shown above are applied to the Indonesian situation and modified where necessary.

5.1.1 Selection of (important) project regions

The economic importance of the cattle industry in a region can be measured by its proportion in regional GDP or workforce. These figures were not available in the project regions. For the supply chain analysis it is advisable to represent a huge proportion of beef production and farms producing beef cattle. As a consequence, beef cattle numbers were chosen as an indicator for the importance and the spatial distribution of the cattle industry.

Once the indicator for important regions is found (cattle numbers), the spatial reference unit to measure their importance needs to be defined. In agri benchmark, total cattle numbers as well as cattle densities per ha total land and per ha agricultural land is used.

Details about the choice of districts, indicators and reference units are provided in Appendix 11.3.

The beef cattle population and cattle density provide an insight for site selection of the typical farms. However, they are not the only determinant since an important factor that also critical for site selection is the local policy/planning on the future development of beef

industry. This knowledge was provided by the local BPTP partners and added to the statistics presented above. Figure shows the final selection of districts and the reasons for doing so.

Figure 5.1 Selected districts and reasons for selection

DISTRICT	REASONS FOR SELECTION
NTT	
Timor Tengah Utara	– Highest cattle density – Fourth highest cattle number
Kupang	– Second highest density – Highest cattle number
Timor Tengah Selatan	– Third highest density but very close to Kupang – Third highest cattle number
NTB	
Lombok Barat	– Highest cattle density – Highest cattle number
Lombok Tengah	– Second highest density – Third highest cattle number
Lombok Timur	– Third highest density – Fifth highest cattle number but very close to Bima
Sumbawa	– Second highest cattle number – Important exporter of live cattle to Lombok – Another island
South Sulawesi	
Bantaeng	– Highest density
Barru	– Second highest density
Bulukumba	– Fourth highest density – Higher cattle numbers than Sinjai
Bone	– Similar density to Takalar and Gowa – Highest number of beef cattle in South Sulawesi – Biggest growth of cattle numbers in recent years
Pinrang	– Medium density – Main cattle production area (number of cattle) – Location for cattle industry development (local government)
East Java	
Pamekasan	– Second highest density on Madura island – Big supplier of steers and heifers – Third biggest growth in cattle – Madura breed
Tuban	– Third highest population number – Main source of bull weaners transferred to other areas – Very good transport infrastructure Jakarta-Surabaya
Nganjuk	– Highest density per total land – Biggest cattle market in EJ, twice a week – Second biggest growth in recent years – Very good transport infrastructure Jakarta and other
Jember	– Biggest cattle population in East Java

Source: Own calculations based on local statistics

5.1.2 Farm structure, types and production systems

Once decided about the regions, the next step is to decide about the type and size of farms and production systems we want to analyse.

Enterprises

In the first step, it is necessary to distinguish into two beef enterprises even if a farm does both – the breeding and raising of calves and producing animals going to slaughter form these calves:

- Cow-calf (suckler-cows, beef cows), abbreviated as CC
  from birth of the calf to the day of weaning. The day of weaning is defined as the day on which the calf does not receive milk from the cow anymore.

- Beef finishing (fattening), abbreviated as FIN
  from the day of purchasing the animals or transferring them from the own cow-calf enterprise (= day of weaning)

For details see Appendix 11.3.

The differentiation into different enterprises appears to be a novelty in Indonesian farm analysis. Further, existing literature mainly focuses on Bali cattle with very few results on Madura/Ongole/PO and their cross breeds (see Appendix 11.4).

The two examples most common cases of enterprise combinations in the project regions are:

Example 1: A farm fully specialised in beef production with a cow-calf enterprise and a beef finishing enterprise, finishing its own weaners from the own cow-calf enterprise without buying additional weaners for finishing.

Example 2: A farm having a cow-calf and/or a finishing enterprise as above but at the same time an important cash crop enterprise (rice etc.).

Farm sizes

Once we know what main activities the farms have, we need to know more about the farm sizes. For our purpose, farm size is defined based on the two enterprises as follows:

- Cow-calf: Average number of cows per year
- Beef finishing: Total number of finished cattle sold per year

In this context, the question arises whether we want to represent a large proportion of farms or a large proportion of production with our typical farms. Contrary to the world-wide agri benchmark project where we are clearly after a large proportion of production, this project aims at representing both

- a large proportion of farms because the target group of the project are small-holder farms and

- a large proportion of production to capture as many animals and market share as possible.

As it turned out, the farm sizes were usually below five animals. As bigger farms are very rare, this type of farms also represents the majority of cattle. Thus, choosing this farm size serves both purposes of representing the majority of farms as well as production. In some cases, exception showing the potential were analysed (NTT, NTB).

Production systems

For both beef enterprises, the SOP provides the indicators shown in Figure 5.2 to describe the typical production system.

Figure 5.2 Indicators used to describe production systems

Whole farm level	Enterprise level	
Cow-calf / Finishing	**Cow-calf**	**Finishing**
Fully specialised	Breeds	Breeds
Combination with other enterprises with other enterprises	Own replacement	Origin of animals
Finishing (cow-calf)		*Dairy*
Crop	Stocking rate	*Cow calf*
Dairy		
Horticulture	Weaning weights	Category
Pig production		*Bulls, Steers*
Other	Weaned calves	*Cows, heifers, calves*
	per cow and year	
Natural conditions		Stocking rate
Soil type		Final weights
Climate		Daily weight gain
Herd size	Extent purchase of feed	Extent purchase of feed
Labour organisation	Feed base	Feed base
Mainly family labour	*Pasture*	*Pasture*
Mainly paid labour	*Silage and hay from grass*	*Silage and hay from grass*
Extent contractors used	*Other silage and hay*	*Other silage and hay*
	Grains and others	*Grains and others*
Capital input	Destination of the weaner calves	Sale of beef
Old or new buildings	Slaughter	*Domestic/Export*
Type of buildings	*Finishing*	*Direct sale to consumer*
Own machines or contractor	*Breeding*	
Loan level	*Live export*	

Source: agri benchmark

The list is used when defining the typical / prevailing production systems in the regions identified.

This step is very crucial and has to be done before going into the field and getting the farmers groups (panels) together. Usually there are no or very limited statistics available for this step. This means that in most cases we need to rely on your expert assessment to create a realistic definition of typical farms.

The better this definition is done, the easier it is to a) get farmers organised for the panels, b) collect data from these farmers' groups, and c) produce meaningful results from the data and for the regions.

For the farms analysed, three production systems are defined which are differentiated by the use of inputs and husbandry system. These production systems were formulated and agreed by the project team and represent the most prominent production systems in eastern Indonesia:

- Intensive: cut & carry system with permanent confinement in pens

- Semi-intensive: Cut & carry plus temporary / seasonal grazing

- Extensive: permanent grazing without confinement (pens)

5.1.3   Data collection and adjustments of tools

Data collection

From the previous step the type of farms were defined. The next step was to contact farmers for a group meeting (panel). The following steps for data collection were taken:

• Organisation of the meetings (done by the local BPTP partners).

• Project information and consent forms were provided to the participants.

• Data collection was done using the standard agri benchmark questionnaire.

• Data issues occurred and were addressed in the following fields: a) The small farm and herd sizes, b) live weight and carcass weight estimations of cattle, c) feed prices and cost of production of forage.

It can easily be seen that all factors mentioned above have a significant influence on the productivity and output levels of the production systems. It is important to have this in mind as the weight produced is the main reference unit for all costs and returns in the economic analysis. It is, however, the appropriate reference unit for benchmarking because it implicitly reflects the different productivity levels of different systems. Other thinkable reference units like 'per animal' or 'per ha' would reflect these differences to a much lesser extent or not at all.

The results should therefore be interpreted with care. A ten percent variation in weights results in a ten percent variation of all costs and results related to the weight.

Details on the procedure are provided in Appendix 11.4.

Adjustments and modifications of the questionnaire and the analysis tools

The first field trips in May 2008 showed that some adjustments and modifications of the agri benchmark analysis tools were necessary. They affected both the questionnaire as well as the calculation tools (model) used. The following major deficits / requirements were defined and addressed / changed /adjusted subsequently.

In the **questionnaire** the recording of labour hours and cash crop variable costs was improved by adding variables and figures and the questionnaire was translated into Bahasa.

The **model** and **calculation tools** were converted into aversion were animal numbers were not rounded to integer figures to reflect the small farm sizes and productivity parameters expressed in percentages of herd size.

5.2 Beyond farm level methodology

Similar to the farm level approach, the objective of the beyond farm analysis was to obtain as much information and data with least input and while representing as much product traded as possible in the supply chain.

For this purpose, the '75 percent rule' was developed and later extended by the concept of 'typical supply chains' (TSC). Both approaches are described below.

5.2.1 The 75 percent rule

For the whole supply chain the focus was on the actors with the 'highest market shares'.

We aimed for at least 75 percent of market share in livestock numbers and beef sales in the following parts of the supply chain:

- Interisland traders

- Abattoirs

- Processors (Bakso)

- Supermarkets

- Wet markets

These actors were chosen because from the project objectives and activities they represent the most important parts of the supply chain. The 75 percent rule was applied in all project regions (NTT, NTB, EJ, Jakarta). As can be seen from this list, the supply chain was approached from the top and from the bottom.

It was expected that within the analysis further described below, both ends of the supply chain will meet and eventually close the chain. This effect is shown further below, taking supermarkets, wet markets and abattoirs as an example.

On abattoir, supermarket and wet market level, the analysis focused on the main consumption centers of the regions:

- NTT: Kupang

- NTB: Mataram

- SU: Makassar

- Jakarta: Municipality (covering Central, West, North, East and South Jakarta)

Where market share statistics were not available, they were estimated with the help of experts from institutions, agribusiness and research. The following is an example of how the approach was implemented. The starting point is the supermarket (Figure 5.3).

Figure 5.3: **Supermarkets and their shares in beef supply (data are created for demonstration purposes)**

Rank	Name of supermarket	Beef sold p.a tons	Share in total %	Cumulated share %
1	Hero	1.500	36%	36%
2	Hypermart	950	23%	58%
3	Carrefour	800	19%	**77%**
4	Makro	450	11%	88%
5	Rest	500	12%	100%
	Total	**4.200**	**100%**	

Source: Own illustration

The TOP 3 supermarkets have a market share of 77 percent in all beef sold in supermarkets. We aimed at interviewing at least two supermarket managers from each of the TOP 3 supermarket chains. The number of at least two managers seems to be appropriate to avoid possible survey errors in one particular case and to make plausibility checks of the data between two supermarkets of the same chain level.

To link the previous supply chain levels, each interviewee was asked about the main suppliers providing at least 75 percent of the total beef supply. This way a trickle-down effect through the supply chain can be achieved. Further, it can be assumed that in many cases the TOP suppliers of the TOP supermarkets are also among the TOP actors on the respective supply chain level (Figure 5.4).

Figure 5.4 Schematic illustration of TOP-actors and their interactions on abattoir, wet market and supermarket level
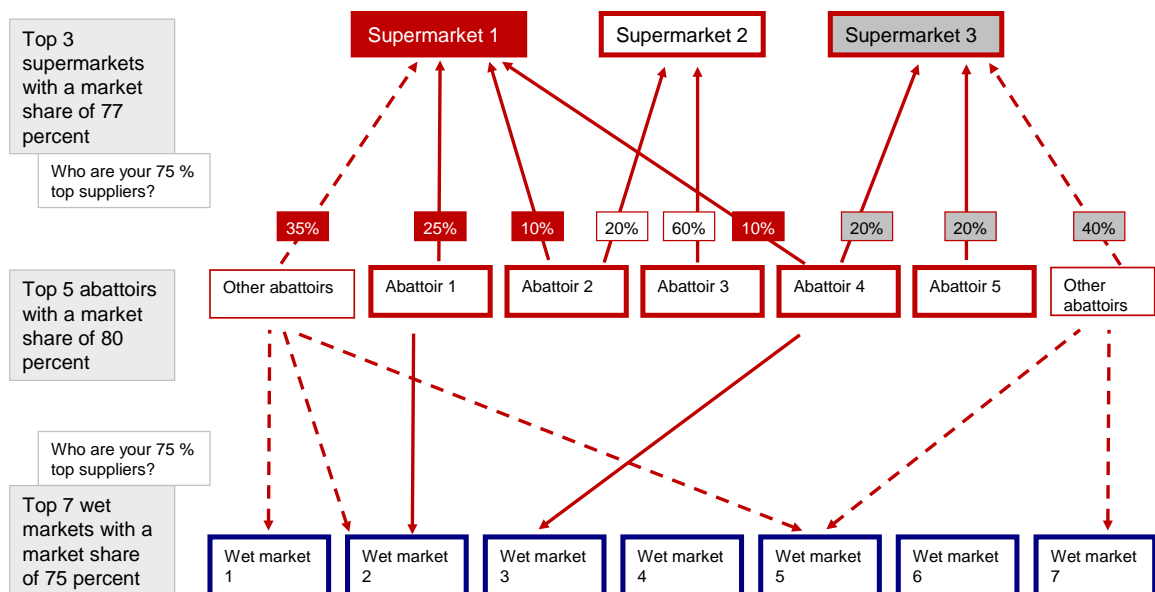
Source: Own illustration

This illustration was widened, continued and extended to the other supply chain levels, for example interisland traders supplying abattoirs.

The figure shows that all TOP 3 supermarkets receive beef from at least two of the TOP 5 abattoirs. It further shows that two of the TOP 5 abattoirs deliver to two of the TOP 7 wet markets. Further supplies for two supermarkets come from other abattoirs which do not belong to the TOP 5 abattoirs. These other abattoirs also deliver beef to a number of wet markets.

Modifications of the 75 percent rule

During the interviews with the retail level in Jakarta, it became clear that on both supermarkets and wet markets the significance of beef from eastern Indonesia (EID) was lower than expected. Under certain circumstances the 75 percent rule might then lead to an underrepresentation of the EID beef in our sample. As a consequence, to capture both the total beef supply AND the EID beef supply, the approach was modified as follows and is explained by taking two situations as examples illustrated in Figure 5.4.

Figure 5.5a: Situation 1: The 75 % top sellers of total beef represent a similar market share of eastern Indonesian beef.

		Absolute figures			Shares of markets in beef types		
Rank	Name of market	total beef sold p.a tons	of which beef from EID tons	of which beef from other regions tons	total beef sold p.a %	of which beef from EID %	of which beef from other regions %
1	Name 1	1.500	500	1.000	36%	42%	33%
2	Name 2	950	250	700	23%	21%	23%
3	Name 3	800	150	650	19%	13%	22%
4	Name 4	450	200	250	11%	17%	8%
5	Name 5	500	80	420	12%	7%	14%
	Total	**4.200**	**1.180**	**3.020**	**100%**	**100%**	**100%**

		Cumulated shares				Shares of beef types	
Rank	Name of market	total beef sold p.a %	of which beef from EID	of which beef from other regions		beef from EID %	beef from other regions %
1	Name 1	36%	42%	33%		33%	67%
2	Name 2	58%	64%	56%		26%	74%
3	Name 3	**77%**	**76%**	**78%**		19%	81%
4	Name 4	88%	93%	86%		44%	56%
5	Name 5	100%	100%	100%		16%	84%
	Average					**28%**	**72%**

As the lower part of the Figure shows, in this situation, the top 75 percent sellers represent a market share of 77 percent of all beef and a market share of 76 percent of EID beef. It further shows that market shares of EID in total beef are in average 28 percent, ranging from 16-44 percent. In this case, the original approach presented in Section does not need to be changed.

Figure 5.5b: **Situation 2: The 75 % top sellers of total beef DO NOT represent a similar market share of eastern Indonesian beef.**

		Absolute figures			Shares of markets in beef types		
Rank	Name of market	total beef sold p.a tons	of which beef from EID tons	of which beef from other regions tons	total beef sold p.a %	of which beef from EID %	of which beef from other regions %
1	Name 1	1.500	100	1.400	36%	12%	42%
2	Name 2	950	50	900	23%	6%	27%
3	Name 3	800	300	500	19%	35%	15%
4	Name 4	450	200	250	11%	24%	7%
5	Name 5	500	200	300	12%	24%	9%
	Total	**4.200**	**850**	**3.350**	**100%**	**100%**	**100%**

		Cumulated shares				Shares of beef types	
Rank	Name of market	total beef sold p.a %	of which beef from EID	of which beef from other regions		beef from EID %	beef from other regions %
1	Name 1	36%	12%	42%		7%	93%
2	Name 2	58%	18%	69%		5%	95%
3	Name 3	**77%**	**53%**	**84%**		38%	63%
4	Name 4	88%	76%	91%		44%	56%
5	Name 5	100%	100%	100%		40%	60%
	Average					**27%**	**73%**

As the lower part of Figure 5.5 shows, in this situation, the top 75 percent sellers represent a market share of 77 percent of all beef but only a market share of 53 percent of EID beef. It further shows that market shares of EID in total beef are in average 27 percent, ranging from 7-44 percent. In this case, the original approach presented in Section needs to be changed in order to represent 75 percent of EID beef.

This can be done in different ways:

1. In the case shown above, the inclusion of the retailer 'Name 4' would lead to a market representation for EID of 76 percent.

2. If the supply of EID is more scattered or found in other than the top 75 percent supermarkets or wet markets, then the above list has to be extended until the market share of 75 percent of EID beef is reached.

Data issues and examples

In practice, in almost every level of supply chain to capture market share data is a challenging process. Normally, there are no consistent statistical data or records available for the public. An exception is measuring market shares of abattoirs. Measuring market share of abattoirs is simple since data on the number of cattle slaughtered in abattoirs is documented by the abattoir management and reported to the Dinas office on a regular basis regardless of their business type and ownership. However, due to decentralisation, data is not usually available on provincial level and has to be collected from each district level government separately.

For certain level where large scale private modern business are operated, such as feedlots, beef importers and beef processors, the business association of respective field become the main source to estimate the market share of their members. Cross-checks were made via direct contact for interviews.

Obtaining data for supply chain levels that still in traditional system or in fragmented areas such as wet market traders and cattle traders require a lot of work with local expert and cross-check references with local Dinas, Provincial/district government offices, key actors, and information from upstream/downstream level of the supply chain (their buyers/ suppliers). It is relatively easy for small regions since the local market size is small and it is usually quite well known which traders hold the biggest market share in the local markets. Difficulties occurred when dealing with a larger area such as Jakarta, Makassar and Surabaya, where various players are trading cattle in various sizes of businesses that are spread around the city/region. For example, our approach on cattle traders is as follows:

1. Collect data and information from various institutions dealing with domestic export and import of cattle in the regions. These include Quarantine, Dinas Peternakan (Office of Livestock) of agriculture/livestock, abattoir managers and the traders themselves.

2. Cross–check references between those data.

3. Made an expert judgment based on the data to arrive at market shares.

5.2.2 Typical supply chains (TSC)

With the 75 percent rule, key actors holding the largest market share were successfully identified. It provided the 'big picture' of each supply chain level and showed how particular actors are linked with each other. However, it did not provide the necessary detail to perform consistent margin calculations along the supply chain.

The Typical Supply Chain (TSC) approach is designed to address the data and information gaps. TSC are described as the prevailing supply chain representing the overall supply chains. The TSC work is based on the findings derived within the 75 percent rule, assuming that the actors identified are the most important since they hold the

largest market share for their region. On each supply chain level, interview partners from the previous step were revisited and asked to provide more details.

The steps taken to identify the TSCs were:

1. Identify the key supply chain in the region considered. Two criteria were used for identification: Firstly, the TSC should represent the majority or the single most important proportion of cattle and beef traded in the region. Secondly, the TSC should also represent the highest potential/development in the last 5 years. Based on our findings, eight typical supply chains were identified by the project team, they were presented to a wider public in a workshop in Surabaya (Nov. 2009) and then refined during the final workshop in Jakarta (May 2010).

2. Select the most suitable respondents to represent each actor in the supply chain. The respondents were usually those having the highest market share, but also connecting and trading with the next/previous actors of the supply chain. In cases where the first respondent refused to cooperate, the second actor on the list fulfilling the selection criteria was approached. Each local project team discussed and performed this procedure separately and presented their respondents for the TSC study (first and second option).

3. Collect details of product flows, procedures (how is it done), economics and information flow from each respondent. A second interview was conducted in cases where not all data could be obtained in the first interview. The following details were collected:

    a. Purchase: Organisation of purchase, cost, prices and quantities, key suppliers.
    b. Handling and management of cattle, beef and beef products
    c. Sale: Organisation of sale, cost, prices and quantities, key buyers.
    d. Cost associated with each activity, including transport, labour, processing, and fees (legal and illegal).

4. Calculation and analysis. Calculation and analysis were conducted together by the team.

5.3 Scope of the data collection and interviews

Based on the methods and questionnaires described above, the project team conducted series of interview, both at farm and beyond farm level. The total number of interviews conducted by the project team for each level is presented in Figure 5.6.

Figure 5.6:   **Interviews conducted by the project team**

	NTT	NTB	SulSel	East Java	Jakarta	Total
Typical farms (Groups)	5	8	5	5	nr	23
Cow-calf enterprises	.	2	.	2	nr	4
Beef enterprises	1	2	.	1	nr	4
Combined enterprises	4	4	5	2	nr	15
Beyond farm						
Livestock trader	12	6	6	3	1	28
Abattoir	2	5	2	1	5	15
Wet market trader	6	10	11	13	10	50
Supermarket	1*	nr	3	3	3	10
Importer - live cattle	nr	nr	nr	nr	4	4
Importer - beef + offals	nr	nr	nr	nr	1	1
Beef processor (frozen)	nr	nr	nr	1	1	2
Beef processor (fresh)	6	4	1	5	5	21
Consumer	50	50	50	16	50	216

 * = Meat shop   nr: not relevant

Source: Own surveys

6 Achievements against activities and outputs/milestones

6.1 Objective 1: To draw a comprehensive picture about the stakeholders, product, finance and information flow as well as the competitiveness in the eastern Indonesian supply chain and their main domestic and foreign competitors.

No.	Activity	Outputs/ Milestones	Completion date	Comments
1.1	Collect and update farm level data	Farm level data base	M1-M2 M12-M13 M24-25	Completed. - 23 typical farm data sets from 15 districts in four project regions were collected. - Fine-tuning and price update to 2008 and 2009 figures performed.
1.2	Farm level data analysis	Benchmarking in national and international context	M2-M7 M14-M19 M26-M30	- Comparison of cow-calf enterprises, finishing enterprises and whole farms level on national level. - Selected farms included in global analysis 2009 and 2010, introducing cut & carry system to global network.
1.3	Collect and update beyond farm gate data	Beyond farm level data base	M8-M10 M20	- Key beyond farm supply-chain levels were studied. - The 'top 75 percent' rule were developed and applied. - Number of interviews performed: 28 traders 15 abattoir managers 50 wet market traders 10 supermarket managers 4 importers live cattle 1 importer beef and offal 23 beef processors 216 consumers
1.4	Analyse beyond farm gate data	Benchmarking of the national supply chain	M9-M11 M21-M22	- Results indicate that imported beef and feedlot are gaining importance. - Sourcing cattle from eastern Indonesia and other domestic origin is becoming more difficult and more expensive. - New markets for eastern Indonesian cattle/beef: locally, Kalimantan, Papua. - High profitability throughout the supply chain.
1.5	Report to ACIAR		M10, M17, M22, M30	- Annual reports are available with ACIAR. - Regular communication established. - Final report, particularly Chapter 7.

PC = partner country, A = Australia

6.2 Objective 2: To analyse the incentives, driving forces and decision making of main actors in the beef supply chain.

No.	Activity	Outputs/ milestones	Completion date	Comments
2.1	Collect farm level information	Farm level information base	M12-M13 M24-M25	- Collected as part of Activity 1.1,
2.2	Collect beyond farm level information	Beyond farm level information base	M12-M13 M20	- Collected as part of Activity 1.3,
2.3	Analyse farm (and beyond farm gate) information		M13-M14 M25-M26	- Key factors identified via 75 percents market rule method. - 8 typical supply chains developed. - Economic incentives dominate; cash requirement with farmers main incentive - Profitability main driver - Delayed 3 months due to introduction of new analysis step. - Further analysis via typical supply chain framework.
2.4	Report to ACIAR		M17, M30	- Annual reports are available with ACIAR. - Regular communication established. - Final report, particularly Chapter 7.

PC = partner country, A = Australia

6.3 Objective 3: To improve farmers' and agribusiness' access to knowledge about the beef supply chain in eastern Indonesia.

No.	Activity	Outputs/ milestones	Completion date	Comments
3.1	Planning workshop stakeholders		M1, M8, M12, M20, M24	- Workshop 1: May 2008 in Makassar - Workshop 2: Nov 2008 in Mataram - Workshop 3: April 2009 in Kupang - Workshop 4: Oct 2009 in Surabaya - Workshop 5: May 2010 in Jakarta - An internal evaluation of objectives, content and output of the project was performed in Workshop 4 (Appendix).
3.2	Present results to stakeholders	Feedback of results to workshop participants	M8, M12, M20, M24	Public day in - Workshop 3 (local representatives of businesses, policy and research) - Workshop 4 (local representatives of businesses, policy and research) - Workshop 5: May 2010 in Jakarta with participation of key players in the supply chain (Traders, Abattoir, APFINDO, NAMPA, Matahari, consumer representatives, government agencies)
3.3	Produce and disseminate short report in project regions	Inform participants and decision makers in the supply chain	M10, M22, M30	- Leaflet, summarizing key project findings were developed and produced in both in Bahasa and English. This leaflet is used by BPTP staff as media to disseminate information to supply chain actors.

No.	Activity	Outputs/ milestones	Completion date	Comments
3.4	Disseminate and promote final report	Inform participants and decision makers in the supply chain Initiate possible further activities	M30	- Intermediate results were field-tested to a wider audience in public day during workshop, for feedback and comments. - Final report available. - After approval book publication of chapters 3, 5 and 7 of final report planned.

PC = partner country, A = Australia

6.4 Objective 4: To develop proposals for making the Indonesian supply chain more effective and competitive and provide farmers with higher incomes.

No.	Activity	Outputs/ milestones	Completion date	Comments
4.1	Analyse the future development under most likely conditions	Obtain an idea about most likely development of the supply chain	M9, M21	- Available data and information indicate likelihood further shortages of eastern Indonesian beef supplies. - Profitability likely to remain strong until cattle numbers fall below critical numbers. - Incentives for supermarkets and importers to use imported beef and cattle likely to increase.
4.2	Identify possible development strategies	A set of different development strategies is available for analysis	M12, M24	- Strategies need to target driving forces and keep a holistic view on the supply chain. - Information flow between stakeholders needs to be improved. - Cash requirements of farmers must be satisfied in another way than selling premature cattle. - Target markets for eastern Indonesian beef should be reconsidered. - Change of market directions and growing "new market areas" for eastern Indonesia cattle appear appropriate - Further integration of market-led technical and economic interventions is required. - Data improvements and enhanced information flow/sharing is necessary.
4.3	Analyse strategies	The impacts of different strategies are available	M14, M15, M26, M27	- Strategies were presented at public workshops in Surabaya (Nov. 2009) and Jakarta (May 2010) but no direct feedback was obtained. - Separate impact and cost-benefit analysis for each strategy/proposal could not be performed within the scope of the project.
4.4	Report to ACIAR		M17, M30	Summary of this report.

PC = partner country, A = Australia

6.5 Objective 5: Develop appropriate strategies to reduce weight loss during inter-island transportation.

No.	Activity	Outputs/ milestones	Completion date	Comments
5.1	Identify appropriate strategies to reduce weight loss	Appropriate strategies identified that could be implemented within the supply chain	M6, Y1	- Improved feeding identified as key factor in weight improvements.
5.2	Undertake study on management strategies for dealing with weight loss including better feed and water, pre-conditioning, rest and electrolytes	Management approaches to reduce weight loss identified	M18	- Two trials conducted with treatment and control group. - Improved feeding in treatment 1 lead to reduced weight loss at higher feeding costs. - Positive cost-benefit of improved feeding, when considering the volumes of cattle traded big impact on industry.
5.3	Economic and supply chain analysis to identify suitability of management strategies	Impact within the supply chain	M24	- Feeding alone is not the key to solve the issue. - A whole range of issues need to be addressed: a) water supply, b) loading and handling facilities, c) boat design and space, d) feeding

PC = partner country, A = Australia

6.6 Objective 6: To develop a methodological framework to extend analysis to other products and/or regions and countries and to create a sustainable link between the Indonesian project partners and the research project agri benchmark.

No.	Activity	Outputs/ milestones	Completion date	Comments
6.1	Adjust farm level methods	Method and tools are adjusted to ID conditions	M1-M2, M9, M21	Modification completed and proved to be applicable for EI context.
6.2	Develop and adjust beyond farm level methods	Methods and tools for analysis are available	M4-M5, M16-M17	- 75 percent rule developed and applied throughout the chain. - 8 typical supply chains developed and analysed.
6.3	Participate in agri benchmark Beef Network	Global comparison data on beef and cow-calf production	M4, M16, M28	- Global data set available for Indonesian partners. - Indonesia is represented with six farms from all regions and all production systems in the global data set. - Results were published in the Beef Report 2009 and Beef Report 2010. - ICASEPS to remain partner in agri benchmark after the project is finished.

No.	Activity	Outputs/ milestones	Completion date	Comments
6.4	Training in agri benchmark methods and tools	Partners are enabled to continue analysis		- Partners of the three BPTPs and ICASEP are trained in agri benchmark analysis tools. - Typical farm approach - Data collection and revision - Herd dynamics and simulation

PC = partner country, A = Australia

7 Key results and discussion

Commencing with an overview of the 'big picture' and main driving forces of the Indonesian beef sector, this section summarises our findings in the three key study areas of the project:

- Farm level

- Interisland transport study

- Beyond farm level including Typical Supply Chains

7.1 The big picture

7.1.1 The domestic cycle and the international context

As beef production is embedded in the overall development, Figure 7.1 and 7.2 illustrate a brief overview on the macro-economic framework conditions for the period 1995 to 2009:

- The population grew from close to 200 million to approximately 230 million people.

- The GDP in current USD more than doubled (basically in the period 2003 to 2008) and increased by approximately one third in constant USD of the year 2000.

- The consumer price index[1] increased by more than four times but consumer beef prices went up basically in line with the CPI. This means that beef was neither getting relatively cheaper nor dearer compared with the average basket of goods.

- After a sharp devaluation of the Rupiah in 1998, the exchange rate between the IDR and the USD remained basically the same at around IDR 10,000 per USD.

Figure 7.3 illustrates the development of beef production, consumption and imports. When looking at the figures, some doubts must be raised about the consistency of the data:

- The official statistics indicate that for many years consumption was *exactly* met by production. This appears to have changed in 2003 when production overtook consumption with the exception of the year 2007.

- Given the fact that there are officially hardly any exports, it is surprising that at the same time beef imports started to rise. This finding constitutes a mismatch with the production/consumption figures and is not supported by any of our own interviews.

Coming back to the previous figures, the main findings for the years 2004 to 2009 is that although the beef prices increased by approximately 50 percent, the per capita income even doubled (both in IDR and USD term). With the constant per capita consumption, the increase in beef consumption was mainly driven by population growth.

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1   Defined by the U.S. Bureau of Labor Statistics as a measure of the average change over time in the prices paid by urban consumers for a market basket of consumer goods and services (http://www.bls.gov/cpi/cpifaq.htm)

Figure 7.1   Population and income in Indonesia 1995-2009
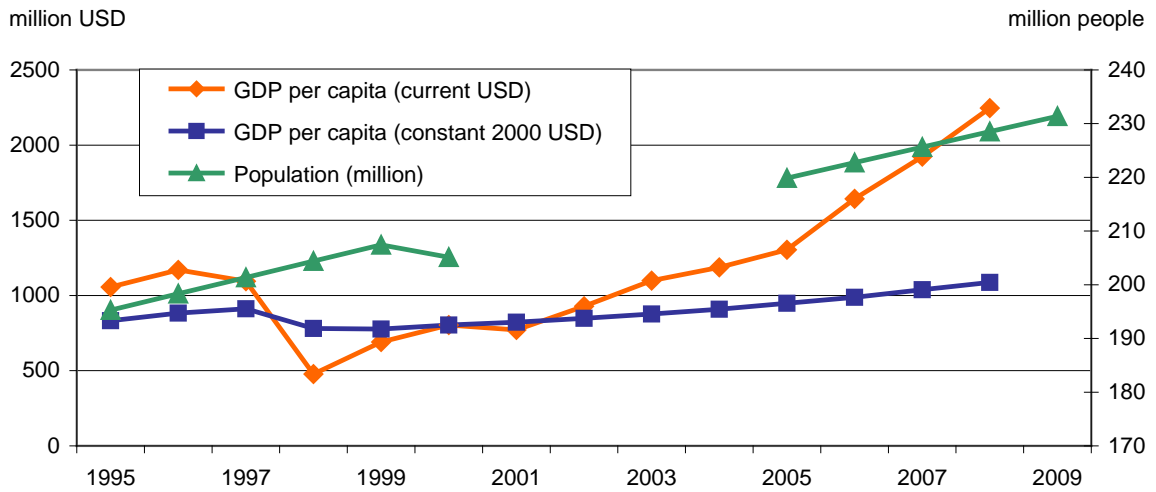
Figure 7.2   Beef prices and inflation in Indonesia 1995-2009
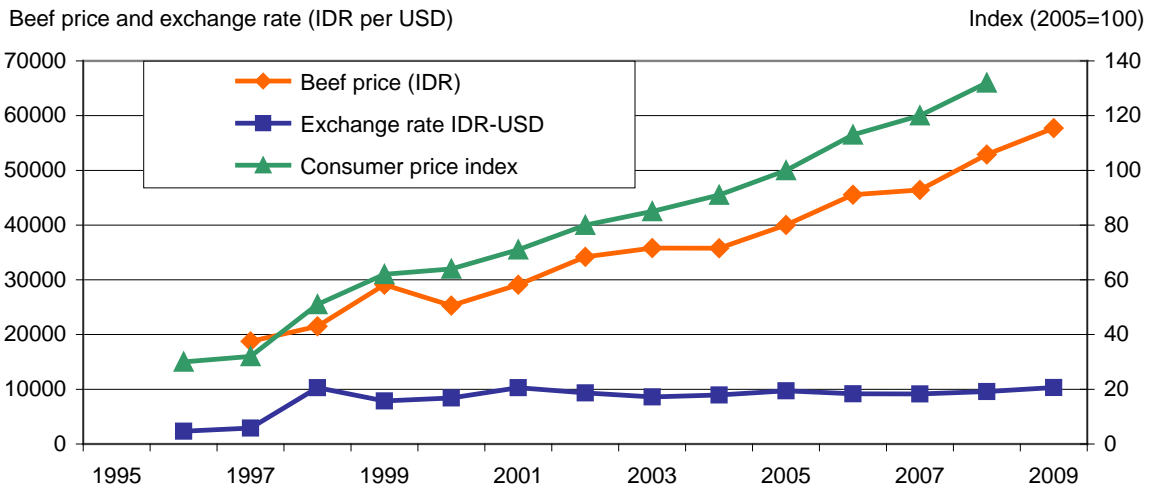
Figure 7.3   Beef production, consumption and trade in Indonesia 1995–2009
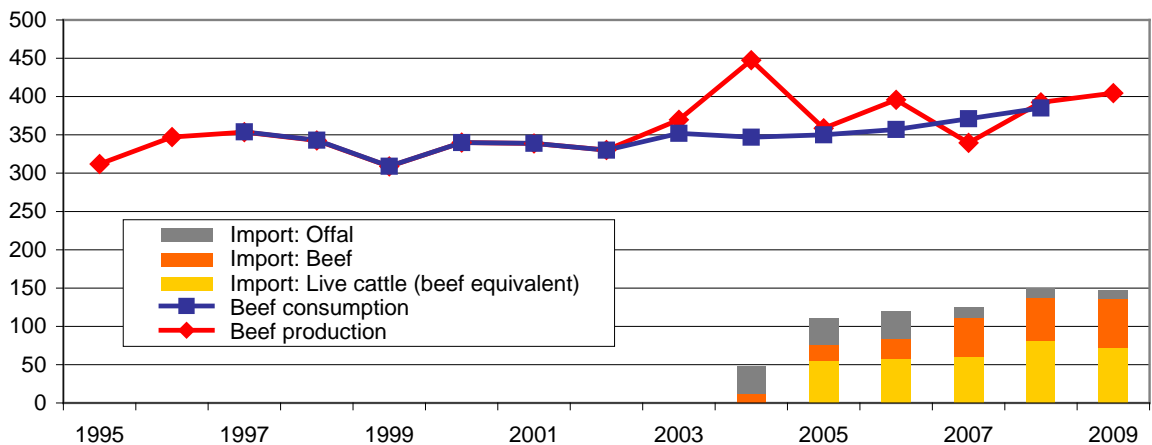
Sources:http://www.bps.go.id/
http://data.worldbank.org/
http://database.deptan.go.id/
Blue print program swasembada daging sapi 2014 (DG Livestock, 2010)
Livestock statistic 2009 - http://www.ditjennak.go.id/t-bank.asp
Selected Socio-Economic Indicators of Indonesia 2009, (BPS, 2009)

These economic framework conditions constitute driving forces for beef production and beef markets and materialised in a 'vicious cycle' for domestic production in the last six years:

1. Greater demand and rising beef prices means that more beef needs to be made available either from domestic or from imported sources.

2. The additional quantities can be provided by either killing more cattle at the same weight, increasing carcass yields or a mix of both. In Indonesia, apparently the first path was chosen.

3. With cattle in shortage and cash requirements as the main incentive for farmers to sell their cattle (not the optimum slaughter weight), there is an incentive to sell premature cattle which means a decrease in slaughter weights which again means less domestic beef available than potentially could be.

4. This aggravates the shortage of domestic cattle and beef, leads to the slaughter of productive female cattle and a drop of cattle number in certain areas, eventually resulting in further increasing beef prices for domestic cattle.

5. The high price level attracts imports of both beef and live cattle which were mainly supplied by Australia and New Zealand due to sanitary restrictions. Market shares of imported beef and live cattle are now approximately 30 percent and doubled since 2002. The rapid development of supermarkets also supports the demand for imported beef and beef from imported live cattle.

6. If the domestic cycle continues long enough, it might happen that imported beef becomes less expensive than local beef, as observed in our surveys. With these settings, Indonesia remains an attractive export market, particularly for low value beef.

Any policy aiming at improvement national beef supply needs to reflect these fundamentals and address the driving (market) forces. Pure focus on the supply side is most likely to fail under the current market and trade policy settings.

7.1.2 Market structure

The intertwined role and flow of goods on each supply chain levels are described in Section 7.4 which provides a detailed picture of the market structure of the eastern Indonesian beef supply chain. The overall picture is summarised in Figure 7.4.

Figure 7.4 **The regional product flow of the beef supply chain in eastern Indonesia and its competitors**

Source: Own illustration
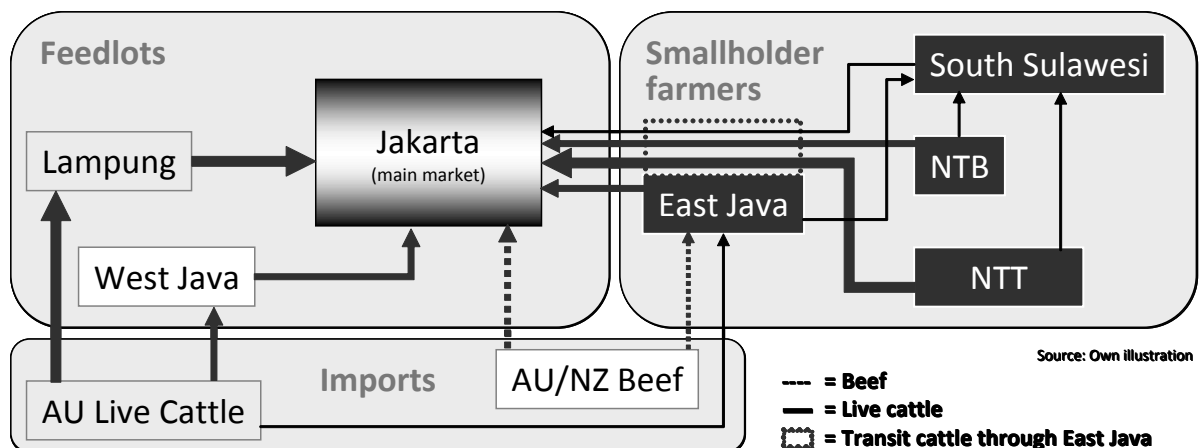
Source: Own illustration

The right hand side of the illustration represents the project regions in eastern Indonesia (including East Java), the left hand side mainly Java and parts of Sumatra and the bottom the import from overseas. Solid lines indicate the flow of live cattle and dotted lines show the flow of beef and offal.

- Jakarta is still the main market but it can be observed that local markets are growing, too. Cattle 'exports' from eastern Indonesia to Jakarta (via Surabaya) are most important for NTT and of diminishing importance for the other regions. Exports between the project regions as well as to other regions than Java (such as Kalimantan) are of growing importance. For example, in 2010, NTB sold live cattle not only to South Sulawesi but also to West Sulawesi, Maluku, North Maluku, Papua, Babel, Jambi and NTT (telephone communication Dinas Peternakan NTB, October 2010).

- The Jakarta market is more and more served by feedlot cattle originating from Australia and fed in Sumatra (with Lampung being most important) and West Java. As regards non-feedlot cattle, it seems that (East) Java cattle gain importance over cattle coning from further East.

- Australian and New Zealand imports of beef go mainly to Jakarta and to a lesser extent to Surabaya.

More detail on single product and trade flows is provided in the sections below.

7.1.3   Trade Policy

The international trade policy framework in Indonesia, both on live cattle and frozen beef imports, has a significant impact on the national market in which Australia plays an important role. Indonesia imported 21,000 tons of beef in 2005 and increased the volumes to 64,000 tons in 2009 (DG Livestock, 2010). Between 30 to 50 percent of that amount was contributed by Australia (MLA, 2009). Live cattle imports from Australia doubled during the period 2005 to 2009 from 347,967 head in 2005 to 768,133 head in 2009 (MLA, 2010).

Due to Indonesia's import policy prior to April 2009, the Indonesian market was only open to countries who could fulfil the following requirements: (1) origin from a country free from BSE and FMD and (2) Halal requirements. Therefore, in terms of country of origin, Australia, New Zealand and the US are the top three countries that export their beef to Indonesia. Their market share in Indonesia is illustrated in Figure 7.5.

Figure 7.5:   **Import – Country of origin, 2004 – 2008**

Year	Imported Chilled/fresh beef Market share (%)				Imported beef (total beef) Market share (%)			
	Australia	US	NZ	Others	Australia	US	NZ	Others
2004	96	1	2	1	33	3	64	0
2005	86	1	4	9	40	2	57	1
2006	93	0	6	1	43	0	57	0
2007	85	0	14	1	58	0	41	1
2008	77	0	14	9	52	1	46	1

Source: Hoang, MLA, 2009

Two recent trade policy initiatives provided the potential for changes in the market structure.

The AANZ free trade agreement

The AANZ free trade agreement applies to Australia, New Zealand and ASEAN countries and will reduce tariff barriers for certain products including beef, which are relatively low already (DFAT, 2010). However for the year of 2010, this agreement is limited by import permits that capped at 92,000 head in July 2010. As a result of the above policy, given: (1) the proximity of Australia to Indonesia, (2) the long established business network between Australia and Indonesia, (3) the AANZ FTA (Free Trade Agreement), and (4) the Indonesian Halal Policy, it can be expected that Australia will continue playing a significant role in the Indonesian beef supply chain.

The zone-based import policy

The zone-based policy (Permentan No. 20 2009) was planned to allow imports from FMD-free zones within exporting countries to Indonesia. This policy would potentially have opened opens a door for low cost beef producers such as India and Brazil. With the consumer preferences in Indonesia, this would have allowed Brazil and India to export lower value cuts, putting downward pressure on Indonesian prices and making it more difficult for local smallholders to compete. The regulation had been legally in place for several months, but in August 2010 the Indonesian Supreme Court declared that the law has to be reverted to the original (country based import). This is based on the result of a judicial review requested by the veterinary association (Perhimpunan Dokter Hewan Indonesia – PDHI), consumer association (YLKI) and several NGOs on the basis of disease risk and Brazil's and India's limited ability to trace cattle movements between zones.

The rejection of the zone-based policy coincides with the import restrictions on Australian live cattle over 350 kg and limits on import permits earlier in 2010, eventually resulting in a reduction of feedlot capacity to 50 percent and a dramatic increase of beef prices of up to IDR 80,000 per kg in late August 2010. This will further accelerate the forces driving the domestic beef cycle described in Section 7.1.1 and will most likely put more pressure on the Indonesian government to address the issue of beef supply.

7.1.4   Data and infrastructure

Infrastructure is weak both in terms of the availability of market data and physical infrastructure.

- Our visit to various government offices and literatures found conflicting statistics figures in most of cattle related statistics, which include cattle population and domestic trade. The import figures are also not consistent with the statistics of MLA Australia. The government is aware about this and improving the quality of statistics is on the priority list of the beef sufficiency program.

- Inter island live cattle transport and cattle handling infrastructure remains a problem in eastern Indonesia. In the inter island trading, live cattle are normally transported in regular ships which are not suitable for long term cattle transport. Animals are stressed, lose weight and run a high risk of injury or death (see Section 7.3 for details).

- The lack of cold chain facility in most abattoirs, transport facility (truck/ships) and wet markets limit the efficient distribution of beef. Cold-chains are not common in rural areas and only available to a certain degree in urban areas. Many food items are sold without temperature control, even in urban areas. This is particularly relevant for wet markets, food peddlers or small restaurants. According to USDA (2009) the main reasons for limited cold chain network are: (1) limited capital, (2) low awareness of the benefit of using refrigerators, and (3) the common practice of buying and consuming on the spot.

The lack of these infrastructures and market information systems and statistics means that a) policy cannot be based on evidence and b) the potential of the sector cannot be exploited.

7.2   Farm level results

7.2.1   Introduction

A total of 23 typical farm data sets were constructed during the project period using the methods described in Section 5.1. As a result, we obtained a very detailed data set allowing the cross-regional analysis of production systems and their economics.

The combination / specialisation of cattle enterprises in these farms is as follows:

- 14 out of the 23 farms operate both a cow-calf and a finishing enterprise. With the exception of one farm, both enterprises were used for analysis.

- Five operate a cow-calf enterprise only.

- Four have a beef finishing enterprise only.

Figures 11.4.1 to 11.4.5 in the Appendix provide an overview on the typical farms analysed. In the following, the results are presented separately for the cow-calf enterprises, followed by the finishing enterprises.

7.2.2   Results for cow-calf enterprises

This following section shows the most important results for the cow-calf enterprises, split into physical productivities and economic results.

Figure 7.6 shows the most important physical productivity and performance indicators of the farms analysed. For those farms who operating both a cow-calf and a beef finishing enterprise, the name of the beef finishing enterprise is indicated as well. These enterprises are analysed in Section 7.2.3.

The main findings are:

- *Replacement rates* (reflecting cull cows and cow mortality) are between 10-15 percent with the exception of the NTB extensive grazing farms in East Lombok and Sumbawa as well as the Bone farm in Sulawesi.

- *Ages at first calving* are typically between 30 and 36 months.

- *Calf losses* (mortality) of 10-17 percent are still rather high in NTT (but down from the past 20-30 percent levels) and lower in the other regions (less than or up to 10 percent).

- Number of calves per 100 cows (*weaning percentage*) and varies widely from 65 percent to 97 percent in the sample. Min factors impacting on the weaning percentage are the Calving percentage (fertility, inter-calving intervals) and calf mortality.

- *Weaning ages* are between 6 months and nine months and show the usual variation

- *Weaning weights* are shown for female and male weaners and show some variation which is influenced by a) breeds, b) feeding intensity and c) market demand. Bali Cattle are typically 50 and 80 kg LW at weaning, Bali and Madura cross cattle between 60 and 180 kg and Ongole cross cattle between 105 and 115.

- It should be mentioned that some of the productivity figures from our sample are higher than those obtained from literature review (see also Figure 11.4.6 in the Appendix).

Figure 7.6: Productivity and performance figures of the typical cow-calf farms 2009

Farm name Cow-calf (1)	Farm name Finishing (2)	Breeds (Bulls * Cows)	Replace-ment rate (%)	Age at first calving (months)	Calf losses (%) (3)	Weaned calves per 100 cows and year	Weaning weight (kg)	Weaning age (days)	Total live weight sold per cow and year (kg) (4)
NTT-OEB-2	NTT-OEB-1	Santa G. * Bali Cattle	13	33	17%	83	160 - 180	210	193
NTT-KUP-5	NTT-KUP-3	Bali * Bali	13	30	17%	71	65	240	95
NTT-TAP-9	NTT-TAP-4	Bali * Bali	13	36	17%	75	60 - 70	270	119
NTT-TTS-30	NTT-TTS-15	Bali * Bali	12	33	10%	90	85 - 110	300	153
NTB-LOB-2	NTB-LOB-2	Bali * Bali	12	30	7%	93	70 - 80	210	91
NTB-LTG-2	–	Bali * Bali	13	33	7%	93	65 - 75	180	90
NTB-LTG-3	–	Bali * Bali	14	27	7%	93	90 - 105	180	102
NTB-LTM-54	–	Bali * Bali	18	36	15%	64	50 - 60	255	114
NTB-SBW-4	NTB-SBW-4	Bali * Bali	21	33	7%	84	60 - 70	200 - 210	98
NTB-SBW-7	–	Bali * Bali	22	36	8%	83	60 - 70	200 - 210	112
SU-BON-3	SU-BON-1	Bali Cattle	20	36	5%	65	50 - 60	240	48
SU-BAR-5	SU-BAR-1	Bali Cattle	16	36	10%	81	60 - 70	210 - 270	120
SU-BUL-4	SU-BUL-2	Sim/Lim * Bali cattle	12	36	8%	68	75 - 90	210	110
SU-BAN-4	SU-BAN-2	Sim/Lim * Bali cattle	12	36	3%	74	60	165	135
SU-PIN-5	SU-PIN-2	Sim/Lim * Bali cattle	15	36	5%	69	60 - 65	210	117
EJ-PAM-2	EJ-PAM-1	Lim * Madura	14 - 16	33	3%	97	93 - 98	240	163
EJ-NGA-2C	EJ-NGA-2	Sim/Lim * Ongole	14 - 16	36	3%	97	105 - 110	230	185
EJ-TUB-3	–	Sim/Lim * PO	11	33	3%	78	110 - 115	238	151
EJ-JEM-4	–	Sim/Lim * PO	8	33	5%	95	105 - 115	235	119

(1) Number refers to average suckler-cow inventory per year.

(2) Number refers to total finished cattle sold per year on farms with both cow-calf and finishing the own weaners.

(3) Percentage loss between number of calves (born) alive after one day and day of weaning.

(4) Includes all animal sales of the cow-calf enterprise: slaughter cattle, weaner calves, breeding cattle. Transfers to the own beef finishing enterprise included.

Source: Own calculations

- *Total live weight sold per cow* is the result of all previous indicators and shows significant variation between the farms. The live weight sold comprises the weaners sold to other farms / traders or transferred to the own finishing enterprise, cull animals for slaughter and breeding animals, if any. Breed-specific weights as well as overall productivity are the main factors and lead to variations of more than 100 percent between the farms. Extremes are the Bone farm with less than 50 kg and the NTT farm in Oebola with almost 200 kg live weight produced per cow and year.

The economic results of the cow-calf enterprises are presented in Figure 7.7 for the regional averages which were weighted by the total live weight sold. They are expressed in IDR per 100 kg total live weight sold to make the farm data comparable. Per head or per ha figures cannot provide consisting comparative data they do not reflect the differences in productivity between the farms. Figures 11.4.7 and 11.4.8 in the Appendix show the live weight figures as well as the per head figures for the individual farms, the latter for information purposes.

The main findings are:

Market returns

- Highest returns are found in Sulawesi, driven by the highest prices of the regions, followed by East Java mainly driven by high weights. These differences seem to reflect strong demand in Sulawesi. NTT and NTB are at the lower end with lowest prices in NTT and medium prices but lower weights in the NTB farms.

- Sales of breeding cattle are only relevant in the farms in NTB and Sulawesi (forward sales to other regions).

- Sales of cull animals are particularly important in NTT and East Java. At least for NTT this appears to be an indication that there is strong demand for all kind of cattle categories and not just for weaners.

Costs

- As typical for the cow-calf enterprise, *animal purchases* are virtually irrelevant.

- Operating costs consist of *expenses* (cash cost) plus *depreciation*. They do not include the valuation of own production factors like labour, land and own capital (opportunity costs).

- *Operating costs* are highest in the farms in Sulawesi and lowest in the NTB-farms. The Sulawesi farms appear to be the farms with the highest intensity for almost all inputs. This might be driven by the high prices which would usually trigger higher intensity levels.

- The Sulawesi farms show particularly high values for *purchase feed* and *energy*. The East Java farms have the highest costs for purchase feed whereas the NTB and NTT farms do not buy feed at all or at low level.

- *Opportunity costs* are highest in the farms in Sulawesi and lowest in the NTT-farms. They are particularly low for labour in NTT and NTB due to lower wages and in the NTB case for land, too.

Profitability

- Profitability is expressed as *gross margin* (returns less operating cost) and as *net margin* (returns less total costs). On average of the regions, the farms are profitable with positive gross margins and net incomes.

- In terms of *gross margins,* the farms in Sulawesi show the highest profitability, closely followed by the farms in East Java and with NTT and NTB with substantial distance at the lower end of the range.

- When opportunity costs are reflected, the picture changes in favour of the NTT and NTB farms due to their relatively low opportunity costs. Now the Sulawesi farms show the lowest – albeit positive – net incomes while the NTT-farms are the most profitable.

Figure 7.7: **Economic results of cow-calf farms 2009**
(weighted averages of the regions)

Weighted figures per 100 kg live weight sold	NTT	NTB	Sulawesi	East Java
1. Returns (sales)				
Cull and slaughter animals	971.805	688.633	674.987	1.383.989
Breeding animals		105.375	1.137.505	
Calves sold/going to finishing	590.694	952.852	1.500.335	1.247.554
Subtotal	**1.562.499**	**1.746.861**	**3.312.828**	**2.631.544**
2. Purchase				
Animal purchases		174.348		
Subtotal		**174.348**		
3. Operating cost				
Feed (purchase feed, fertiliser, seed, pesticides)	37.243		698.772	1.010.975
Machinery (maintenance, depreciation, contractor)	1.671	840	4.643	6.965
Fuel, energy, lubricants, water		41	397.187	60.755
Buildings (maintenance, depreciation)	2.864	6.238	123.913	60.053
Vet & medicine	13.257	3.768	67.632	35.245
Insurance, tcwes	3.435	2.376	1.893	3.698
Other inputs cow calf enterprise	20.159	7.986	36.229	88.252
Other inputs	1.841	554	4.192	
Paid labour				
Rented land		1		
Liabilities	0		1	1
Subtotal	**80.469**	**21.805**	**1.334.461**	**1.265.943**
4. Gross margin				
Returns (sale)	1.562.499	1.746.861	3.312.828	2.631.544
Purchase		174.348		
Operating cost	80.469	21.805	1.334.461	1.265.943
Gross margin	**1.482.029**	**1.550.708**	**1.978.366**	**1.365.601**
5. Opportunity cost				
Family labour	158.472	418.290	694.826	803.758
Own land	102.164	2.555	355.366	107.190
Own capital	29.245	39.783	61.400	61.124
Subtotal	**289.881**	**460.627**	**1.111.591**	**972.072**
6. Net margin				
Gross margin	1.482.029	1.550.708	1.978.366	1.365.601
Opportunity cost	289.881	460.627	1.111.591	972.072
Net margin	**1.192.148**	**1.090.081**	**866.775**	**393.529**

Source: Own calculations

7.2.3   Results for finishing systems

Figure 7.8 provides the productivity parameters of the beef finishing enterprises and Figure 7.9 shows the economic results of the regional averages. For those farms who operating both a cow-calf and a beef finishing enterprise, the name of the beef finishing enterprise is indicated as well.

The main findings about the physical performance are:

- All cattle come from *cow-calf origin,* either from the own cow-calf enterprise or purchased from other farms. The vast majority of cattle are *bulls*; exceptions are the Kupang farm NTT-KUP-100 finishing unproductive *cows* as well land the Lombok farm NTB-LTM-12 finishing *steers* in addition to the bulls.

- The vast majority of the cattle are *weaners* with seven to nine months of age. The all operate a combination of cow-calf and beef finishing enterprises. Exceptions are the farms specialised in finishing (NTT-KUP-100, NTB-LTM-4, NTB-LTM-12 and EJ-JEM-2) which are buying older animals for a final finishing period.

- Depending on the age of the animals, *finishing periods* vary from six months to two years with cattle usually having at least two years when finished.

- Weights and daily weight gains depend on breed-specific potential, age of the animals, the feeding ration, the health status of the animals and the market requirements. In general, weights as well as daily weight gains are rather low and below breed potential, at least for the farms with Bali cattle. Reasons for this were outlined in the previous section. The cross-bred cattle constitute certain exemptions of this observation but they are usually on a higher energy ration.

- *Dressing percentage* for all cattle are with one exemption in Sulawesi below or just 50 percent despite the use of all kind of animal parts like offal and heads for human consumption. Dressing percentages were calculated for warm carcasses, without blood and bones. This means that carcass conformations are rather poor.

Figure 7.8: Productivity figures of the typical finishing farms 2009

Farm name Finishing (1)	Farm name Cow-calf (2)	Breeds	Age at start (days)	Finishing period (days)	Age at end (days)	Weight at start (kg LW) (3)	Daily weight gain (g / day) (4)	Final weight (kg LW) (3)	Dressing percentage (%) (5)
NTT-OEB-1	NTT-OEB-2	Santa Gertrudis * Bali Cattle	210	690	900	180	545	556	45
NTT-KUP-3	NTT-KUP-5	Bali Cattle	240	490	730	65	378	250	47
NTT-TAP-4	NTT-TAP-9	Bali Cattle	270	730	1000	70	288	280	45
NTT-TTS-15	NTT-TTS-30	Bali Cattle	300	600	900	110	233	250	47
NTT-KUP-100	–	Bali Cattle	730 - 1825	180	910 - 2005	170 - 200	444 - 500	260 - 280	45
NTB-LOB-1	NTB-LOB-2	Bali Cattle	210	510	720	75	343	250	45
NTB-LTM-4	–	Bali Cattle	1080	180	1260	220	333	280	48
NTB-LTM-12	–	Bali Cattle	285 - 630	120 - 240	525 - 750	80 - 200	500 - 625	200 - 275	56
NTB-SBW-2	NTB-SBW-4	Bali Cattle	210	420	630	70	262	180	48
SU-BON-1	SU-BON-3	Bali Cattle	240	480	720	60	438	270	48
SU-BAR-2	SU-BAR-2	Bali Cattle	540	180	720	120	500	210	43
SU-BUL-2	SU-BUL-4	Sim/Limousin * Bali cattle	210	155 - 520	365 - 730	60 - 120	558 - 871	255 - 350	48-50
SU-BAN-2	SU-BAN-4	Sim/Limousin * Bali cattle	120 - 210	580 - 670	790	50 - 70	431 - 791	300 - 600	48-50
SU-PIN-2	SU-PIN-5	Simmental * Bali Cattle	210	510	720	60 - 70	294 - 843	210 - 500	48-50
EJ-PAM-1	EJ-PAM-2	Limousin * Madura	240	460	700	95 - 100	430 - 470	293 - 316	47
EJ-NGA-2	EJ-NGA-2C	Sim/Limousin * Ongole	225 - 235	480 - 490	715	100 - 120	500 - 700	345 - 456	47-50
EJ-JEM-2	–	PO crosses	548	180	728	360	833	510	50

(1) Number refers to total finished cattle sold per year
(2) Number refers to average suckler-cow inventory per year.
(3) LW = live weight.
(4) (Weight at end - weight at start) / finishing period.
(5) Warm carcass weight (without bones and blood) / live weight pre-slaughter.

Source: Own calculations

Figure 7.9 shows the economic results for the beef finishing enterprises for the regional averages weighted with the carcass weight sold. All economic results are usually expressed as IDR per 100 kg carcass weight (CW) to make the farm data comparable. Again, per head or per ha figures are misleading because they do not reflect the differences in productivity between the farms. Figures 11.4.9 and 11.4.10 in the Appendix shows the carcass weight figures as well as the per head figures for the individual farms for information purposes.

The main findings are:

Market returns

- Similar to the cow-calf enterprises but less pronounced, highest *returns* (=beef prices) are found in Sulawesi. East Java is second, followed by NTB and NTT.

- If the Sulawesi price is set to 100, East Java is at 91, NTT at 75 and NTB at 86.

Costs

- *Animal purchase* costs are the single highest cost item in all farms. Compared with other cost items, they are relatively close to each other (on the per 100 kg carcass weight base). The reason why differences are less than in cow-calf is the higher carcass weights in East Java which to a certain extent applies to the Sulawesi farms using cross-breeds, too.

- If animal purchase costs in Sulawesi are set to 100, the other regions are at 90 (NTT and NTB) and 70 (East Java). This might be an indication that cattle supply is less scarce in East Java compared with the other regions.

- Operating costs display significant differences between NTT and NTB on one side and Sulawesi and East Java on the other side with cost levels five times higher than the other two provinces. The main driver are costs for purchase feed and production of own feed.

- Opportunity costs are highest in the farms in NTB and lowest in the NTT-farms. The NTB farms seem to substitute feed purchase and production by labour used for herding the cattle and cutting/carrying feed for longer distances.

Profitability

- Profitability is expressed as gross margin (returns less operating cost) and as net income (returns less total costs). On average of the regions, the farms are profitable with positive gross margins and net incomes.

- Gross margins are positive for all regions with the highest margins in NTB (due to the low operating costs and lowest in Sulawesi (due to high animal purchase and operating costs).

- Reflecting opportunity costs results in negative net margins for TNB, Sulawesi and East Java farms. The only positive margin remains in NTT which is biased by one exceptionally profitable extensive farm. Taking that farm out of the sample would also lead to negative net margins in the NTT average.

The fact that profitability is higher in cow-calf than in beef finishing can most likely be explained by the general scarcity of feeder cattle resulting in high prices for these animals and high returns for those producing them. Once these feeder cattle are finished, the beef obtained from these animals has to compete with substantial volumes of relatively low-priced imported beef and live animals coming from Australia (and New Zealand) putting downward pressure on the beef price level in the domestic market.

Figure 7.9: **Economic results of beef finishing farms 2009**
(weighted averages of the regions)

Weighted figures per 100 kg carcass weight sold	NTT	NTB	Sulawesi	East Java
1. Returns (sales)				
Beef returns	4.257.649	4.922.713	5.705.680	5.205.645
Subtotal	**4.257.649**	**4.922.713**	**5.705.680**	**5.205.645**
2. Purchase				
Animal purchases	2.873.694	2.895.051	3.198.030	2.250.813
Subtotal	**2.873.694**	**2.895.051**	**3.198.030**	**2.250.813**
3. Operating cost				
Feed (purchase feed, fertiliser, seed, pesticides)	351.137	51.349	1.658.024	1.921.751
Machinery (maintenance, depreciation, contractor)	2.210	12.221	5.869	23.404
Fuel, energy, lubricants, water		319.009	548.444	102.944
Buildings (maintenance, depreciation)	48.994	53.361	206.528	87.135
Vet & medicine	42.557	76.237	50.654	21.815
Insurance, taxes	8.852	12	3.296	3.609
Other inputs beef enterprise	97.893	45.399	20.977	9.361
Other inputs	5.448	12.852	9.681	
Paid labour				
Rents paid				
Interest for liabilities	0	0	1	1
Subtotal	**557.091**	**570.440**	**2.503.473**	**2.170.020**
4. Gross margin				
Returns (sale)	4.257.649	4.922.713	5.705.680	5.205.645
Purchase	2.873.694	2.895.051	3.198.030	2.250.813
Operating cost	557.091	570.440	2.503.473	2.170.020
Gross margin	**826.863**	**1.457.223**	**4.177**	**784.812**
5. Opportunity cost				
Family labour	239.459	1.821.221	1.124.111	1.090.129
Own land	407.782	102.134	534.562	130.241
Own capital	22.084	16.403	139.173	38.873
Subtotal	**669.325**	**1.939.758**	**1.797.846**	**1.259.243**
6. Net margin				
Gross margin	826.863	1.457.223	4.177	784.812
Opportunity cost	669.325	1.939.758	1.797.846	1.259.243
Net margin	**157.538**	**-482.535**	**-1.793.669**	**-474.431**

Source: Own calculations

7.2.4   Incentives and driving forces

The results of the economic analysis show that most of the cow-calf and beef finishing systems are profitable short- and mid-term. A significant number is even profitable long-term, covering full economic costs.

The analysis of the 'hard facts' such as animal numbers, production and productivity figures and their economics provides a picture about WHAT the farmers are doing but not necessarily WHY they are keeping cattle.

The farmer groups interviewed were therefore asked about their motivation, reasons and incentives for keeping cattle. The main results are as follows:

- The vast majority of farmers names 'economic reasons', 'good business' and 'cash income' for keeping cattle. Reasons like 'status', 'tradition' were also mentioned but to a much lesser extent.

- In another question the farmers were asked: 'What determines the point in time when you are selling your cattle?' With very few exceptions, almost all farmers in NTT and NTB replied: 'When we need cash'.

- In Sulawesi and East Java, more farmers named other criteria like the final weight of the cattle but the need for cash was still the prevailing reason for selling cattle.

- The need of cash typically occurs at the following occasions: weddings, funerals, school fees, trip to Mecca (NTB, Sulawesi, East Java).

- An interesting aspect in some areas (like NTT with pronounced dry season) is that labour availability is considered as a limiting factor during the wet season when all labourers are required for rice and other field work. That is why it is difficult to calve the cows in wet season, dry season calving then leads to feed supply shortages and corresponding calf mortality. This problem is addressed by efforts to improve forage production in the dry season.

- Access to local credit systems is an option to avoid the practice of selling the cattle too early. The availability of microfinance service can solve the cash issue and allow farmers to keep the cattle longer until they have the mature (optimum) weight. Unfortunately, limited access to local credit systems is a common problem everywhere in Indonesia. The main problem has been unavailability of collateral owned by farmers, certified by for example land or building certificates, vehicle (car, motor bike) ownership documents (BPKB).

- In Bali, the provincial government provides farmer group with local credit system called Credit without Collateral (Kredit Tanpa Agunan/KTA) for cattle finishing. The credit amount is IDR 25 million for five group members (IDR 5 million each) with a loan period of 1 year. In the following year, the credit ceiling will be increased to IDR 100 million per group for five group member (IDR 25 million each). BPD Bali (Bank Pembangunan Daerah Bali) or Bali Regional Development Bank manages the credit. Similar microfinance programmes are for example available in NTT (LTM, Puskud).

- The similar credit scheme can be adopted for a program to keep farmers' cattle longer until they reach the optimum weight. However, an analysis needs to be made to assess whether the additional benefit from the longer cattle keeping is larger than the additional cost (credit, feed, etc).

These findings highlight that there is a strong economic incentive to keep cattle. On the other hand, cattle are often not sold at the optimum weight but when the cash requirement occurs. It further illustrates that any policy targeted at increasing the number and/or weights of cattle in the present deficit situation need to take these drivers into account.

7.2.5 International comparison

Some of the Indonesian farms were included in the international comparison of agri benchmark. The following is valid for the comparison of the predominantly smallholder farm in Eastern Indonesia and does not cover feedlots. When comparing with their overseas competitors, the main findings are show in Figure 7.10 and summarised below.

Figure 7.10: **Summary of Indonesian smallholder farms compared with the rest of the world**

Cow-calf enterprises

Values in ID are …	Size	Productivity	Market returns	Costs	Profitability
… higher than (1)	-	South America	All others	South America Ukraine Australia	Most others
… on par with (1)	China	Most others	Europe	Australia Mexico	Some European
… lower than (1)	All others	Some others	-	Europe USA, Canada	-

Finishing enterprises

Values in ID are …	Size	Productivity	Price	Costs	Profitability
… higher than (1)	-	Pasture systems in: South America Australia	All others	Australia South America North America Ukraine	Most others
… on par with (1)	-	Pasture systems in: South America Australia	Austria Germany Spain	Most Europe	Colombia China Ukraine
… lower than (1)	All	All others	Norway		-

Note: Some countries are mentioned more than once. This means that some typical farms in that country be,ong to one group and others to another group.

(1) higher: ID values are more than 10 % higher; on par: +/- 10 %; lower: more than 10 % lower

Source: Deblitz et al. (2010)

Indonesian farms are comparably small

Compared with family farms in developed but also less developed countries, the herd sizes of typical Indonesian beef producers are very small with herd sizes below five cattle. This means that size economies and possible capital-intensive technology cannot be implemented.

Indonesia is a high price country

In 2009, beef price levels in Indonesia were approximately USD 450 per kg carcass weight with further increases in 2010. This is on the same level as Austria, Germany, France and Spain.

Productivity levels are rather low

Compared with other countries, low productivity levels can be observed, particularly in beef finishing enterprises. In many of the cow-calf enterprises, calf losses (mortality) reach elevated levels, sometimes calving percentages are below international competitors, too. The critical variables in beef finishing are low levels of daily weight gains, final weights and dressing percentages.

Cost levels low to medium

Cost levels in cow-calf are relatively low in international comparison, higher than in South America, Australia and Ukraine but lower than most European and North American farms. They result from low factor prices (with the cut & carry system mainly based on labour) and low input levels in terms of purchase feed. Beef finishing costs are only in the mid range. Cost of beef production are less favourable, sometimes reaching European (high cost) levels and also higher than in North America where feedlots dominate. The relatively high costs mainly result from the low productivity levels described above.

Profitability levels are comparably high

Medium-term profitability levels (gross margins) on enterprise level are comparably high, particularly in cow-calf production, driven by the low costs mentioned above. Also, On whole-farm gross margin level, all farms are profitable. This means that the Indonesian farms belong to the top performers in terms of profitability.

7.2.6   Conclusions

The high price levels for beef provide an incentive to produce more beef. In the recent past, this has apparently triggered decreases of the beef herd rather than increases. On the other hand, high price levels and gross margins for livestock and beef do not exert much pressure to improve productivity and management short- to medium-term. The recent failure of the FMD-zone import policy means that beef prices are likely to further increase. The lack of market incentives to improve productivity and management means that the relative international competitiveness of smallholder farms – measured in cost of production levels – is likely to rather decrease than increase over time.

If the main incentive for smallholders remains the occasional cash requirement, on-farm pressure to grow herd sizes will probably not occur quickly. The need to grow rather applies to commercial farms with a planned production programme where size effects provide economic benefits. It is therefore questionable if productivity and management improvements in smallholder farms would occur without government intervention and subsidisation.

The high price levels of beef coincided with high price levels for other commodities like rice (see Figure 3.4 in Section 3.3). The beef-rice price relations have changed in favour of rice. After the price hikes in 2007/2008 and the subsequent drop in prices global crop and feed prices are on the rise again and it is likely they continue doing so in the future. In countries with scarcity of land (such as Indonesia), this situation usually leads to a) a displacement of beef production by crops on land that is suitable for cropping, b) a relocation of cow-calf production to grassland (if available) and c) an intensification of the beef finishing systems. Recent developments in Argentina provide an example for these developments. Further, if price rises of staple foods like rice suppress demand or become prohibitively expensive for the low income population, it is likely that government intervention shifts away from beef and in favour of staple foods.

7.3   Inter-island study

7.3.1   Background

Jakarta is a main target market for NTT export cattle. As Figure 7.11 shows, there is a long and complex transport chain from NTT to the final destination in Surabaya or Jakarta. The main interisland transport steps are:

- Truck. 4 t DVM in Timor, capacity 8-10 animals and 8 t DVM (15-18 animals) from Surabaya port–Quarantine.

- Boat. Kupang–Surabaya: 4600 t DVM, 42 m length, 8 m width, speed 7-9 knot, capacity 500 animals; consists of double-decks for stocks, the crates were made from bamboo for partition. Dimension for goods and cattle – 23 m length, 8 m width.

- Trailer truck, 2 decks and 2 trailers: Surabaya–Bekasi. Capacity 25 animals in each trailer (total 50 animals per truck).

Figure 7.11:   The transport of live cattle from Kupang to Jakarta
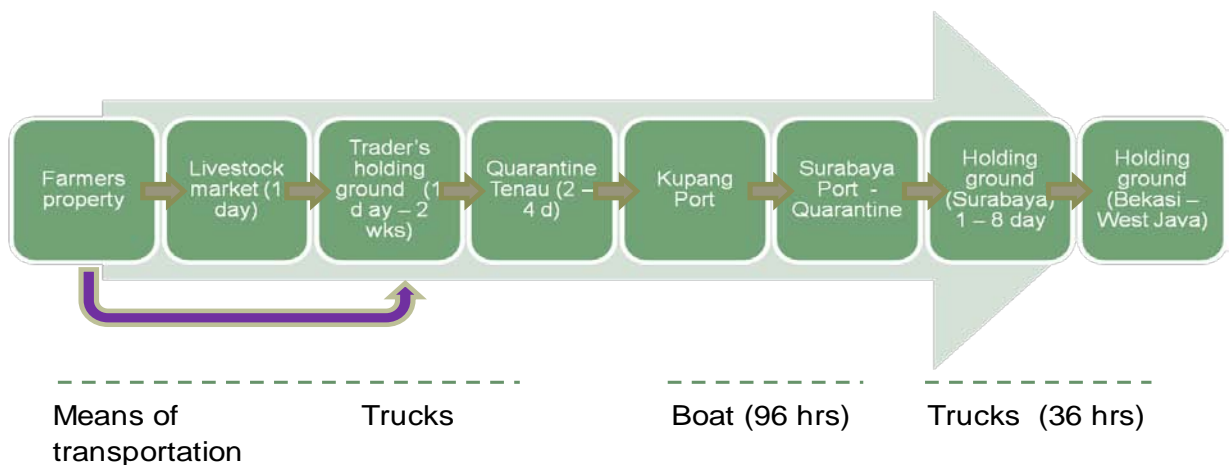
Source: Own illustration, Budisantoso

Transportation by its nature is a threatening and unfamiliar event in the life of a domestic animal. It involves a series of handling and confinement situations which are unavoidably stressful and can lead to distress, injury or death of animals if not properly managed. There is increasing recognition of the need to minimise stress of the animal, for economic reasons as well as related to animal welfare.

On the journey from Kupang to Jakarta, animals suffered from mortality and weight loss during transport. It can be assumed that the economic loss related to these issues will eventually be covered by the producer/farmer in terms of lower prices. As reported by traders, the weight loss was up to 10-12% of the body weight on the journey from NTT to Jakarta.

Improvements of animal handling and feeding during cattle transportation are expected to reduce weight loss and eventually result in higher prices paid to producers.

7.3.2   The trial

The study started with a feeding trial to determine the animal body weight loss during the transportation in each of the destination and stopover points and to improve animal handling and feeding using legumes-grass hay (linkages with ACIAR LPS 2006/003).

The first trial was conducted from 21 October – 5 November 2008. 30 male cattle with an average weight of 270 kg were selected for the trial. The animals were divided into two groups, i.e., 15 cattle of improved feeding (treatment) and 15 cattle of control.

The second trial was conducted from 14 – 27 September 2009. 21 male cattle with an average weight of 199.6 kg were selected for the trial. They were again divided into two groups, i.e., 13 cattle were treated with improved feeding and 8 cattle as control.

Figure 7.12 shows the feed for the control and the treatment group. The treatment animals were fed with grass-legumes hay feeds, consisting of 60% legumes and 40% mulato grass (Brachiaria brizantha X B. ruziziensis).

Figure 7.12:   Set-up of control and treatment group

Point of destination	Trial 1 Control	Treatment	Trial 2 Control	Treatment
Kupang quarantine	Fresh maize stover	Legumes-grass hay	Native grass	Native grass
Boat	Native grass (A. timorensis) hay	Legumes-grass hay	Native grass (*A. timorensis*) hay	Legumes-grass hay
Surabaya quarantine	Fresh native grass (imperata)	Legumes-grass hay	Fresh native grass (imperata)	Fresh native grass
Resting place (Surabaya – Bekasi)	Fresh native grass	Legumes-grass hay	Fresh native grass	Fresh native grass

Source: Own research design

The starting point of the trial was the trader's holding ground in Oesao, 40 km from Kupang port. Animals were weighed in all locations and stopover points, i.e. on the holding ground, in the quarantine in Kupang (at arrival and departure), in the quarantine in Surabaya (at arrival and departure) and at the final destination in Tambun, Bekasi – West Java.

The sale price was calculated by weighing cattle after unloading and resting and after they had been given feed and water for 4-5 hours in Tambun.

7.3.3   Results

The following observations were made during the journey. The total duration from the exporter's holding ground to the final destination in Bekasi was 15 days for the first trial and 13 days for the second trial. The total number of cattle loaded in the boat was 281 animals from 5 trading companies in the first trial and 76 cattle for the second.

Quarantine – Kupang
Shelter is good, but lack of facilities.
Lack of drinking water. Only some pens have water pipes. Drinking water had to be collected 10 km from quarantine.
No feeding trough.
No proper facilities for the stockmen (Kleder)
Tenau port in Kupang
No loading/unloading ramp, increase the risk of injury or broken legs.
There is no special boat designed for cattle transportation. The boat was also loaded with other agricultural products, such as tamarind and candle nuts, etc.
Cattle were shifted from the truck to the boat vice versa using a crane. Animals were lifted by its head-neck-horn with ropes. 3 – 5 animals in each batch.
High density animals on the boat and lack of ventilation. Heats build-up quickly, particularly in the lower deck.

Surabaya quarantine
Shelter is good, limited drinking water.
Fresh feed is available all day, nutritional status unknown
No proper facilities for the stockmen.
Cattle health was properly handled.

Body weight changes

Figure 7.13 provides an overview of the body weight changes during the journey. In the Kupang quarantine, the body weight loss of the treatment animals was higher than that of control animal, because the control animal was given green maize stover whereas the treatment animal was given hay with much higher dry matter content. The lack of water caused a lower feed intake in the treatment animal.

Figure 7.13: Body weight losses

Weight loss	First Trial		Second trial	
	Control	Treatment	Control	Treatment
kg	17.2	12.5	3.6	2.2
in percent	6.4%	4.6%	1.8%	1.1%

Source: Own survey

The second trial shows that the body weight loss was not significantly different between treatment and control animal. It can be assumed that the limited access to water in the boat reduced the feed intake of both groups. As a consequence, the impact of different feeding regimes did not become visible.

Feed intake

Grass-legumes hay consumption in the boat was higher than standing hay A. timorensis, due to its poor quality and limited quantity provided. The first trial shows the average feed intake was 2.9 kg DM/d (1.08 percent of body weight) in the treatment group and 1.5 kg DM/d (0.59 percent of BW) in the control group. The second trial shows slightly different figures with 2.2 kg DM/d (1.1percent of BW) and .2 kg DM/d (0.6 percent of BW) respectively.

It should be noted that the feed intake required to maintain the body weight is 2.5–3.0 percent of the body weight in dry matter. Furthermore, observation on the 3rd day of second trial showed that feed intake increased from 1.9 to 3.1 kg DM/d.

Mortality and injuries

The following mortalities and injuries were recorded:

- Mortality or injury could happen in the boat or in the truck
- Mortality in the boat was 3 animals (1.1% of total animal loaded)
- Mortality in the truck was 3 animals (1.1% of total animal loaded)
- Broken legs 1 animal, injury occurred during shifting animal from the trailer to the boat.

Constraints

The following are further constraints characterising the boat transport which are or can potentially be economic or animal welfare issues:

- Drinking water availability in quarantine and in the boat limits feed intake.

- Other factors limiting feed intake are: high density of animals in the boat and high concentration of methane, ammonia and monoxides.

- The boats are not designed for animal transport. There are no feeding or water troughs.

- The hairy leaf of Mulato grass causes skin irritation for hay handlers/stockmen.

- High stress during loading.

Cost-benefit of the change in feeding regime

At a price of IDR 23,000 per kg live weight, the total weight losses recorded (from Kupang to Bekasi holding-ground) are equivalent to the following losses in sale revenues:

- First trial: IDR 395,600 (control) and 287,500 (treatment)

- Second trial IDR 82800 (control group) and 50600 (treatment group)

Figure 7.14 further shows the economic cost/benefit of the treatments. After deduction of the costs, the treatment group provides a benefit of IDR 97,600 (first trial) and IDR 25,000 (second trial) per animal.

Figure 7.14:   Cost-benefit calculation

Items	Trial 1		Trial 2	
	Control	Treatment	Control	Treatment
Feed req (kg DM/d)	7,5	7,5	7,5	7,5
Total feed kg/4 hr	30	30	30	30
Cattle weight (kg)	270	270	200	200
Feed intake (kg/4 hr)	6	12	5	9
feed cost in boat (Rp)	7.500	18.000	6.250	13.500
- Grass legumes Rp. 1500/kg				
- Native grass hay Rp. 1250/kg				
BW loss	6,4%	4,6%	1,8%	1,1%
- kg/head	17,2	12,5	3,6	2,2
- Rp/head	395.577	287.523	82.800	50.600
Saving (Rp/head)		**97.554**		**24.950**

Source: Own calculation

7.3.4   Conclusions

Weight losses are a result of a multitude of issues surrounding the transport of cattle from Kupang to Surabaya. It appears that a more comprehensive approach needs to be taken if the mortality, injuries, weight losses and inconveniences for animals and humans shall be overcome. It should be remembered that the transport is carried out for the sole purpose of slaughtering the animals nonce they arrived in Jakarta after a journey of at least 14 days. Specific issues to be addressed are:

- The feeding in the Kupang quarantine needs improvement. Fresh herbage should provided.

- The cattle loading and unloading facilities need improvement, for example by installing loading and de-loading rams for trucks and boats.

- The boats used for transport should be constructed for this purpose.

- The cattle density on the boats should be reduced.

- Training in animal handling should be provided for the stockmen.

- The water supply pre-, during and after transport needs drastic improvement. This will lead to increased feed intake and lower weight loss.

- The use electrolytes solutions (Na, K, Ca, Mg) for reducing transport stress should be considered (Schaefer et al, 1997).

It is proposed to carry out a feasibility study implementing the proposed changes.

7.4 Beyond farm results

7.4.1 Feedlot operations

Production of beef in Indonesia is dominated by smallholder farmers. Feedlots contribute up to 570,000 head of cattle or approximately five percent of the total inventory in 2008 (DG Livestock, 2010). Section 7.2 provided an overview of the smallholder beef production in Indonesia.

Feedlot operators work mainly in the western part of Indonesia, in the islands of Java and Sumatra. Feedlots typically operate on a large scale with up to 120,000 head sold per annum and focussing on finishing (not raising) cattle. Feedlots in Indonesia import live cattle of 280-350 kg live weight with approximately 2 years of age from Australia. Feedlot operators are not interested in using Bali cattle for the reasons described by Hadi et al (2002): limited and scattered supply, low average daily gain and the established practice of purchase without weighting. This was confirmed in our interviews with feedlot operators.

The typical business practice in feedlotting is to import live cattle, normally Brahman cattle from the northern regions of Australia, then feed the cattle for 90 to 100 days, and finally sell the cattle to the buyer as live cattle, or beef if they own their own abattoirs. The members of AFPINDO, the feedlot association in Indonesia, produce live cattle with an average daily weight gain (ADG) of around 1.0 to 1.5 kilogram and 50 percent carcass yield. Some of our respondents integrate their feedlot operation with an advanced abattoir facility. Some of the feedlot operators also integrate additional activities like beef processing and distribution of the product. Surprisingly, there is little presence of modern trading arrangements. For marketing purposes, most feedlots continue working with privately managed beef distributors and traditional networks of traders and butchers in the respective region to ensure that their cattle are distributed efficiently to traditional markets.

On the feed side, feedlots usually have feed supply arrangements with farmers and agri-food industries to purchase their by-products to ensure a continuous supply of ingredients for the production of consistent quality feed. In this context, the by-products from production of pineapples, copra, cocoa, palm oil and cassava play an important part in feeding.

Regarding beef statistics, APFINDO reports that there is a discrepancy in Indonesian livestock statistics and suggest that the actual import percentage is higher than the published data. Further, they also had an opinion that the current government objective of self sufficiency policy is likely to fail due to the absence of clear guidelines and lack of policy support.

7.4.2 Domestic livestock trading

Livestock traders connect beef producers with other livestock traders on a different regional level or with (beef) traders who operate in abattoir facilities. Our observations show that due to the rapid development of the interisland cattle trading, low reproduction

rates in the production areas, better access to price information for the producer, increasing cost of transport and rapid development of local consumption in the production areas, the costs of interisland cattle trading business are rising rapidly.

Our observations also indicate the lack of cattle for trading. Most traders in NTT and NTB report that it has become more difficult for them to source cattle that fulfil the requirements for domestic export (to other provinces), the most important of which is the minimum weight of cattle to trade inter-province, 250 kg per head. Our abattoir respondents confirm that the average weight of cattle that are slaughtered in their facility is less than it used to be five years ago.

Another challenge in this business is related to the local policy. There are two important issues related to local policy.

1. First, due to decentralisation (more local decision making), governments in district and provincial level see local sources as an opportunity to increase their income (PAD: Pendapatan Asli Daerah). Retribution and toll fees for transporting and trading cattle are part of this system and overlapping policies between districts and province result in aggregated levels of such fees and other barriers for efficiently running cross-district and cross-province businesses.

2. The second issue is related to local development policies. Some regional governments, such as NTT and NTB, are very keen to increase and/or maintain their cattle population and thus introduced a quota to cattle trading. However, there is no clear indication on how this quota is determined and how it was implemented and monitored on the ground. The following figure shows the position of each region in the domestic cattle trade.

Figure 7.15:   **Domestic export and import in project regions 2005-2009 (head)**

	2004	2005	2006	2007	2008	2009*
Cattle import						
DKI Jakarta	81.532	69.385	63.003	52.233	47.568	42.268
East Java			6.000	6.500		
NTB	500					
NTT		567				
Sulsel		4.607	1.935	1.990	2.050	2.050
Cattle export						
DKI Jakarta						
East Java	9.497	12.094	138.684	142.461		
NTB	18.251	26.158	28.640	27.210	29.413	30.500
NTT	44.901	48.519	61.279	63.036		
Sulsel		1.693	8.255	2.969	2.969	2.969
Balance (Ex - Im)						
DKI Jakarta	-81.532	-69.385	-63.003	-52.233	-47.568	-42.268
East Java	9.497	12.094	132.684	135.961		
NTB	17.751	26.158	28.640	27.210	29.413	30.500
NTT	44.901	47.952	61.279	63.036		
Sulsel		-2.914	6.320	979	919	919

  * = Preliminary

  Source : Calculated from DG Livestock

Source: DG Livestock Statistics 2009

According to the official statistics, Figure 7.15 shows that Jakarta has been the largest net importer of live cattle for slaughter for the period 2004 to 2009. The declining numbers of cattle imported to Jakarta is likely due to two factors:

- The first factor is the rapid expansion of abattoir development in neighbouring districts such as Bekasi and Tangerang. This means that more cattle are transported to these district (which is part of west Java province), slaughtered in their abattoirs and then enter the Jakarta market as beef.

- The second factor is the rapid development of frozen beef entering the Jakarta wet markets. This was indicated by our respondents on the wet markets. Jakarta is characterised by a large, growing population and a relatively efficient infrastructure for distributing products and information. This creates more competition.

Figure 7.15 also indicates that East Java has been the biggest exporter. However, the time series data need to be considered with great care:

1. The jump in the East Java numbers from 2005 to 2006 is implausible. When confronted with inventory figures in East Java, the beef cattle inventory only increased slightly from 2.52 million head (2005) to 2.58 million head (2006); the largest feedlot operated in East Java produced 7,134 head in 2005 and 10,890 head in 2006.

2. It is likely that the export figures from East Java include the re-exports from NTT and NTB.

3. For the years 2008 and 2009 no data are recorded in some provinces.

NTT and NTB are the next two in the ranking, with the NTB figures consistently growing over the period. Neither of them has any import recorded in this statistics. It is a surprise that both NTT and East Java have no export figures for 2008 and 2009 since our interviews with various levels of supply chain stakeholders in NTT and East Java indicated that both provinces do export some cattle during the period. Sulawesi has constant export and import figures for 2008 and 2009.

Further, most traders confirm that the price gap between Jakarta (higher price) and those provinces (lover price) is not as high as it used to be. As a consequence, their margin has become lower. Possible reasons for this include:

- There is a growing demand for live cattle in eastern Indonesian provinces other than the project regions (such as Kalimantan, Sulawesi and Papua) which are on the way of becoming new market destinations for eastern Indonesian cattle.

- There is an increasing demand from the local markets in eastern Indonesia due to the increasing number of population and/or income level as well as urbanisation. This is particularly true in urban areas such as Mataram (NTB), Makassar (Sulawesi Selatan) and Kupang (NTT).

- There is an increasing competition of eastern Indonesian beef with beef supplied from feedlots and imported frozen meat. Prices for imported frozen meat are close to prices of beef produced from domestic sources and prices of imported offal or lower quality beef are very often lower than from local sources. Similar price relations apply for beef produced in feedlots and in the traditional system. Further, the slaughter cost per head is identical and feedlot cattle have higher yields (higher weights and sometimes higher carcass yields). Both factors reduce the incentive of traders to buy/trade local cattle.

- Transport costs from eastern Indonesia to Jakarta increased (truck, ships etc.).

All these factors tend to relatively increase the prices of cattle produced in eastern Indonesia.

7.4.3   Livestock slaughtering: Abattoirs

Abattoirs are an important part of the beef supply chain, in particular when it comes to hygiene and sanitary standards of food services. Abattoirs play an important role for traders. Once the cattle are slaughtered, different parts of the cattle are distributed into two different channels, making the abattoir the meeting point for specialised traders. Specialisation of traders include: meat, bones and foot, skin, offal, and head.

Most abattoirs in the research regions are operated by the government. The typical services by the abattoir are providing a) a place to kill, b) temporary pens to keep cattle and c) pre- and post-mortem veterinary checks. The usual charge for this service is IDR 15,000-34,000 per head. In contrast, fees in private-owned abattoirs in Jakarta are IDR 45,000 per head with the abattoir staff doing all the work.

Most government-owned abattoirs display one or more of the following particularities:

• Absence of or difficulties to implement hygiene and sanitary standards.

• Some of these abattoirs are just a place to kill the cattle, since all the work is conducted by the traders. Traders bring their cattle to the facility and then his/her men do all the work including slaughtering, cutting and cleaning.

• With the low fee for their service and the usually small size of operation – the number of cattle slaughtered in the abattoir is normally five to 30 head per day – the operation of a government-owned abattoir raises only small amounts of income, which sometimes is not enough to cover its operational cost. The livestock office argues that this is justified since these abattoirs are intended as public service, not as a source of income. Staff salary and other fixed costs are paid by the government budget.

• Typically, transparency of cattle weights is limited. As a result, stealing meat by the workers is a common event.

• Meat cutting standards are not established in some cases.

Some non-typical abattoirs, usually owned by private sectors, would operate on a larger scale and provide additional/better service such as live cattle trading and a transparent trading process. A private operation in Bogor is specialised in producing premium beef quality and slaughter cattle coming exclusively from their feedlot facility in Lampung and sells the product to a single beef distributor who takes it to the supermarkets.

Compliance with Halal[2] requirements is an important factor for consumers and beef producers particularly in predominantly Islamic regions. In government-managed abattoirs, the government regularly provides training for selected traders to conduct Halal-slaughtering in their facilities. Those trained traders then receive a certificate and have 'the right' to use the abattoir. Non-government abattoirs (typically owned by private sector) would have one or more dedicated staff to do the Halal-slaughtering. When it comes to sourcing of cattle, the supply of cattle to abattoirs in the project regions can be characterised as shown in the Figure 7.16.

In general, Bali cattle coming from our typical farms are slaughtered below their optimum weight (at 150 to 300 kg live weight) while crosses are slaughtered on a higher weight with 250 to 600 kg. Boediyana (2009) reports average weights of Bali cattle in Java Island of 300 kg live weight and 275 kg live weight for other regions. In comparison, cattle from feedlot production are slaughtered at 350 to 400 kg live weight.

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[2]   *Halal food means food permitted under the Islamic Law and should fulfil the following conditions: (1) does not consist of or contain anything which is considered to be unlawful according to Islamic Law; (2) has not been prepared, processed, transported or stored using any appliance or facility that was not free from anything unlawful according to Islamic Law; and (3) has not in the course of preparation, processing, transportation or storage been in direct contact with any food that fails to satisfy point (1) and point (2). (FAO/WHO Codex Alimentarius Commission (CAC/GL no 24.1997))*

Figure 7.16: **Abattoir sources and suppliers of cattle by regions**

Province	Typical source of cattle (major location)	Typical Supplier	Typical Breed Slaughtered
Mataram	Local NTB (mostly from Lombok and Sumbawa)	Trader	Bali
Kupang	Local NTT	Trader	Bali
Makassar	Local South Sulawesi, NTT	Trader and feedlot (Pare pare)	Bali Cross
Surabaya	Local East Java, Central Java, NTT,NTB, Bali	Trader and feedlot	PO, Bali, Brahman Cross and PO cross
Jakarta	Local Jakarta municipality, West Java, East Java, Lampung, Central java, NTT, NTB, Bali.	Trader and feedlot	PO, Bali, Brahman Cross and PO Cross

Source: Own survey

An obvious issue that is found in some abattoirs – including in the government-owned abattoirs across provinces – is the practice to slaughter productive female cattle. Slaughtering of productive female cattle is banned by the regulations, except in certain conditions. But one way or another, traders are usually able to slaughter productive cattle. According to most of our respondents, this practice is a crucial driver of the decrease of beef cattle population which is repeatedly quoted in all project regions but not shown in official statistics.

With respect to the potential for development, the following points are critical for improving abattoir performance and policy development:

- Competition with frozen meat.

- Competition with backyard (illegal) abattoir operations.

- Better knowledge of consumer preference and level of knowledge on hygienic and sanitary aspects of beef.

7.4.4   Beef distribution

The abattoir transforms the product from live cattle to beef. From the abattoir, beef is distributed into two directions. Firstly, beef is channelled to consumers via wet markets, supermarkets, mobile peddlers and restaurants. Secondly, it goes to the beef processing industry for further processing before entering the different markets mentioned above including fast food outlets. This section focuses on wet market and supermarket since they represent the largest value of beef sales to consumer. Beef processing is discussed in Section 7.4.5.

Wet markets

Our observations show that wet market traders still play an important role in beef distribution, particularly as suppliers to bakso (meatball) home industries, households and small scale restaurants. However, the proportion of wet markets in total retail sales is continuously shrinking. A survey conducted by AC Nielsen in 2006 suggests that wet market shares for 51 items of consumer goods was decreasing at a rate of one to three percent per year during the period 2001 to 2006 (KPPU, 2007))

Though the situation varies between the five project provinces, it can be observed that beef sales to household level consumers are stagnant or in some case even decreasing, while on the other hand sales to Bakso (meatball) producers grows in most of the project regions.

Wet market traders in Jakarta typically own 1 to 3 booths. In one particular wet market they would sell approximately 50 to 75 kg beef and beef products per day. Further, wet

market traders are typically specialised. According to the type of product they sell, there are three main types of specialised wet market traders: 1) meat only, 2) offal only and 3) bones and foot only. They sell their product in various volumes.

In terms of suppliers, most wet market traders receive their supply directly from butchers, larger traders operating in abattoirs and/or other beef suppliers located in the wet market. The following practices are found in the wet markets:

- Selling meat that is produced from backyard/unregistered abattoirs (no health check and veterinary control).

- Mixing local beef with frozen beef. As explained above, frozen beef is not preferred and therefore usually cheap while fresh meat is expensive. Mixing local beef with thawed (imported) beef enables sellers to keep the price low and thus attract more price-sensitive consumers.

- Cheating on scales (non-calibrated scales).

In terms of prices, the traders experienced a rapid increase in beef prices. The underlying drivers for beef price development, among others, are the following factors. The plus and minus signs show the direction each driver has on the beef price.

- Increasing demand (+)

- Limited supply of local beef cattle from small scale farmers. (+)

- Increasing price of live cattle and transport cost. (+)

- Supply from feedlot (based in Jakarta municipal, West Java, Lampung). (–)

- Competition with imported frozen beef and offal. (–)

- The appreciation of the Rupiah against major currencies, for example the Australian dollar. A high IDR buys more AUD and more import beef, offal and also live cattle for fattening purposes. Both frozen meat and fresh meat from fattening/feedlot contributes a significant part of beef supply chain in Jakarta. (–)

While the first three factors result in higher beef prices, increased volumes of imported beef, offal and live animals at a lower AUD exchange rate contribute c.p. [3] to a reduction of prices. Most experts agree that without the imported beef and offal, the Indonesian beef prices would be even higher than they are now. It can be expected that with the opening of the Indonesian market to beef imports from Brazil and India, local beef prices will come under pressure. As a result, it is likely that cattle from eastern Indonesia are losing market shares in Jakarta-based wet markets unless the cost of producing and transporting cattle and beef can be reduced.

Supermarket

Supermarkets are expanding rapidly in some of the research regions, particularly in urban areas where the population number and density is high. Our examination of the top 3 supermarket chain reveals several key aspects of the beef supply chain, which are backed by data from direct interviews with the supermarkets' fresh product distribution centre officer and in some case with the national fresh product general manager. These aspects include:

- Beef and fresh products in general are not supermarket core business. They run it as complimentary service, and claim that the unit usually creates more cost than profit for the company, or – in the best case – provide a very low margin.

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3   c.p. = *ceteris paribus: all other things being equal.*

- Beef is sometimes used as a marketing tool. Specific cuts are advertised and sold below their purchase (wholesale) price which is sometimes even lower than the corresponding wet market price for the same cut, to attract consumers. The loss is subsidised by revenues from other items sold in supermarket.

- Sales per store vary between 1.5 kg per day in a store in urban areas on the Lombok Island to more than 100 kg per day in metropolitan Jakarta. The volume also varies between locations and seasons and is above average at weekends and public holidays.

- In general, western cuts are not yet well recognised by Indonesian customers. Supermarkets often sell western cuts with a local name, or create a new one. For example, blade and chuck are sold as daging rendang. Higher quality of blade (import from Australia or New Zealand) is simply sold as premium rendang. Daging rendang is the major product or name for beef cuts and accounted for up to 60 percent of sales in certain supermarkets.

- Cultural reasons and preparation techniques are commonly cited by our experts as the main reasons behind these phenomena. Indonesians use long (slow) cooking techniques for beef preparation where beef is boiled or simmered to make soups and stews. Barbecue-like steak preparations are uncommon or unknown. Thus, marbling, softness and other western-style meat characteristics are not (yet) appreciated by the Indonesian consumers. For various reasons (e.g. Halal, freshness, taste), local beef is still preferred by supermarket consumers, although the origin of beef is not such an important factor for the buying decision, it apparently was in the past (see also Section below on consumer analysis).

Most supermarkets managers agree that price and hygiene are now among the more important factors for buying beef in supermarkets. It seems that consumers are more sensitive to price these days. Hygiene and sanitary standards seems to be the second reason. Supermarket's beef is perceived to have higher hygiene and sanitary standards. In addition, most supermarket managers mention a growing demand for safe beef from their household consumers. The driving factors for this demand according to our observations include:

- A growing middle class in urban areas, with more people having a better education; of these some obtained their education from western countries.

- In addition, the major supermarkets put a lot of effort to educate their consumers and also their suppliers. More and more international food quality standards, such as HACCP and ISO, are partially or entirely incorporated in the beef supply chain management. A major retailer is moving forward by applying ISO 22000 [4] in some of their leading stores in 2009.

Most supermarkets do not source their beef supplies from local, government-owned abattoirs. The main reason is that most of the government-owned abattoirs operate by providing kill-only service with limited application of hygiene and sanitary standards. While further detail on abattoirs is explained in Section 7.4.3, our observation suggests that beef from these abattoir-based traders is usually sent to the wet market and not to the supermarket. According to the traders, the main reasons for this are the difficulties to meet the terms and conditions requested by supermarket, such as:

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[4] The ISO 22000 specifies requirements for a food safety management system where an organisation in the food chain needs to demonstrate its ability to control food safety hazards in order to ensure that food is safe at the time of human consumption (International Organization for Standardisation, 2005).

- Payment. Dealing with wet market provides immediate cash income and thus better cash flow for the traders than dealing with supermarkets. In contrast, supermarkets apply different terms of payment and they also apply various cost-relevant trading terms, including listing fee, regular discount and penalties for not complying with their conditions (KPPU, 2008).

- Specific cuts. There is no specific standard of cutting the cattle on the wet markets.

- Hygiene and sanitary standards. Cold chain, hygiene and sanitary standards and implementation of food-grade standards are very important for supermarkets but typically not available at wet market level.

Based on these characteristics, we can conclude that importers, feedlots and modern meat processors are the backbone of the beef supply to supermarkets.

Confronting these findings with our research purposes, it is likely that cattle from eastern Indonesia (excluding East Java) have a very small market share in the Jakarta-based supermarkets. The situation is slightly different in Surabaya supermarkets where a larger portion of the supply comes from local cattle and from imported cattle that were slaughtered in BUMD type abattoirs in Surabaya.

7.4.5   Beef Processors

Large scale processors

Large scale beef processors normally produce various products, which include corned beef, sausages, meatballs, and burgers as well as gourmet foods such as salami and cold cuts. However, it appears that meatball is the most common product produced by all processors.

Some of the beef processors are vertically integrated. Japfa Santori is the extreme example for integration. They are fully integrated from farm to processed product both in poultry and beef. Other companies combine their business with abattoir facilities, import and/or food distributions. This practice is reasonable for two reasons: first to increase the margins and second to secure their end-user and procurement channels.

In terms of beef procurement, Figure 7.17 indicates that most of the large-scale beef processors source their supply from beef importers or direct imports. It also indicates that beef processors use only imported beef and/or beef from feedlot production, a fact that was confirmed by ASPIDI (beef importer association) and NAMPA (beef processor association) on interviews. Some of the processors own abattoir facilities and source their beef from there.

The following points are the main drivers of the dominance of imported beef for the beef processing:

- Price: Local supply is normally more expensive.

- Hygiene: local beef is perceived as un-hygienic beef because the cattle are slaughtered in local abattoirs with poor hygienic standards.

- Grading system: Established grading systems are not in place in local abattoirs, which in turn makes the processor to source their preferred cuts from selected private abattoirs or imports.

Figure 7.17:   **List of selected beef processors active in the island of Java**

Company	Sales/year	Business lines	Processed Products (beef only)*	Brands (beef only)*	End-use channels	Production location	Procurement channels
Japfa comfeed/ Santori	Rp. 5.3 trillion (2005)	Confectionary, beverage, processed food, animal feed manufacturing, chicken breeding and processing, aquaculture farming, beef cattle breeding, beef cattle fattening and meat processing.	Corned beef, Sausages and Meatball	So Good, So Nice	Retail and HRI (hotel, restaurant and institutional)	7 processing plants in East Java, Lampung-South Sumatera	Direct, Importer, Own abattoir(s)
San Miguel purefoods	n.a.	Processed meat products, also work in brewery, plastics and non-alcohol beverage	sausages, meatballs, luncheon meats, and cold cuts	Farmhouse and Vida	Retail and HRI	Join Venture (Philippines) Jakarta	Direct, Importers
Madusari Nusaperdana / Pangan Sehat Sejahtera	n.a.	Chilled Processed Food, Frozen Food	Sausages, Luncheon meat, Meatball, Corned, Burger, Salami	Kimbo, Vigo and Fino	Retail	Bekasi, West Java	Importers Distributors
Eloda Mitra	n.a.	Chilled Processed Food, Canned Food, Frozen Food, Soup	Sausages, Meatball, Burger	Bernardi	Retail	Sidoarjo, East Java	Importers, Distributors
Macroprima Pangan Utama/ Macrosentra Niagaboga	n.a.	Dairy, food processing equipment, processed meat, food distributor, Restaurant	Sausages, Smoked beef	So-Lite, Kanzler and Rollado	Retail and HRI	Cikupa, West Java	n.a.
Sumber Prima Anugrah Abadi	n.a.	Meatball, Sausages	Meatball, Sausages	Sumber Selera	Retail	Tangerang	Importer, Distributor, Own abattoir(s)

* : Main products

Source: Compiled from NAMPA, USDA Foreign Agricultural Service (2009), official company's website, SWA and own interviews

Small-scale processors

Surveys on small scale beef processors were conducted in all regions. The following are the top 4 products of processed beef that are commonly found in both wet markets and supermarkets:

1.   dried shredded meat (abon),
2.   smoked beef (daging se'i),
3.   beef jerky (dendeng), and
4.   meatball (bakso).

Unlike bakso that should be consumed within a few days, dendeng and abon can last for weeks because it is usually dried with salt, sugar or spices added during the process. Smoked beef (daging se'i) is a NTT specialty and difficult to find in other regions while meatballs are prominent in all regions. Most respondents claim that they use local beef (Bali or Ongole) for their production.

All respondents buy their beef in local wet markets. The main reasons for this include long established networks with the wet market traders, price (perceived as cheaper than supermarket) practicability/convenience (because they can buy other ingredients at the same kiosk) and in some cases the meat quality where local beef is considered superior for meat ball production to imported beef due to its physical consistence. Another possible reason is that there are usually several beef grinding service providers in wet markets, located conveniently next to the meat section, where bakso producers can grind their beef.

During the last five years, our respondents witnessed that more and more people got involved into this business and individual production decreased. They also note that it becomes more difficult for them to get local beef for their bakso production.

7.4.6   Consumption and preferences

Consumption

On the demand side, Indonesia is a huge and growing market for beef. The population, currently estimated at 230 million and growing, consumes 1.18 kg of beef per capita per year (Ditjennak, 2009). Despite the financial crisis, Indonesia's GDP-growth for 2009 was 4.5 percent, 1 to 2 percent higher than Malaysia and Thailand (Patunru and von Luebke, 2010). These factors combined with the population growth, and the rapid development of modern retail and food service resulted in the perception of business actors that demand of beef will continue increasing until 2020. This is confirmed by our beef processors respondents since none of them considers closing down their business, and some of them even plan to expand their business. A recent publication from Meat and Livestock Australia also confirms this point of view (MLA, 2010). The wet market and supermarket retailers also shared the same opinion. Hence, there is a positive expectation from both the wet market retailers and supermarket representatives that the market for beef is going to grow further.

Figure 7.18 shows the demand and supply statistics of beef in Indonesia during the period 2005 to 2009 and provides overall figures on the development of beef consumption, local production and imports. It suggests that imports provide approximately 30 to 40 percent of total supply during the period 2005 to 2009, in which the feedlot industry (live cattle imports) consistently provides approximately 50 percent of total imports and beef import tripled over the period. The number of live cattle imported was converted into meat equivalent. Figure 11 also suggests that the Indonesian self sufficiency levels were between 60 to 62 percent for the year 2007 to 2009.

Figure 7.18:   Local production, import, export and consumption 2005 - 2009

		2005	2006	2007	2008	2009
A	Local production (000 ton)	217,40	259,50	210,80	233,60	250,80
B	Import					
	-Live cattle (000 head)	256,20	265,70	412,20	570,10	n.a
	-Live cattle (beef equivalent)(000 ton)	55,10	57,10	60,80	80,40	72,80
	-Beef (000 ton)	21,50	25,90	50,20	57,20	64,10
	-Offal (000 ton)	34,70	36,50	13,80	12,90	10,60
	Total Import (B)(000 ton)	111,30	119,50	124,80	150,50	147,50
	Percentage of offal to total import (%)	*31,18*	*30,54*	*11,06*	*8,57*	*7,19*
	Percentage of live cattle to total import (%)	*49,51*	*47,78*	*48,72*	*53,42*	*49,36*
C	Export					
	Beef (000 ton)	0,10	0,01	0,05	0,06	n.a.
D	Total supply (A + B - C)(000 ton)	328,60	378,99	335,55	384,04	398,30
	Percentage of import to total supply (%)	*33,87*	*31,53*	*37,19*	*39,19*	*37,03*
E	Direct Consumption (000 ton)	n.a.	n.a.	314,00	313,30	325,90
	Percentage of total supply (%)			*93,58*	*81,58*	*81,82*
	Percentage of local production (%)			*148,96*	*134,12*	*129,94*
F	Available for processing (D - E) (000 ton)			21,55	70,74	72,40
E	Self sufficiency level (A/D) (%)			62,82	60,83	62,97

Source: Processed from DG livestock 2010

The live cattle import figures in Figure 7.18 are far below the data published by MLA. MLA publishes monthly statistics of Australian live cattle exports, including to Indonesia, its largest market destination. The MLA data suggest that during the period 2005 to 2009 their export figures to Indonesia were: 347,967 head (2005), 386,566 head (2006), 516,992 head (2007), 644,849 head (2008) and 768,133 head (2009). Assumed that the weight of each cattle are 280 kg (the minimum weight of cattle imported to Indonesia according to AFPINDO) the edible product equivalent (including beef) of live cattle import figure were at least, 50, 54, 72, 91 and 107 thousand tonnes for that period.

Consumer preferences

Peck's (2008) study on global beef supply chain suggests that consumers will always pay a premium for meat that provides safety, nutrition, convenience and health. Consumers of beef in Indonesia, in particular those with a higher income and living in the urban areas, are no exception to this global trend.

In each of the project regions, a simple survey on consumer preferences was conducted as part of the study. The interviewees were shown a list of beef characteristics. In addition, they could also name additional characteristics relevant to them. For each characteristic they could indicate their preference on a scale from 1 (unimportant) to 5 (most important).

Our consumer interviews suggest that the most important characteristic seems to be freshness, while domestic origin is less important compared to freshness and low fat (see Figure 7.19). This finding is also shared by supermarket managers. Our interview with national supermarkets managers suggests that the demand for local beef is likely to decrease due to the rapid development of supermarkets and their push and continuous effort to keep educating the consumer on the hygiene and sanitary aspects of beef. Most of our supermarket respondents mentioned hygiene and sanitary aspects as an important reason for their buying decision.

Figure 7.19:   Consumer preference index for beef characteristics (weighted number of ranks 1-5 relative to total replies)
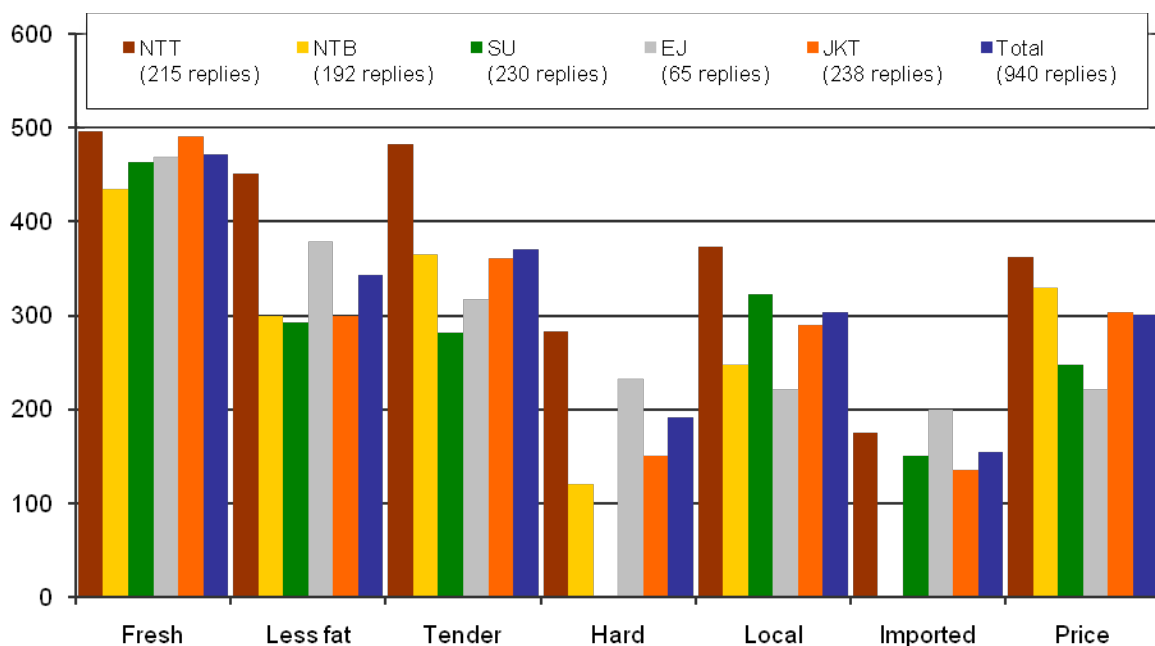
Source: Own survey

At the same time, hygiene and sanitary conditions is the area where improvements are most wanted by consumers (see Figure 7.20). This opinion is shared by ASPIDI that suggests that Indonesians are getting used to imported beef from Australia and future consumer preference will be gradually shifting towards western values.

Availability seems to be an issue as well but it was not specified whether availability refers to supply quantities or specific cuts and qualities. With regard to specific cuts, only 7 per cent of our respondents want better availability of preferred cuts when asked for the type of improvement that they want. Priority seems to be on low-price beef irrespective of the cuts as long as it is fresh (warm). This is why the beef price (or to be precise low value beef cuts) increase during the Muslim festival period and this supports the (temporary) supply shortages reported in other sections of the report.

Figure 7.20: **Consumer preference index for improvements (weighted number of ranks 1-5 relative to total replies)**
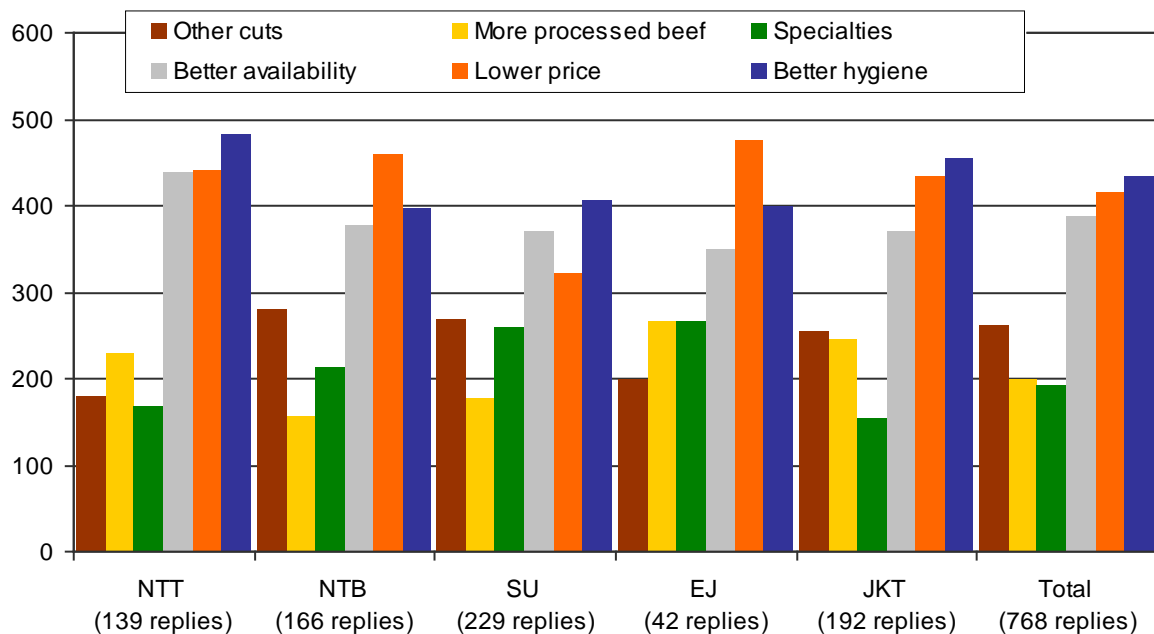
Source: Own survey

In terms of consumer types, it is likely that we witnessed a shift in consumer types from individual household consumers to meatball (Bakso) sellers appearing as beef buyers on wet markets. Bakso sellers are increasingly recognized as an important consumer in most project regions.

The observation of an increase in sales for Bakso also raises a number of questions, especially wether the Bakso sales happen at the expense of meat (beef) sales or whether they are the major expansion path of beef consumption and wether this path is a result of the low price of Bakso (on average) compared to meat (beef). Compared to meat, Bakso comes with some additional features to the consumer. First, as a processed product, Bakso can be stored in a longer period, and second bakso is normally available in various sizes and quality and thus provide various prices to suit consumers' income. Further, MLA consumer research in Indonesia (conducted in late 2007 published in 2009) suggests that beef is still viewed as a luxury good, and thus consumer are sensitive to price. The MLA consumer research also suggests a lack of awareness of how to cook beef in a way that is perceived superior to meat and fish.

7.5 Typical supply chains (TSC)

Based on the approach described in Section 5.5.2, the following eight TSCs were selected for analysis:

[1] **NTT-1** Interisland trade from NTT to Jakarta (via East Java)
A large amount of cattle are transported to Jakarta by boat and truck via Surabaya to be slaughtered in Bekasi and Tangerang and consumed in Jakarta on the same day (see also interisland study, Section 7.3).

[2] **NTT-2** NTT local flow
The second important flow from NTT is the flow of cattle within the Timor Island. Cattle are transported from Kupang district, Timor Tengah Selatan, Belu, and Timor Tengah Utara to be slaughtered and consumed in Kupang.

[3] **NTB-1** NTB − Sumbawa interisland flow
This is the most important flow of cattle in NTB. It shows flow of cattle from districts in Sumbawa Island to Mataram (Lombok Island) normally by ferry and small boat. Some of them are slaughtered in Mataram and consumed on the same day while the rest goes to the interisland traders which hold them for a while in Mataram and later send them to Kalimantan, Sulawesi or Java.

NTB − [4] **NTB-2** Lombok local flow
This supply chain represents the flow of cattle from Lombok Tengah, Lombok Barat and Lombok Timur to Mataram. Cattle are slaughtered and sold as beef in Mataram wet markets.

[5] **SU-1** Sulsel − North Makassar local flow
Cattle from Barru, Pinrang, Sidrap and Bone are transported as live cattle to Maros, a city next to Makassar, to be slaughtered and then sold as beef in the markets in the northern part of Makassar.

[6] **SU-2** Sulsel − South Makassar local flow
The second flow of cattle to Makassar from districts in Southern parts of South Sulawesi namely Bantaeng, Bulukumba, Sinjai and Jeneponto (cattle reception area of cattle from NTT and NTB). They are transported as live cattle to Gowa, to be slaughtered in the local abattoir in Gowa and sold as beef in the markets in the southern part of Makassar.

[7] **JKT-1** Australian live cattle to Jakarta
Flow of imported cattle from Australia is important to DKI Jakarta. It holds the more than 50 percent of the market share of beef consumed in Jakarta. Live cattle are kept by feedlots located conveniently in the outskirts of DKI Jakarta (Banten) for approximately 100 to 120 days before slaughtered and sold as beef in Jakarta wet markets and supermarkets.

[8] **JKT-2** Australian boxed beef to Jakarta (frozen)
Boxed frozen beef play a significant role for Jakarta markets. They are sold both in wet markets and Supermarkets. A small percentage of the beef are also processed, mainly into meatball and sold both in wet markets and supermarkets

The location of the eight TSCs on Indonesian Map is shown in the Figure 7.21.

Figure 7.21: **The eight typical supply chosen for analysis**

Source: Own illustration

Issues

TSC helps to draw the whole supply chain picture with reasonable input. When conducting the margin analysis presented hereafter, some issues occurred which are described below.

Conversion from live weight to carcass weight

The first issue that appeared when we did the calculation is the conversion from live cattle to beef and then processed beef. Farmers, cattle importers, feedlot and live cattle traders deal with live cattle whereas the Jagal/slaughterer and abattoirs deal with live cattle as input product and beef, offal, hide, bones and other beef cattle part as their output product. Wet market traders, supermarkets, beef importers and beef processors deal with one or more beef cuts/specifications and pay different prices on them. Further, we assumed that 50 percent is the dressing percentage to facilitate conversion from live weight to carcass weight.

Since we were dealing with businesses, some data are restricted to disclose to the public and different figures appear from different sources (e.g. data obtained from business associations which do not always match data obtained from the individual companies). Further, data related to the size of the businesses and details of financial figures are particularly hard to obtain because they relate to tax, business strategy and competition (in the case of beef processors, traders, importers), they are part of a larger business where allocation of single items is difficult (in the case of supermarkets) or managed by the government where some costs are not accounted for (in the case of abattoirs). We decided not to include government-owned abattoirs in the TSCs calculation for the following two reasons:

- They are managed as non-profit operations and they provide kill-only service to the traders with the aims to provide hygienic beef for the market.

- Although it runs on public money, it is very difficult to obtain cost breakdown of abattoir budget (including salary and maintenance).

Matching prices between supply chain levels

It turned out that data/information from one level of supply chain does not always fits with data from the next level. For example, the sale price of the previous level of the supply chain should be identical with the purchase price of the next level, but this was not always the case. There can be the following reasons:

- Cattle price are determined via estimation of its weight, and sets in per head basis. While beef are sold per kilogram. In some cases, Jagal(slaughterers) and beef traders that operate in government owned abattoir set the prices of beef without put it on a scale.

- Wrong data or data from two different points in time (with price changes between them) were taken during interviews. However, this risk was minimized with reference prices obtained from interviews with other actors, including their competitors and next level suppliers/buyers.

- In the case of beef processors, they bought specific beef cuts (e.g. low value beef for meatball production), thus their purchasing price is different to the average sale price of wet market traders that cover a range of beef cuts (value).

Figure 7.22a and 7.22b show examples of the impact of the issue in TSC-NTB 2 (Interisland trade from Sumbawa to Mataram) and TSC-NTT 2 (NTT local flow). Similar issues appeared in all eight TSCs.

Figure 7.22a: Cost structure of various levels of the beef supply chain in TSC NTB-2 (IDR per 100 kg LW)

Legend F   Farm NTB-SBW-2
LD   Livestock trader (inter-District)
LIA   Livestock trader (inter-Island) Sumbawa
LIB   Livestock trader (inter-Island) Lombok
J   Jagal/slaughterer
WT   Wet market trader Mataram
BP   Beef Processor

Source   Own calculations

Figure 7.22b: **Cost structure of various levels of the beef supply chain in TSC NTT-2 (IDR per 100 kg LW)**
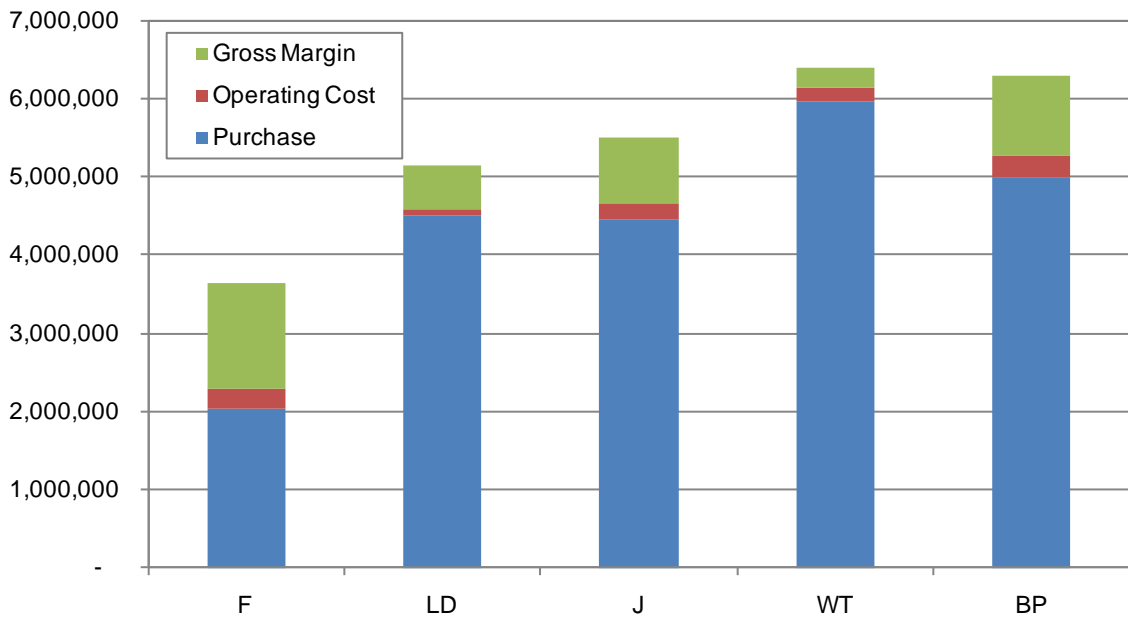
Legend **F** *Farm NTT-TAP-4*
LD *Livestock trader (inter-District)*
J *Jagal/slaughterer*
WT *Wet market trader Kupang*
BP *Beef Processor*

Source   Own calculations

Figure 7.22a and 7.22b shows the mismatch between the sale price of one actor and the purchase price of another actor of the next level in TSC NTB-1 (a) and TSC NTT-2 (b). The sale price of farm (F) is lower than the purchasing price of the inter-district livestock trader, while on the other side the sale price of the inter-district livestock trader is slightly higher than the purchasing price of Mataram/Kupang based inter-province livestock traders.

We took the following approach to address the issue. Data issues were managed by including both data from buyers and suppliers in the calculation. Two anecdotal figures were created in each level of the supply chain:

X (1):   is an anecdotal figure with adjusted purchase based on previous level return

X (2):   is an anecdotal figure with adjusted return based on next level purchase

For example:

LD (1)   is an anecdotal inter-district livestock trader figure with adjusted purchase prices identical to the farm level sale price.

LD (2)   is an anecdotal inter-district livestock trader figure with adjusted return based on Sumbawa based inter-province livestock trader purchase.

Figures 7.23a and 7.23b shows the result with the two additional figures.

Figure 7.23a: Adjusted Cost structure of various level of supply chain in TSC NTB-2 (100 kg LW)

Figure 7.23b: Adjusted Cost structure of various level of supply chain in TSC NTT-2 (100 kg LW)

Source: Own calculations

In the next step we combined the adjusted figures with the actual figures by creating an average figure of both figures as shown in Figures 7.24a and 7.24b.

Figure 7.24a: Adjusted Cost structure of various level of supply chain in TSC NTB-1 (average figure) (100 kg LW)
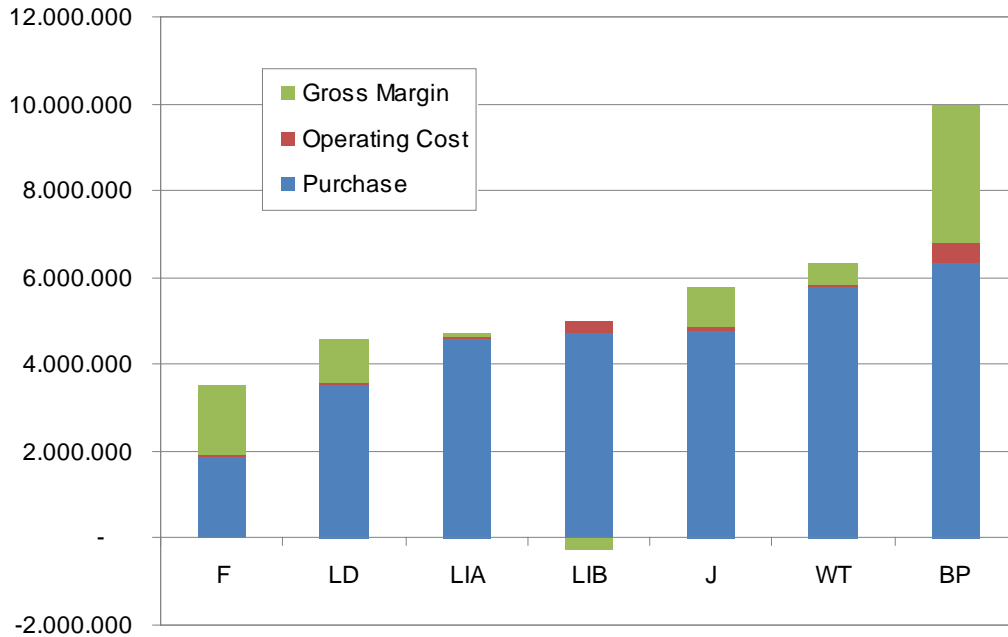
Legend
F   *Farm NTB-SBW-2*
LD   *Livestock trader (inter-District)*   **LIA**   *Livestock trader (inter-Island) Sumbawa*
LIB   *Livestock trader (inter-Island) Lombok*
J   *Jagal/slaughterer*   **WT**   *Wet market trader Mataram*
BP   *Beef Processor*

Source: Own calculations

Figure 7.24b: Adjusted Cost structure of various level of supply chain in TSC NTT-2 (average figure) (100 kg LW)
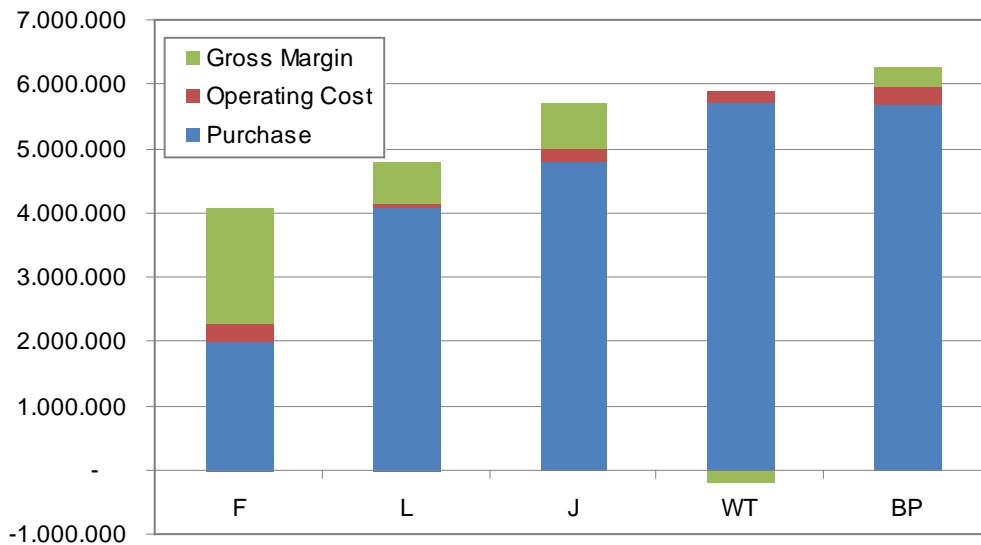
Legend
F   *Farm NTT-TAP-4*
LD   *Livestock trader (inter-District)*   **J**   *Jagal/slaughterer*
WT   *Wet market trader Kupang*   **BP** *Beef Processor*

Source: Own calculations

- Figure 7.24a and 7.24b show that the largest gross margin per 100 kg live weight in the TSC NTB-1 and TSC NTT-2 are generated by the beef processor, while the smallest gross margin is obtained by the livestock traders. The beef processor also bears the largest operating cost while the wet market trader bears the smallest.

- LIB (TSC NTB-1), the Mataram-based livestock trader and WT (Kupang wetmarket), appears to be the ones with negative margin. This means that they run a certain level of risk to make a loss in this supply chain. However, interisland trading usually has a positive margin in our interviews because the trading is typically combined with other activities such as inter-district trading, Jagal/slaughtering or wet market trading.

- For example, one of the respondents in South Sulawesi runs an integrated operation of buying cattle from NTT, NTB and districts in South Sulawesi, slaughtering them in the local abattoir and selling the beef in his own booth located in the Makassar wet market. He also supplies live cattle to other traders operating in the region.

- Interisland trading usually has a positive margin in our interviews because the trading is typically combined with other activities such as inter-district trading, Jagal/slaughtering or wet market trading. One of the respondents in South Sulawesi runs an integrated operation of buying cattle from NTT, NTB and districts in South Sulawesi, slaughtering them in the local abattoir and selling the beef in his own booth located in the Makassar wet market. He also supplies live cattle to other traders operating in the region.

7.5.1 TSCs results

The above procedures were applied to 8 selected TSC. Figure 7.25 shows the summary of TSC findings.

Figure 7.25: **Summary of TSC findings – from farm to beef processor**

TSC 100 Kg CW(beef)/year	Remarks No of supply actors	Gross margin		Operational cost	
		Largest	Smallest	Highest	Lowest
SU-1	5	Wetmarket trader	Finishing Farm	Beef processor	Wet market trader
SU-2	5	Beef processor	Finishing Farm	Beef processor	Wet market trader
NTB-1	6	Beef processor	Wetmarket trader	Beef processor	Wet market trader
NTB-2	8	Beef processor	Livestock trader (inter island)	Beef processor	Wet market trader
JKT-1	5	Beef processor	Livestock trader	Beef processor	Livestock trader
JKT-2	3	Beef processor	Beef Importer	Beef processor	Beef Importer
NTT-1	7	Beef processor	Livestock trader (inter province)	Beef processor	Livestock trader
NTT-2	6	Wetmarket trader	Finishing Farm	Beef processor	Livestock trader

Source: Own calculations

- It appears that beef processors gain the highest gross margin in almost all supply chain, whereas finishing beef farm receive the smallest margin in the Sulawesi supply chain.

- This likely connected to the function of Beef processors that add value to the beef by processing the beef with various ingredients and also put a lot of labour value during the process. Beef processors also bear the highest production cost.

- Both wet market traders and cattle trader seem to operate profitably in most of the typical supply chains. They operate at the lowest operational cost and gain the lowest gross margin per kg live weight beef traded but on an absolute basis most of this traders realise a significant part of margin due to their trading volumes.

Two additional calculations were made to compare cattle traders and wet market traders across research regions. The cattle traders comparison were made using two reference units, per 100 live weight and per head, whereas the wet market calculation were made only in per 100 kg beef traded. The result is summarised in Figure 7.26.

Figure 7.26:   Summary of TSC findings

	Returns		Gross margin		Total Cost		Purchase cost	
	Highest	Lowest	Highest	Lowest	Highest	Lowest	Highest	Lowest
ID Cattle traders Per head	Jakarta	Kupang, NTT	Makassar SU (South)	Makassar SU (North); Mataram NTB	Jakarta	Kupang, NTT	Jakarta	Kupang, NTT
Per 100 kg LW	Kupang NTT	Makassar SU (North and South)	Makassar SU (South)	Makassar SU (North); Mataram NTB	Jakarta	Makassar SU (South)	Jakarta	Makassar SU (South)
ID Wetmarkets Per 100 kg beef	Makassar SU	Jakarta	Makassar SU	Kupang NTT	Kupang NTT; Makassar SU	Jakarta	Makassar SU	Jakarta

Source: Own calculations

Figure 7.26 shows that on a per head basis (meaning that they may refer to different weight of cattle) the *cattle traders* in Jakarta receive the largest return and at the same time bear the largest operational cost. Kupang-based cattle traders are on the other side of the range, receiving the smallest return and bearing the lowest operation cost. The cattle traders in the southern part of South Sulawesi receive the largest gross margin both on a per head basis and on a per 100 kg live weight basis.

The *wet market traders* in Makassar receive higher gross margin per unit beef traded compared to their colleague in other regions, whereas wet market traders in Jakarta bear the highest operating cost and receive the largest return for that, but resulting in not the largest gross margin.

Further, a closer look to 3 TSCs linked to Jakarta wet market, namely TSC JKT-1 (live cattle import/feedlot), TSC JKT-2 (frozen beef import) and TSC NTT-1 (Interisland trade from NTT to Jakarta via East Java) reveals the following results (see also Figure 7.27):

- It seems that feedlots (F), beef importers (BI) and livestock traders (LPB - cattle from NTT via Surabaya) can deliver a competitive price to Jakarta market in a range from IDR 4500 to 4800 per kilogram beef.

- However they seem to receive different gross margin and require different cost structure.

- Feedlots require the largest operational cost per kilogram beef but also receive a greater gross margin (and risk) at the time of our survey.

- Livestock traders also need a certain level of operational cost and the same time they only obtain a very low margin. This supports our analysis in Section 7.3 that the interisland trader from NTT to Jakarta receives smaller margins compared to 5 years ago.

Figure 7.27:   **Summary of TSC findings – from farm to beef processor**
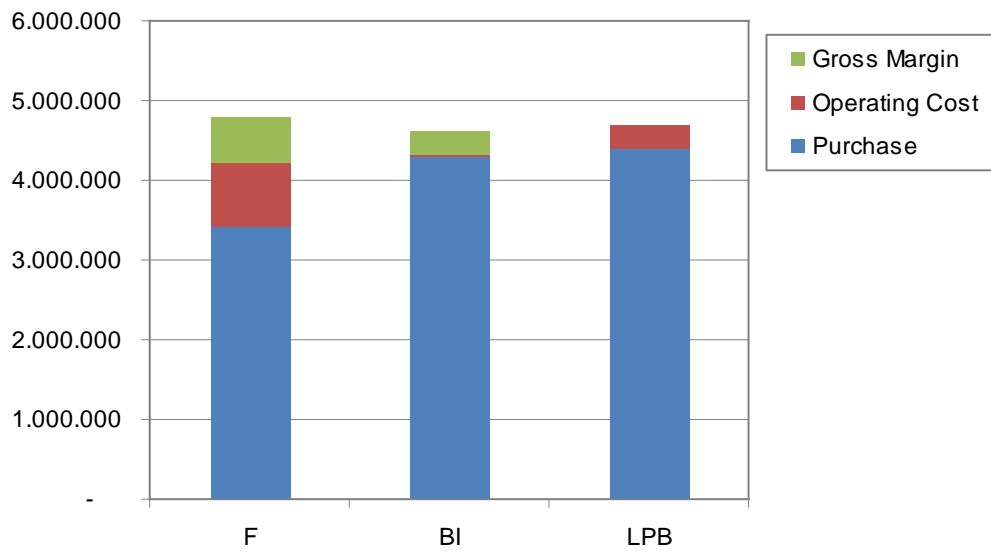
Legend *F*   *feedlot*
BI   *Beef importer*
LPB   *Interisland livestock trader*

Source: Own calculations

8 Impacts

8.1 Capacity impacts – now and in 5 years

The capacity impacts occurred on different levels.

Methodology farm level analysis

The method of typical farms and the standard operating procedure to define typical farms developed by agri benchmark was a) discussed, b) learned, c) modified to project requirements and d) applied in the project (Section 5.1).

It is envisaged to continue the membership of the Indonesian partner institutions within the agri benchmark project. This would allow further future applications of the method in other regions and related flows of information to the local stakeholders.

Methodology beyond farm level

The 75 percent rule was commonly developed by the project participants and applied (section 5.2.1).

The typical supply chain methodology was commonly developed and applied (Section 5.2.2).

The method is applicable and available for future projects dealing with supply chains.

Data

A comparable farm database for monitoring farm performance, with the potential to use, maintain and expand in the next years, is available to the project partners. The continued participation of Indonesian partners in agri benchmark would allow the use, modification and extension of the data base in the future.

Knowledge gains

Beef sector stakeholders gained enhanced knowledge and awareness about supply chain issues (three public seminars – NTT, East Java and Jakarta).

The project partners gained an extended understanding of the sector as a whole (from farm to table).

The project partners started seeing a beef farm as 2 different enterprises (cow-calf and finishing) and the related herd dynamics and economic implications.

The project partners received training in comparative farm analysis and the concept of typical farms.

Improved understanding of drivers for profits and behaviour of producers.

8.2 Community impacts – now and in 5 years

8.2.1 Economic impacts

It can be expected that some of the local farmers perceive the economics of cow-calf and beef production in a more comprehensive way and not just as a tool for generating cash income. Whether this knowledge is transferred into specific actions mainly depends on the future level of beef prices and the individual need of cash. The higher the beef prices grow, the less likely if the change in decision making for selling cattle (cash requirements vs. optimum weights).

Policy makers obtained a different view on the supply chain and the implications of the self-sufficiency policy, the supply-oriented measures and the advantages and advantages of regulatory vs. market-oriented policy approaches.

8.3 Communication and dissemination activities

Feedback about results was provided to and further information was requested from farmer groups and their local leaders in all project regions.

A leaflet was produced and disseminated in the following project regions by the local partners.

Information and discussion workshops for the wider public of stakeholders were conducted in Kupang in April 2009, in Surabaya in November 2009. Participants were from farmer groups, trader, quarantine, Dinas Perternakan, Bappeda, abattoir, feedlot, and BPTP staff.

A larger size of public day was held in Jakarta in May 2010. Participants were mainly from industry and policy stakeholders both at national and provincial level [Feedlot and live cattle importers, traders, abattoirs (private and government), business associations, namely APFINDO (feedlot association) and NAMPA (processors association), consumer organisation YLKI, processors, wet market managers, supermarkets (fresh product manager/ purchasing manager) and policy (DG livestock, university, ICARD (Indonesian Center for Animal Research and Development)] who - apart from contributions of the project team made oral presentations presenting the status quo and issues affecting their sector.

9 Conclusions and recommendations

9.1 Conclusions

9.1.1 Farm level

A. The cow-calf farms analysis indicates the following.

Key Technical aspects

(1) Huge differences in productivity indicators such as calving percentage, mortality and weights. Due to the lack of records on weights and performance indicators the data gaps were tried to close by expert opinion and literature. While there is still scope for improvement, it is unchallenged that these figures are required for benchmarking purposes.

(2) Cross cattle farms can often compensate low weaning percentage with higher weights per animal.

(3) Productivity levels are medium to low in international comparison.

Key Economic aspects

(1) Large variation in weaner prices per head and per kg.

(2) Less variation in total returns.

(3) With few purchased inputs, a major part of total costs are opportunity costs, mainly family labour.

(4) Most of the systems are profitable mid-term (w/o opportunity cost).

B. The finishing farms analysis indicates the following

Key Technical aspects

(1) Most farms operate with low physical productivities, mostly below breed potential. Feeding quantity and quality is an issue.

(2) Daily weight gains and final weights are lower in Bali cattle than in cross cattle.

Key Economic aspects

(1) Considerable beef price variation per kg carcass weight.

(2) The proportion of opportunity costs in total cost lower than in cow-calf due to the purchase of animals and feed.

(3) Costs seem to determine profitability more than returns.

(4) Most of the systems are profitable in mid-term horizon.

(5) Productivity levels are below potential and low in international comparison.

It appears that with present price relations, beef production is a profitable enterprise, also in an international context.

9.1.2   Interisland transport study NTT-Jakarta

A. The two feeding trials did not allow the conclusion that different feeding regimes make a statistically significant difference for weight losses.

B. However, this has to be seen in the context of a whole range of issues surrounding the interisland transport with an impact on weight losses, overall mortality and also stress for the animals: insufficient loading facilities, resulting in injury and stress for animals, inadequate ship design leading to stress, insufficient water supply leading to reduced feed intake.

C. With the reduced feed intake, comparing different feeding regimes is challenging and it is likely that the lack of water offsets any impact of different feeding regimes. It can therefore not be concluded that different feeding does not have an impact on weight loss, either.

In general, it appears questionable whether the present transport system is sustainable under the changed market conditions and animal welfare aspects, especially as the only reason for the long transport is to slaughter the animals in Jakarta.

9.1.3   Beyond farm level

The analysis based on the 75 percent market share and the first results from the economic data obtained from the typical supply chains analysis shows that trading and selling beef presently seems to be a good business throughout the supply chain. At the same time we witness substantial changes in the supply chain.

A. The main market for eastern Indonesian cattle / beef seems to shift from Jakarta to local markets and domestic 'export' regions. With the population growth and income development, demand for beef has increased locally. Examples for domestic 'export' destinations are Kalimantan and Papua. At the same time, transport cost and cattle prices have gone up and the price gap between Jakarta and other regions is getting smaller, making it less profitable to ship cattle from the East of the country to Jakarta.

B. On the other hand, the main market in Jakarta seems to rely more and more on imported boxed beef as well as beef produced in Indonesian feedlots based on Australian live cattle imports. Consumers in Jakarta get used to this kind of beef and their preference is less on domestic origin than on hygiene issues which are better served by supermarkets than wet markets. However, freshness, colour and low fat remain important product features. Processors and importers further report about consumers' growing interest for product diversification.

C. While typically in deficit, the Indonesian beef market at the beginning of 2010 was characterised by an oversupply of beef resulting from a decrease in beef demand and an increased supply of feedlot cattle and boxed beef at the same time. This lead to decreasing beef prices for the first time in years. It is, however expected that the situation normalises in foreseeable time, especially if import restrictions continue.

D. With increasing demand remaining the main driver, most interviewees reported the ongoing slaughter of productive female cattle which appears to be a particularly concerning issue in NTT. This has triggered plans by the local government to basically take over beef production for at least a while. Whether this has a positive net impact on beef supply and stabilisation of local herds remains to be seen.

E. The vast majority of the interviewees indicated that they are planning to grow their businesses as well as improve hygiene conditions for their customers. Taking the above mentioned into account, it is at least questionable whether the first part of these goals can be realised given the expected shortage of beef supply.

9.2 Recommendations

9.2.1 Improve data quality and quantity

Data gaps and inconsistencies between national, regional and international sources occurred frequently. Effective, efficient and consistent policy, research and extension for farmers need accurate data as a basis for decision making and benchmarking of achievements. Reliable data lack in two areas:

- Livestock and beef sector statistics (cattle inventories, domestic and international trade) are contradicting, if not wrong. This impression is gained from analysing the data available and from comments obtained by industry and government stakeholders in the supply chain.

- Farm data, especially cattle weights, are difficult to obtain due to the absence of scales.

As the market does not provide these data and private companies often benefit from a lack of transparency short-term rather than suffering from it, policy should invest in regular livestock surveys and market information systems.

The present project's findings could be used as a starting point to build a supply chain monitoring system along the supply chain. A successful example for an industry-based market information system which at the same time makes the data available to research is the University of Sao Paulo's CEPEA in Brazil. There, market price information is collected on a daily basis for various products and various market places by telephone, e-mail and internet. The information is then made publically available and published on CEPEA's website. The activity is co-funded by the industry and the government.

9.2.2 Target policies and projects towards incentives and driving forces

At present, the vast majority of policies and most projects are largely targeted towards regulatory measures and incentive programmes to improve cattle supply. Examples are quotas for exporting cattle, the ban of slaughtering productive female cattle and breeding programmes including the provision of breeding stock and insemination. Reports from the regions are conflicting whether these policies are effective in increasing cattle numbers. Another question is whether they are efficient, in other words, whether the way the tax money is presently spent yields the maximum number of additional cattle.

In general, policy should get in where markets fail or when the sum of individual transaction costs to reach a society's goal are higher than the collective transaction costs caused for example by a government decision. Further, to make a policy effective and efficient, it should be directed to the driving forces and incentives such as cash requirements of farmers, consumer needs, infrastructure deficits.

In the present case, it seems that the policies in place do not necessarily address the driving forces to the extent required. It is questionable whether self-sufficiency is the appropriate policy goal to react to the beef deficit situation or whether a mix of allowing the beef supply partially coming from imports and at the same time improving the framework conditions for local production would make better use of tax payer's money. Supply related measures should be used rather in emergencies but not as a standard and persistent policy instrument. Tax money might be better directed towards improving transport infrastructure (see below), hygienic conditions along the supply chain, cooling facilities, solving a cash problem with farmers and encouraging marketing initiatives for local beef on local, domestic and even overseas markets.

9.2.3 Improve communication and information in the supply chain

It appears that the communication and information flow throughout the supply chain is presently limited. Examples from Austria and Switzerland show that creating

communication and meeting platforms for stakeholders of the supply chain can especially help to link smallholder farmers to markets, reduce transaction costs in the chain by increasing knowledge about the counterparts and to better serve consumer's needs. It is therefore encouraged to create and Indonesian Beef Forum as a platform and meeting point for supply chain actors. Funding could be provided by private sector and policy and activities could comprise workshops and exchange on hot issues, development of sectoral strategies and policy design, invitation of foreign experts to learn from overseas experiences and overseas travel to learn from best-practice examples.

9.2.4 Creation of new markets for eastern Indonesian produce

Market shares and preference for beef from eastern Indonesia in the main market Jakarta decreased in the last years. Given increased transport costs, competition with imports and growing local demand, the prospects of repositioning beef from eastern Indonesia in the market should be considered. Our research suggests that the best market position for beef and live cattle (feeder and slaughter) from eastern Indonesia is at their local consumption centre (province capital) and other "new" market destinations in eastern Indonesia such as provinces in Kalimantan and Papua.

9.2.5 Include economic and efficiency aspects into research and policy

As mentioned above, policy measures should be assessed for effectiveness and efficiency. Economic components should be integral part of each research project dealing with production. This covers questions like the following:

- how can stakeholders beyond farm gate and market might support/limit on-farm technical development?

- integrating economic and supply chain components in upcoming projects [how do technical changes transfer into economic impacts? (monitoring)]

- comparisons of intensive and extensive production systems in various locations [which is the better system for which location?]

- profitability of different land use options under various policy and market scenarios [is it more profitable to produce beef or other livestock/ crops? What are limiting technical, economic and social factors?]

- 10 years future market impact and farm strategy analysis reflecting risk (How can smallholder farms develop their portfolio by minimising risk and maximising household income?)

9.2.6 Capacity building and future pilot projects

With the large amount of money allocated by both province and national level government for the beef cattle sector, it is envisaged that capacity building activities is an option to leverage the impact of ACIAR project. ACIAR could assist in setting up a regional team with a comprehensive expertise (both farm and beyond farm) to:

1. Check the viability of this report's recommendations for implementation in the regional context, and, if necessary, on-demand small scale project/research can be made available.

2. Advise local government of recent policies/development and integrate the research into policy and action. This team also can play a role can help to 'communicate' research findings to into implementation. Examples:

   2.1 By facilitating the improvement of the grading system policy that is currently implemented by the NTB government.

   2.2 To review/amend the effectiveness of quota policies which are currently implemented by the NTB and NTT governments.

3. To install a knowledge and experience pool gained of ACIAR experts. It can facilitate the private sectors and/or donor funded projects and integrate/complement its activities.

NTT and NTB seem to be the best location to start the initiative and have the greatest possibility to success. The team can make use of the network and contacts to private companies, business associations, local practitioners and regional experts that actively participate in this project.

9.2.7 Other room for improvements

There is scope to improve productivity on farm level. The most important single measure seems to be the reduction of calf losses as it immediately helps increasing the quantity of animals. Related to that is feeding quantity and quality.

Consumer preference seems to shift towards food safety in general and hygiene aspects in particular. There is awareness throughout the chain to improve hygiene. This will most likely lead to cool chains and related structural changes in the supply chain as this technology requires economies of size.

Improve efficiency in the supply chain, especially when it comes to transport of domestic live cattle. Another issue is the small farm sizes in many parts of Indonesia which makes sourcing of homogeneous lots of cattle relatively difficult. Thus, consistency of supply (quantity and quality) was frequently mentioned by supermarkets, processors and importers as a reason for preferring imported beef over domestically produced.

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10.2 List of publications produced by project

Kristedi T, Deblitz C (2010) (in preparation) The dynamics of the beef supply chain in Eastern Indonesia, Bulletin of Indonesian Economic Studies, ANU College of Asia & the Pacific

11 Appendixes

11.1 Project teams

ICASEPS Bogor

Staff: Leader: Prajogo U. Hadi, Researcher: Helena Purba, Saktyanu Kristyantoadi

Tasks: Overall coordination in Indonesia, Data and information from Jakarta and surrounds, Data and information from East Java

BPTP NTT

Staff: Leader: Joko Triastono, Researcher: Henrik Marawali, Paskalis Thomas Fernandez, Esnawan Budisantoso

Tasks: Data and information from NTT

BPTP NTB

Staff: Leader: Ketut Puspadi, Researcher: Sasongko, Lia Hadiawati, Hermansyah

Tasks: Data and information from NTB

BPTP Sulsel

Staff: Leader: Nasrullah, Researcher: Aziz Bilang, Musadalifah, Reskiana,

Tasks: Data and information from Sulsel

Charles Sturt University

Staff: Leader: Claus Deblitz, Researcher: Teddy Kristedi

Tasks: Overall project management, Data and information from Australia, Reporting to ACIAR

11.2 Internal evaluation

Figure 11.2.1

Note:
Red highlighted cells represent more than 50 percent of the replies

Items	I fully disagree (--- / 1)	I disagree (-- / 2)	I disagree more than agree (- / 3)	I agree more than disagree (+ / 4)	I agree (++ / 5)	I fully agree (+++ / 6)	Total (n)	- (1+2)	o (3+4)	+ (5+6)
GENERAL										
The project is relevant for the sector		1			3	7	11	1		10
The objectives of the project are clear					8	3	11			11
The activities and steps are clear		1		3	3	4	11	1	3	7
The project is more complex than other projects		1		3	2	5	11	1	3	7
The project yielded the expected results	1			3	5	2	11	1	3	7
METHODS										
On-farm method - typical farms										
The typical farm approach is relevant for the project	1		1	3	2	4	11	1	4	6
The method is easy to understand	1		1	5	2	2	11	1	6	4
The method was sufficiently explained	1			4	3	3	11	1	4	6
The method was easy to apply	1	1	3	2	2	2	11	2	5	4
The method yielded the expected results	1		1	3	4	2	11	1	4	6
Beyond-farm method - 75 percent rule										
The 75 percent rule is relevant for the project		1		3	6	1	11	1	3	7
The method is easy to understand		2	1	2	4	2	11	2	3	6
The method was sufficiently explained		2		2	4	3	11	2	2	7
The method was easy to apply		2	1	2	4	2	11	2	3	6
The method yielded the expected results		1	1	2	5	2	11	1	3	7
INTERVIEWS										
On-farm										
The questionnaire volume was appropriate			1	3	7		11		4	7
The questionnaire complexity was appropriate		1		3	5	2	11	1	3	7
The questionnaire handling was comfortable	1	2	1	4	3		11	3	5	3
It was easy to identify respondents/participants		1	2	4	3	1	11	1	6	4
It was easy to do the interviews	1	1	1	4	2	2	11	2	5	4
The interviewees understood objectives and questions		2		3	5	1	11	2	3	6
Beyond-farm										
The questionnaire volume was appropriate			1	2	5	2	10		3	7
The questionnaire complexity was appropriate			1	2	4	3	10		3	7
The questionnaire handling was comfortable		1	2	2	3	2	10	1	4	5
It was easy to identify respondents/participants		1	1	4	2	2	10	1	5	4
It was easy to do the interviews	1	1		3	4	1	10	2	3	5
The interviewees understood objectives and questions	1	1	1	3	3	1	10	2	4	4
PROJECT MANAGEMENT CSU										
Tasks and duties were clear to me			1	2	3	4	10		3	7
The deliveries were clear to me			1	2	3	4	10		3	7
The timing was appropriate				3	6	1	10		3	7
Announcements were made timely			1	2	4	3	10		3	7
We were following the project planning				5	2	3	10		5	5
The quantity of work (workload) was appropriate		1	2	2	1	4	10	1	4	5
Support & feedback were sufficiently given				4	5	1	10		4	6
Communication was understandable				4	4	2	10		4	6
Friendliness prevailed		1	1		2	6	10	1	1	8
WORKSHOPS										
The frequency of workshops was appropriate				1	4	6	11		1	10
Programme/Content was satisfactorily		1			5	5	11	1		10
Results were useful				1	5	5	11		1	10
Organisation/Management were good					5	6	11			11

Summary of groups

11.3 Farm level methodology

Importance of regions

The importance and spatial distribution of beef cattle production can be measured in three ways, namely:

- Number of cattle [on feed] per region: This indicator can be misleading if sizes of regions differ substantially. Large regions appear important whereas small regions appear unimportant although the latter might have a higher cattle density (higher relative importance of beef production). The same applies if the share of a region in total cattle number in a country is chosen as an indicator.

  Examples are Bone in South Sulawesi, the district with the highest beef cattle population in the province. Bone has a lower density compared to its neighbouring districts, Barru, Pinrang and Sinjai. Similarly, Kupang in NTT holds the highest beef population, but the highest beef density is in Belu (in terms of total land) and Timor Tengah Utara (in term of agricultural land). However, this is not the case in NTB, since Lombok Barat district hold the highest beef population and density.

- Number of cattle per square kilometer: This is an absolute density measure taking the different sizes of regions into account. However, it might be misleading in regions with a particularly high or low proportion of agricultural land in total land.

  Examples for the districts that hold the highest beef density in term of total land are Bantaeng (South Sulawesi), Lombok Barat (NTB) and Timor Tengah Utara (NTT).

- Number of cattle per ha agricultural land: This indicator comes closer to farming. It does not take into account non-agricultural land where beef production usually does not happen.

  Examples for the districts that hold the highest beef density in term of agricultural land are Bantaeng (South Sulawesi), Lombok Barat (NTB) and Belu (NTT). The conclusions that can be drawn from using this indicator are not significantly different than using the previous one.

For the analysis, a mix of the three reference units was chosen to select the regions. Figure 11.3.1 provides a summary of the regions and districts selected for analysis.

Figure 11.3.1: **Cattle numbers and densities in the regions and districts selected.**

Province / district	Cattle density on agricultural land No. cattle per 100 ha	Cattle density on total land No. cattle per 100 ha	Inventory head
NTT			
Timor Tengah Utara	34	22	59,417
Kupang	33	24	139,081
Timor Tengah Selatan	26	18	121,325
Belu	32	26	96,374
Kodya Kupang	23	21	3,447
NTB			
Lombok Barat	113	99	112,648
Lombok Tengah	76	62	73,891
Lombok Timur	60	38	60,677
Sumbawa Barat	49	11	20,224
Bima	47	15	61,874
Kota Bima	42	27	9,763
Sumbawa	31	13	88,964
South Sulawesi			
Bantaeng	90	74	29,560
Barru	78	37	43,146
Sinjai	71	56	45,724
Bulukumba	68	62	71,365
Takalar	57	51	28,570
Gowa	51	33	60,220
Bone	51	35	152,775
Pare Pare	37	21	2,077
Pinrang	35	22	41,618
East Java			
Sumenep	1,034	117	233,470
Pamekasan	776	124	97,840
Bangkalan	624	110	138,008
Sampang	597	100	122,856
Tuban	275	83	152,745
Jember	237	75	184,833
Nganjuk	227	113	138,853

Note 1: Districts are listed in descending order of cattle density per 100 ha agricultural land.

Note 2: Districts marked in red were selected for being analysed in the project (see text).

Source: Regional Statistics

Enterprises

In the first step, it is necessary to distinguish into two beef enterprises even if a farm does both – the breeding and raising of calves and producing animals going to slaughter form these calves:

- Cow-calf (suckler-cows, beef cows), abbreviated as CC
  from birth of the calf to the day of weaning. The day of weaning is defined as the day on which the calf does not receive milk from the cow anymore.

- Beef finishing (fattening), abbreviated as FIN
  from the day of purchasing the animals or transferring them from the own cow-calf enterprise (= day of weaning)

The distinction into two enterprises and the start and end of them is necessary for the following reasons:

- At the time of weaning, the cow-calf enterprise has the opportunity to either sell the weaners on the market or to keep them for own finishing. This means there is an opportunity cost (=sales price) for not selling them.

- The finishing enterprise, on the other hand, could buy the cattle from another source instead of using the own ones for finishing. Thus, there is an opportunity cost for the beef finishing enterprise for taking the cattle from the own cow-calf enterprise.

- As a consequence, the transfer of weaners form the cow-calf enterprise is accounted as 'sale' of the weaners from the cow-calf to the beef finishing enterprise and the weaners are valued using the market price (opportunity cost).

- This also allows comparing farms running both enterprises with specialised farms that have only a cow-calf or a beef finishing enterprise.

In the project, both enterprises were analysed. With respect to the two enterprises, the following on-farm constellations are possible:

1. The farm has cow-calf only and sells weaned calves to other farms.

2. The farm has beef finishing only and buys weaners / backgrounders / store cattle from other places.

3. The farm has both a cow-calf and finishing enterprise and finishes its own weaners (and possibly buys additional cattle for finishing from other places).

Usually the farms would have more than the two beef-related enterprises. The task is to find out what the typical / prevailing combinations of enterprises are.

Production systems

For both beef enterprises, the SOP provides the indicators shown in Figure 11.3.2 to describe the typical production system.

Figure 11.3.2   Indicators used to describe production systems

Whole farm level	Enterprise level	
Cow-calf / Finishing	**Cow-calf**	**Finishing**
Fully specialised	Breeds	Breeds
Combination with other enterprises with other enterprises	Own replacement	Origin of animals
Finishing (cow-calf)		*Dairy*
Crop	Stocking rate	*Cow calf*
Dairy		
Horticulture	Weaning weights	Category
Pig production		*Bulls, Steers*
Other	Weaned calves	*Cows, heifers, calves*
	per cow and year	
Natural conditions		Stocking rate
Soil type		Final weights
Climate		Daily weight gain
Herd size	Extent purchase of feed	Extent purchase of feed
Labour organisation	Feed base	Feed base
Mainly family labour	*Pasture*	*Pasture*
Mainly paid labour	*Silage and hay from grass*	*Silage and hay from grass*
Extent contractors used	*Other silage and hay*	*Other silage and hay*
	Grains and others	*Grains and others*
Capital input	Destination of the weaner calves	Sale of beef
Old or new buildings	Slaughter	*Domestic/Export*
Type of buildings	*Finishing*	*Direct sale to consumer*
Own machines or contractor	*Breeding*	
Loan level	*Live export*	

Source: agri benchmark

The list is used when defining the typical / prevailing production systems in the regions identified.

This step is very crucial and has to be done before going into the field and getting the farmers groups (panels) together. Usually there are no or very limited statistics available for this step. This means that in most cases we need to rely on your expert assessment to create a realistic definition of typical farms.

The better this definition is done, the easier it is to a) get farmers organised for the panels, b) collect data from these farmers' groups, and c) produce meaningful results from the data and for the regions.

Data collection

Organisation of the meetings

The group meetings usually consist of four to six (4-6) farmers. Their farms should come close to what was pre-defined as a typical farm. This means that their farms should have similarities for the indicators described above, especially size and production system. The local BPTP partners organised the meetings with the farmers.

The groups in the panel meetings to collect the data were in fact much larger than anticipated, sometimes as much as 20-30 farmers.

Project information and consent forms

The farmers received a written project information sheet which was read to them in the pane meetings. The farmers joined voluntarily and usually stayed the whole session which took about 2-4 hours. Sometimes people walked in and out during the meetings.

The farmers were also asked to sign off a consent form. This practice did not always work because some farmers could not read and did not know whether what they were asked to sign was what had been explained to them.

Data collection

The interviewer then went step by step through the questionnaire, always asking for the typical number for each variable. The farmers then typically spoke about their own farm but were never asked for 'their' numbers but for the typical number.

We typically saw discussions between the farmers about critical figures. The task of the interviewers was to moderate the discussion and to lead the group to a consensus about the number.

We did not record averages of farmer groups. We ask for the typical number in a typical year for our typical production system. Example: Rice yields between farms may vary from 2 to 3 tons per ha and harvest. We would then not take 2.5 as yield but ask them which yield level would be more typical, closer to 2.5 or closer to 3. The result might for example be 2.8 tons.

We asked numbers from the calendar year 2007 which were later updated to 2008 and 2009 figures. Exceptions and extremes: in case of extreme drought or other extraordinary weather conditions which differ significantly from average years AND have an impact on performance indicators and prices, we reflected them in our figures. The rising feed and crop prices during the project period were an example for this. Normal yield and performance variations are NOT reflected in our numbers, instead we take annual / typical average for the production system considered.

Data issues

Since the method of typical farms was new to most of the project team, it took some time to familiarize. When collecting the farm data, a few challenges and learning experiences occurred:

- The small farm and herd sizes make the collection of certain parameters difficult. This is particularly true for percentage figures related to the animals, such as mortality rates (losses), calving percentages, culling percentages and others. Example losses: the way to circumvent these issues was to ask the farmer groups interviewed about the total number of cattle in the villages and the number of cows and calves that died. These numbers were used to calculate the mortality rates. The same approach was applied for other variables.

- The data required to properly reflect the herd dynamics on the farms was difficult to obtain, particularly for the use of female animals for different purposes: heifers of different age groups (less than 1 year, 1-2 years, > 2 years) can be used as replacement heifers or sold for slaughter, breeding or further finishing once they leave the cow-calf enterprise. The differentiation is relevant because of different prices for the animal categories. These challenges were mainly addressed by intensive training of the partners.

- The live weights of animals are very difficult to estimate because the weighing of cattle on farm level is not common in any of the project regions. The estimation of dressing percentages / carcass yields to arrive at carcass weights was a similar challenge. The first point was addressed by making best practice estimations, the second by using trial results on dressing percentages and modifying them whenever local conditions required.

- Feed price. In some cases, feed price for cattle is not comprehensively reflected. This is in particular true for cattle grazing on common land.

It can easily be seen that all factors mentioned above have a significant influence on the productivity and output levels of the production systems. It is important to have this in mind as the weight produced is the main reference unit for all costs and returns in the economic analysis. It is, however, the appropriate reference unit for benchmarking because it implicitly reflects the different productivity levels of different systems. Other

thinkable reference units like 'per animal' or 'per ha' would reflect these differences to a much lesser extent or not at all.

The results should therefore be interpreted with care. A ten percent variation in weights results in a ten percent variation of all costs and results related to the weight.

Adjustments and modifications of the questionnaire and the analysis tools

The first field trips in May 2008 showed that some adjustments and modifications of the agri benchmark analysis tools were necessary. They affected both the questionnaire as well as the calculation tools (model) used. The following deficits / requirements were defined and addressed / changed /adjusted subsequently.

Questionnaire

The following modifications and amendments to the questionnaire were made:

- Clearer definitions of items and terms were made.

- Non-relevant questions were skipped (direct payments, some cash-flow relevant questions).

- The recording of labour hours was improved by adding variables and Figures.

- The recording of cash crops was improved by adding variables and Figures.

- A standard list of typical crops cultivated in the project regions (rice, king grass, beans etc.) was created to replace the existing crop list in the questionnaire.

- The questionnaire was translated into Bahasa.

- Other, minor issues like extending / altering explanations and changing formats.

The vast majority of these changes were taken over into the international agri benchmark exercise.

Model / Calculation tools

While the existing model tools reflect all farming situations and allow for an enormous range of complex data constellations, some adjustments had to be made.

1. Herd simulation for very small herds

The model has difficulties to realistically reflect very small cattle herds because the in-build herd simulation calculates with entire animals (integer, rounded animal numbers). Farms having only one or two animals are not calculated correctly.

For example, a loss of 5 percent was not be reflected in a one or two animal case: 2 cows with 5 percent losses = 0.1 cows per year losses were rounded down to zero. The minimum number of cows required to have an effect would be 10 cows * 0.05 = 0.5 which will be rounded up to 1 cow loss. But even that is not satisfying because 1 out of 10 cows is 10 % losses. The problem is that economic consequences (cost or returns) related to the animal numbers are not reflected, either.

As a consequence, the herd simulation was adjusted by skipping the rounding. The consequence is that the tools now calculate the correct results but based on portions of animals (such as 1.25 cows etc.). In 2010, this model version was adapted by the global network.

2. The sheer size of the model

The complexity of the model means that it needs a certain degree of user training and skills to be run efficiently. Given the first trainings, it was quickly found that the operation of the existing model tools by the partners was not a viable option within the frame and funds of the project.

It was checked whether a downsized, easier to handle version of the model could be made available to the project at reasonable input. It turned out, however, that this is a major undertaking and can therefore not be completed within the present setting of the project.

It was therefore agreed, that

- for the time being, the existing model structure with the necessary amendments of the herd simulation were used,

- the model calculations were performed by CSU project management,

- based on the first results the usefulness of the results for this and other projects were evaluated.

11.4 Farm level results

Figure 11.4.1   Indicators used for farm description in Figures 11.4.2 to 11.4.10

Farm name	The farm name has the following syntax: province name – district name – cattle number (see size)
	If there are two names provided for one farm, the first (above) is the name for the finishing enterprise, the second (below) the name of the cow-calf enterprise
	In farms with only one of the two enterprises, the missing enterprise is indicated with a '–' in the position described above.
Production system	Cut and carry is 'intensive' where cattle are permanently kept in confinement and pens
	Extensive is a permanent grazing system and semi-intensive is a mix of intensive and extensive in different times of the year and depending on the feed supply
Feed source	Short description of the main feed used
Breed (cows)	In finishing: breed used
	In cow-calf: cow breed
Breeding	Differentiates into natural breeding or artificial insemination (AI)
	Indicates whether pure breeding or cross breeding is applied
Enterprises	Indicates whether the farm only runs one of the enterprises considered or both of them.
	Other enterprises like cash crops are not reflected here but in both the calculations, cost allocation and some of the result charts
Location	Provides the name of the village, subdistrict and district where the typical farm is located
Size	Size in finishing is measured in total slaughter cattle sold per year
	Size in cow-calf is measured by average number of cows per year
Marketing/Sale	Indicates the destination of the sold animals

Source: Own illustration

Figure 11.4.2:   Typical farms analysed in NTT

Farm name	Production system	Feed source	Breed (Cows)	Breeding	Enter-prises	Location Village	Subdistrict	District	Size Cows	Finished	Marketing/Sale
NTT-KUP-3 NTT-KUP-5	Cut and carry	leucena, glicirrida, kapok, ficus, palm pith, cassava	Bali	Bali, Natural breeding	Cow-calf & Finishing	Tesbatan	Amarasi	Kupang	5	3	Marketing to Jakarta (for finished) and local markets (for others : cull cows, cull heifers > 24 months, and male calves to finishing)
NTT-TTS-15 NTT-TTS-30	Extensive	native grass, leucena, palm pith, banana trunk	Bali	Bali, Natural breeding	Cow-calf & Finishing	Bena	Amanuban Selatan	Timor Tengah Selatan (TTS)	30	15	Marketing to Jakarta (for finished) and local markets (for others : cull cows, cull heifers > 24 months, and male calves to finishing)
NTT-TAP-4 NTT-TAP-9	Cut and carry	leucena, glicirrida, kapok, ficus, palm pith, cassava, banana trunk	Bali	Bali, Natural breeding	Cow-calf & Finishing	Tapenpah	Insana	Timor Tengah Utara (TTU)	9	4	Marketing to Jakarta (for finished) and local markets (for others : cull cows, cull heifers > 24 months, and male calves to finishing)
NTT-OEB-1 NTT-OEB-2	Cut and carry	leucena, glicirrida, kapok, ficus, palm pith, cassava, banana trunk	Bali	Cross with Santa Gertrudis, Natural breeding	Cow-calf & Finishing	Oebola	Fatuleu	Kupang	2	1	Marketing to Jakarta (for finished) and local markets (for others : cull cows, cull heifers > 24 months, and male calves to finishing)
NTT-KUP-100 -	Cut and carry	leucena, king grass, native pastures/bush, sesbania	Bali	not relevant	Finishing	Benu	Takari	Kupang	-	100	Marketing to Jakarta (for bulls : 60 heads) and local markets (for cows : 35 heads)

Source: Own survey

Figure 11.4.3: Typical farms analysed in NTB

Farm name	Production system	Feed source	Breed (Cows)	Breeding	Enterprises	Location Village	Subdistrict	District	Size Cows	Size Finished	Marketing/Sale
NTB-LTG-2	Cut & carry, semi-intensive, irrigated land (a, b)	King grass, natural grass, rice straw, leucena	Bali	Bali, manage by farmer	Cow-calf	Tandek	Praya Barat	Lombok Tengah (Central Lombok)	3	-	Local market
NTB-LTG-3	Cut & carry, semi-intensive, upland (no irrigation) (a, b)	Natural grass, rice straw, leucaena, sesbania, banana tree	Bali	Bali, manage by farmer	Cow-calf	Kelebuh	Praya Tengah	Lombok Tengah (Central Lombok)	3	-	Local market
NTB-LTM-4	Cut & carry	King grass, natural grass, rice straw, leucena	Bali	-	Finishing	Batu Basong	Aik Mel	Lombok Timur (East Lombok)	-	4	Local market
NTB-LOB-1 NTB-LOB-2	Cut & carry	Natural grass, rice straw, banana tree	Bali	Bali, manage by farmer	Cow-calf & Finishing	Jatisela	Gunung Sari	Lombok Barat (West Lombok)	3	1	Local market
NTB-SBW-2 NTB-SBW-4	Grazing (extensive) (d, e)	Natural grass, weeds	Bali	Bali, natural breeding	Cow-calf & Finishing	Buer Baru	Buer	Sumbawa	4	2	Marketing to Lombok island, East Java-Jakarta
NTB-SBW-7	Grazing (extensive)	Natural grass, leaf of the tree	Bali	Bali, natural breeding	Cow-calf	Lenangguar	Lenangguar	Sumbawa	7	-	Local market
NTB-LTM-12	Cut & carry	Natural grass, weed, king grass, banana tree, peanut crop	Bali	-	Finishing	Tebaban		Lombok Timur (East Lombok)	-	12	Local market
(NTB-LTM-4) NTB-LTM-54	Grazing (extensive) & Cut -carry	Natural grass,	Bali	Bali, manage by farmer	Cow-calf & Finishing (not analysed)	Sembalun Lawang	Sembalun	Lombok Timur (East Lombok)	54	4	Local market

(a) The possible feed sources are own grass land (king grass), natural grass, rice straw, and leucena.
(b) In both irrigated and upland areas in Lombok Tengah, there are ACIAR Project of SMAR 096.
(c) Farm size (number of cattle) per farmer is generally very small (1 to 3 head).
(d) The most feed source is natural grass.
(e) Farm size is generally large (more than 20 head, or even hundred head).

Source: Own survey

Figure 11.4.4: Typical farms analysed in South Sulawesi

Farm name	Production system	Feed source	Breed (Cows)	Breeding	Enter-prises	Location Village	Subdistrict	District	Size Cows	Finished	Marketing/Sale
SU-BUL-2 SU-BUL-4	Cut and carry	king grass, rice bran, salt	Bali; Bali cross	AI with Simmental, Limousin	Cow-calf & Finishing	Tibona	Bulukumpa	Bulukumba	4	2	Marketing to Jakarta and local
SU-BAN-2 SU-BAN-4	Cut and carry	king grass, rice bran, salt	Bali; Bali cross	AI with Simmental, Limousin	Cow-calf & Finishing	Pattallassang	Tompobulu	Bantaeng	4	2	Marketing to Jakarta and local
SU-PIN-2 SU-PIN-5	Cut and carry (Semi-Intensive)	concentrate, king grass, rice straw, rice bran, salt, urea, mollases	Bali; Bali cross	AI with Simmental	Cow-calf & Finishing a)	Tatae	Duampanua	Pinrang	5	2	Marketing to Kalimantan, Makassar and local
SU-BON-1 SU-BON-3	Cut and carry (Semi-Intensive)	king grass, rice straw, rice bran, salt, urea, mollases	Bali	AI and Natural (Bali)	Cow-calf & Finishing	Kajaolaliddo	Barebbo	Bone	3	1	Marketing to Kalimantan, Makassar and local
SU-BAR-1 SU-BAR-2	Cut and carry	king grass and rice bran	Bali	Natural	Cow-calf & Finishing	Mattirowalie	Tanete Riaja	Barru	2	1	Marketing to Makassar and local

Source: Own survey

Figure 11.4.5:   Typical farms analysed in East Java

Farm name	Production system	Feed source	Breed (Cows)	Breeding	Enterprises	Location Village	Subdistrict	District	Size Cows	Finished	Marketing/Sale
EJ-PAM-1 EJ-PAM-2	Cut and carry	Rice straw, rice bran, mineral, molasses, salt	Madura	Natural breeding with Madura breed, AI with Limousin	Cow-calf & Finishing	Duko Timur	Larangan	Pamekasan	2	1	Marketing to Jakarta and domestic
– EJ-TUB-3	Cut and carry	Rice straw, rice bran, molasses, starbio	Ongole	AI with Limousin, Simmental, etc	Cow-calf	Tuwiri Wetan	Merak Urak	Tuban	3	–	Marketing to Jakarta and domestic
EJ-NGA-2 EJ-NGA-2C	Cut and carry	Rice straw, rice bran, molasses, starbio	Ongole	AI with Limousin, Simmental, etc	Cow-calf & Finishing	Petak	Bagor	Nganjuk	2	2	Marketing to Jakarta and domestic
EJ-JEM-2 –	Cut and carry	Rice straw, rice bran, natural grass, salt	PO Cross	–	Finishing	Sumber Redjo	Ambulu	Jember	–	2	Market to Surabaya and Jakarta
– EJ-JEM-4	Cut and carry	Rice Straw, King/Natural Grass, salt	PO Cross	AI with Limousin, Simental, etc	Cow-calf	Sumber Redjo	Ambulu	Jember	4	–	Market to other district in East Java

Source: Own survey

Figure 11.4.6: Productivity figures from the project and literature

Type of farm enterprise and indicators	NTT Bali	NTT Crosses	NTB Bali	SS Bali	SS Crosses	EJ Madura	EJ M Crosses	EJ Ongole	EJ O Crosses	Unspec. Bali	Unspec. B Crosses	Unspec. Madura	Unspec. M Crosses	Unspec. Ongole	Unspec. O Crosses	Source
Cow - Calf Farm Enterprise																
Calving percentage (%)	90-100	100	89-100	70-91	74-77	100	100	81-100	81-100							Bakry (1994) cited in Poppi (2009)
	62	45 - 89	66	39 - 89												Copland (2009)
	65 - 86									52 - 67						Talib et al. (2003)
	66.6		51.7	60.4				55						53 - 59		Marojo (1989), Achmadi (2000), and Hidayat (2003) cited in Astuti (2004)
																Teleni et al. (1993)
Weight at weaning female calves (kg LW)	60 - 85	160	60 - 90	50 - 87.5	70 - 100	90	95	95 - 100	115 - 120							Talib et al. (2003)
Weight at weaning male calves (kg LW)	65 - 110	180	70 - 105	50 - 87.5	70 - 120	95	100	100 - 105	120 - 125							Baliarti (1991) cited in Astuti (2004)
Weight at weaning - unspecified sex (kg LW)	61 - 97		58 - 110	52 - 76										155		Hartati and Dicky (2008)
														68 - 106		
														120 - 140		Thalib et al. (1999) cited in Hartati and Dicky (2008)
Calf losses - mortality (%)	10 - 17	17	1 - 2	2 - 8	4 - 8	3	5	3	5							
	17.9															Copland (2009)
	48		15	8						8 - 48						Talib et al. (2003)
Finishing Farm Enterprise																
Daily Weight Gain - DWG (g per day)	233 - 500	544	262 - 343	266 - 558	791 - 873	430	470	500	700 - 833							Moran (1985) cited in Poppi (2009)
														650 - 800		Rika et al. (1981) cited in Poppi (2009)
										180 - 390						Moran (1976), Musofie et al. (1982), Aryawan (1989), Bamualin (1995), Rika (1995), Nitis (1996), Parwati et al. (1999), Mastika et al. (2000), Mastika (2001) cited in Mastika (2003)
										108 - 851						Katipana (2001), Dahlanuddin (2002), Paat et al. (1992), Paat and Winugroho (1990) cited in Quigley and Poppi (2009)
	390 - 710		120 - 360	40 - 570								640				Baliarti (1991) cited in Astuti (2004)
												60 - 460		220 - 770		Utomo et al. (1999), Utomo (2001) and Widjaja et al. (2000) cited in Utomo and Widjaja (2004)
Final weight (kg LW)*	250 - 280	556	180 - 250	210 - 300	255 - 600	293	316	345	456 - 510							

Notes
Blue text: figures based on project analysis
Red text: figures based on literatures (various treatments and experiments)
*: Weight at last day of finishing

Sources: see table

Figure 11.4.7: **Economic results of cow-calf farms (IDR per 100 kg live weight sold)**

Results on a per <100 kg live weight sold> basis	NTT-OEB-2	NTT-KUP-5	NTT-TAP-9	NTT-TTS-30	NTB-LOB-2	NTB-LTG-2	NTB-LTG-3	NTB-LTM-54	NTB-SBW-4	NTB-SBW-7	SU-BON-3	SU-BAR-5	SU-BUL-4	SU-BAN-4	SU-PIN-5	EJ-PAM-2	EJ-NGA-2C	EJ-TUB-3	EJ-JEM-4
1. Returns (sales)																			
Cull and slaughter animals	938.809	986.685	987.782	969.322	505.619	712.220	503.255	670.814	1.060.594	751.909	1.056.281	910.104	488.883	520.600	621.378	1.619.091	1.898.630	1.882.220	345.773
Breeding animals					1.019.178	1.006.014	734.436		203.148	216.326	570.432	963.653	1.214.594	1.374.303	1.179.731				
Calves sold/going to finishing	876.135	744.812	590.197	551.007	958.475	1.610.138	1.422.155	939.352	999.820	698.389	2.118.359	1.056.011	1.286.928	1.648.701	1.826.523	671.689	778.852	857.028	2.381.215
Subtotal	1.814.944	1.731.498	1.577.979	1.520.328	2.483.272	3.328.372	2.659.846	1.610.166	2.263.562	1.666.624	3.745.072	2.929.768	2.990.404	3.543.605	3.627.631	2.290.780	2.677.481	2.739.248	2.726.989
2. Purchase																			
Animal purchases								226.703											
Subtotal								226.703											
3. Operating cost																			
Feed (purchase feed, fertiliser, seed, pl	126.599	194.882	84.232	2.582							920.321	521.363	420.353	480.983	1.234.139	1.793.055	996.340	1.424.645	89.561
Machinery (maintenance, depreciation,	5.075	4.521	2.901	806	6.111	20.606	2.926	120	621	0	2.002	10.631	2.190	3.480	2.062	5.693	6.819	3.822	10.956
Fuel, energy, lubricants, water					1.820						312.171	414.912	331.237	645.889	220.625	10.164	18.683	36.624	151.316
Buildings (maintenance, depreciation)	9.270	9.494	7.268	619	43.996	123.454	53.029	527			262.445	18.143	130.149	95.123	219.983	19.517	40.207	73.129	90.848
Vet & medicine	36.701	9.455	26.685	8.563		29.186			35.076	14.142	125.356	67.174	90.654	81.519	23.951	30.177	19.989	20.919	64.293
Insurance, towes	2.686	6.091	1.421	3.692		105.069					1.181		6.878	1.533	614	1.709	36	115	11.339
Other inputs cow calf enterprise	111.854	27.757	40.865	6.880	10.740	25.695	40.852		75.298	19.327	157.698	30.768	42.044	24.261	18.620	119.723	113.790	104.064	31.644
Other inputs	5.161	13.334		806	24.282						20.003				11.583				
Paid labour								1											
Rented land																			
Liabilities	0	1	1	0							1	0	0	0	1	1	1	1	0
Subtotal	297.346	265.535	163.373	23.949	86.949	304.011	96.806	648	110.994	33.469	1.801.177	1.062.991	1.023.505	1.332.789	1.731.577	1.980.039	1.195.865	1.663.318	449.957
4. Gross margin																			
Returns (sale)	1.814.944	1.731.498	1.577.979	1.520.328	2.483.272	3.328.372	2.659.846	1.610.166	2.263.562	1.666.624	3.745.072	2.929.768	2.990.404	3.543.605	3.627.631	2.290.780	2.677.481	2.739.248	2.726.989
Purchase								226.703											
Operating cost	297.346	265.535	163.373	23.949	86.949	304.011	96.806	648	110.994	33.469	1.801.177	1.062.991	1.023.505	1.332.789	1.731.577	1.980.039	1.195.865	1.663.318	449.957
Gross margin	1.517.599	1.465.963	1.414.606	1.496.380	2.396.323	3.024.362	2.563.040	1.382.815	2.152.568	1.633.155	1.943.895	1.866.777	1.966.899	2.210.816	1.896.054	310.741	1.481.616	1.075.930	2.277.032
5. Opportunity cost																			
Family labour	657.542	823.616	338.302	6.284	865.048	1.062.368	1.282.153	169.156	2.021.671	978.879	787.606	1.238.255	300.417	285.261	786.511	755.915	622.963	951.805	835.781
Own land	165.268	269.860	44.714	92.945		5.172		3.161	59	45	499.226	490.604	587.654	207.540	143.843	81.783	13.480	9.010	291.408
Own capital	32.786	20.940	27.979	30.099	21.816	111.704	48.120	36.600	40.770	48.575	78.521	101.041	35.715	45.165	50.699	24.847	26.606	43.376	129.873
Subtotal	855.596	1.114.416	410.994	129.327	886.864	1.179.245	1.330.273	208.916	2.062.500	1.027.499	1.365.354	1.829.901	923.787	537.966	981.053	862.545	663.049	1.004.191	1.257.062
6. Net margin																			
Gross margin	1.517.599	1.465.963	1.414.606	1.496.380	2.396.323	3.024.362	2.563.040	1.382.815	2.152.568	1.633.155	1.943.895	1.866.777	1.966.899	2.210.816	1.896.054	310.741	1.481.616	1.075.930	2.277.032
Opportunity cost	855.596	1.114.416	410.994	129.327	886.864	1.179.245	1.330.273	208.916	2.062.500	1.027.499	1.365.354	1.829.901	923.787	537.966	981.053	862.545	663.049	1.004.191	1.257.062
Net margin	662.002	351.547	1.003.611	1.367.053	1.509.459	1.845.117	1.232.767	1.173.899	90.068	605.656	578.541	36.876	1.043.112	1.672.850	915.002	-551.804	818.567	71.739	1.019.970

Figure 11.4.8:   Economic results of cow-calf farms (IDR per head)

Results on a per <Head> basis	NTT-OEB-2	NTT-KUP-5	NTT-TAP-9	NTT-TTS-30	NTB-LOB-2	NTB-LTG-2	NTB-LTG-3	NTB-LTM-54	NTB-SBW-4	NTB-SBW-7	SU-BON-3	SU-BAR-5	SU-BUL-4	SU-BAN-4	SU-PIN-5	EJ-PAM-2	EJ-NGA-2C	EJ-TUB-3	EJ-JEM-4
1. Returns (sales)																			
Cull and slaughter animals	1.810.329	936.567	1.174.535	1.487.424	460.901	644.116	515.293	764.024	1.040.995	842.042	507.485	1.093.045	535.332	701.370	728.696	2.643.271	3.509.907	2.849.959	410.779
Breeding animals					929.038	909.817	752.004		199.394	242.257	274.061	1.157.357	1.329.993	1.851.507	1.383.483				
Calves sold/going to finishing	1.689.474	706.980	701.781	845.520	873.704	1.456.173	1.456.173	1.069.875	981.344	782.106	1.017.755	1.268.279	1.409.199	2.221.185	2.141.983	1.096.576	1.439.826	1.297.666	2.828.884
Subtotal	3.499.803	1.643.546	1.876.316	2.332.944	2.263.642	3.010.105	2.723.469	1.833.900	2.221.733	1.866.404	1.799.301	3.518.681	3.274.524	4.774.063	4.254.163	3.739.847	4.949.733	4.147.625	3.239.663
2. Purchase																			
Animal purchases								258.203											
Subtotal								258.203											
3. Operating cost																			
Feed (purchase feed, fertiliser, seed, p...	244.124	184.983	100.157	3.961							442.164	626.162	460.291	647.997	1.447.289	2.927.279	1.841.886	2.157.122	106.398
Machinery (maintenance, depreciation,	9.787	4.292	3.450	1.238	5.571	18.636	2.996	137	609	0	962	12.767	2.398	4.689	2.418	9.294	12.606	5.788	13.016
Fuel, energy, lubricants, water					1.659						149.981	498.314	362.708	870.163	258.729	16.594	34.539	55.454	179.763
Buildings (maintenance, depreciation)	17.875	9.012	8.642	950	40.104	111.649	54.297	601			126.090	21.790	142.515	128.153	257.977	31.863	74.330	110.728	107.928
Vet & medicine	70.771	8.974	31.730	13.140		26.395			34.428	15.837	60.226	80.676	99.267	109.825	28.088	49.265	36.953	31.674	76.380
Insurance, tcwes	5.179	5.782	1.690	5.666		95.022					568		7.531	2.066	720	2.790	66	174	13.470
Other inputs cow calf enterprise	215.690	26.347	48.591	10.558	9.790	23.238	41.829		73.906	21.644	75.765	36.953	46.039	32.685	21.836	195.455	210.358	157.568	37.593
Other inputs	9.953	12.657		1.236	22.134						9.610				13.583				
Paid labour																			
Rented land								1											
Liabilities	1	1	1	0							0	1	0	0	1	1	2	1	0
Subtotal	573.379	252.047	194.261	36.749	79.259	274.940	99.122	738	108.943	37.481	865.367	1.276.663	1.120.749	1.795.578	2.030.639	3.232.542	2.210.740	2.518.508	534.548
4. Gross margin																			
Returns (sale)	3.499.803	1.643.546	1.876.316	2.332.944	2.263.642	3.010.105	2.723.469	1.833.900	2.221.733	1.866.404	1.799.301	3.518.681	3.274.524	4.774.063	4.254.163	3.739.847	4.949.733	4.147.625	3.239.663
Purchase								258.203											
Operating cost	573.379	252.047	194.261	36.749	79.259	274.940	99.122	738	108.943	37.481	865.367	1.276.663	1.120.749	1.795.578	2.030.639	3.232.542	2.210.740	2.518.508	534.548
Gross margin	2.926.423	1.391.499	1.682.055	2.296.195	2.184.384	2.735.165	2.624.348	1.574.958	2.112.790	1.828.923	933.935	2.242.018	2.153.775	2.978.485	2.223.524	507.305	2.738.993	1.629.117	2.705.114
5. Opportunity cost																			
Family labour	1.267.954	781.781	402.262	9.642	788.540	960.782	1.312.822	192.660	1.984.312	1.096.219	378.402	1.487.157	328.960	384.313	922.350	1.234.081	1.151.642	1.441.172	992.908
Own land	318.690	256.152	53.167	142.623		4.678		3.600	58	50	239.851	589.221	643.487	279.605	168.686	133.516	24.919	13.643	346.192
Own capital	63.223	19.876	33.268	46.187	19.887	101.023	49.271	41.685	40.017	54.398	37.725	121.352	39.109	60.848	59.455	40.564	49.186	65.678	154.290
Subtotal	1.649.867	1.057.809	488.698	198.452	808.426	1.066.482	1.362.093	237.945	2.024.387	1.150.667	655.977	2.197.729	1.011.556	724.765	1.150.491	1.408.161	1.225.748	1.520.493	1.493.390
6. Net margin																			
Gross margin	2.926.423	1.391.499	1.682.055	2.296.195	2.184.384	2.735.165	2.624.348	1.574.958	2.112.790	1.828.923	933.935	2.242.018	2.153.775	2.978.485	2.223.524	507.305	2.738.993	1.629.117	2.705.114
Opportunity cost	1.649.867	1.057.809	488.698	198.452	808.426	1.066.482	1.362.093	237.945	2.024.387	1.150.667	655.977	2.197.729	1.011.556	724.765	1.150.491	1.408.161	1.225.748	1.520.493	1.493.390
Net margin	1.276.556	333.690	1.193.357	2.097.743	1.375.957	1.668.683	1.262.255	1.337.013	88.403	678.257	277.957	44.289	1.142.219	2.253.719	1.073.032	-900.856	1.513.246	108.623	1.211.725

Figure 11.4.9:   Economic results of beef finishing farms (IDR per 100 kg carcass weight)

Results on a per <100 kg carcass weight sold> basis	NTT-OEB-1	NTT-KUP-3	NTT-TAP-4	NTT-TTS-15	NTT-KUP-100	NTB-LOB-1	NTB-LTM-4	NTB-LTM-12	NTB-SBW-2	SU-BON-1	SU-BAR-2	SU-BUL-2	SU-BAN-2	SU-PIN-2	EJ-PAM-1	EJ-NGA-2	EJ-JEM-2
1. Returns (sales)																	
Beef returns	4.977.394	3.574.193	3.608.611	3.395.483	4.510.763	4.044.133	4.530.901	5.454.125	3.240.491	5.940.900	5.999.537	5.278.760	4.996.837	6.567.827	5.212.364	5.918.267	4.640.160
Subtotal	4.977.394	3.574.193	3.608.611	3.395.483	4.510.763	4.044.133	4.530.901	5.454.125	3.240.491	5.940.900	5.999.537	5.278.760	4.996.837	6.567.827	5.212.364	5.918.267	4.640.160
2. Purchase																	
Animal purchases	1.768.140	1.861.063	2.160.629	1.737.697	3.280.923	1.814.928	2.646.633	3.187.604	2.533.529	3.676.069	3.307.084	2.936.777	2.793.471	3.590.230	1.888.450	1.736.602	2.859.655
Subtotal	1.768.140	1.861.063	2.160.629	1.737.697	3.280.923	1.814.928	2.646.633	3.187.604	2.533.529	3.676.069	3.307.084	2.936.777	2.793.471	3.590.230	1.888.450	1.736.602	2.859.655
3. Operating cost																	
Feed (purchase feed, fertiliser, seed, pe	487.090	344.043	2.447.844	5.765	245.127			80.209		1.355.930	3.224.748	822.919	1.976.025	1.382.603	3.173.632	2.803.722	523.421
Machinery (maintenance, depreciation,	13.919	9.333	6.635	1.801	1.176	9.952	6.638	15.872	889	3.177	21.769	3.760	4.970	3.781	12.968	15.056	35.845
Fuel, energy, lubricants, water	25.422			1.383		1.595		498.054		338.387	749.200	443.970	846.231	287.680	13.171	37.867	204.661
Buildings (maintenance, depreciation)	9.335	19.597	16.621	18.227	64.855	71.649	37.365	62.186	8.134	162.654	37.153	250.580	135.844	333.567	44.457	88.776	109.812
Vet & medicine	7.366	31.153	27.229	8.246	51.255	202.949	25.547	73.906	39.739	50.247	65.238	69.470	50.981	34.323	39.105	21.520	12.337
Insurance, taxes	35.346	12.573	3.250	9.716	9.385		85			1.874	25.907	11.809	2.190	1.125	3.893	79	6.232
Other inputs beef enterprise	14.154	20.135	22.651	1.799	130.258	52.625	171.620	16.808	42.389	63.211		22.983	10.272	14.160	39.165		
Other inputs		27.525			5.538	39.545		13.778		31.731				21.241			
Paid labour																	
Rents paid																	
Interest for liabilities	1	1	1	0	0			0		1	1	1	1	1	1	1	1
Subtotal	592.632	464.360	2.524.230	46.938	507.594	378.314	241.256	760.813	91.151	2.007.210	4.124.016	1.625.492	3.026.514	2.078.480	3.326.392	2.967.020	892.309
4. Gross margin																	
Returns (sale)	4.977.394	3.574.193	3.608.611	3.395.483	4.510.763	4.044.133	4.530.901	5.454.125	3.240.491	5.940.900	5.999.537	5.278.760	4.996.837	6.567.827	5.212.364	5.918.267	4.640.160
Purchase	1.768.140	1.861.063	2.160.629	1.737.697	3.280.923	1.814.928	2.646.633	3.187.604	2.533.529	3.676.069	3.307.084	2.936.777	2.793.471	3.590.230	1.888.450	1.736.602	2.859.655
Operating cost	592.632	464.360	2.524.230	46.938	507.594	378.314	241.256	760.813	91.151	2.007.210	4.124.016	1.625.492	3.026.514	2.078.480	3.326.392	2.967.020	892.309
Gross margin	2.616.622	1.248.770	-1.076.248	1.610.848	722.246	1.850.891	1.643.012	1.505.707	615.812	257.621	-1.431.563	716.491	-823.148	899.116	-2.478	1.214.645	888.196
5. Opportunity cost																	
Family labour	1.803.276	2.057.970	773.648	14.034	111.299	1.408.774	683.177	1.944.922	2.894.202	1.249.399	2.535.682	515.809	604.163	1.545.974	1.721.840	1.375.468	510.408
Own land	453.239	557.050	102.254	207.581	472.509		31.194	152.608	84	791.935	1.004.652	1.008.987	296.386	263.776	186.287	29.763	177.962
Own capital	89.168	85.671	64.800	67.119	2.844	35.573	4.140	8.535	58.008	121.400	207.516	60.935	138.370	170.257	55.374	58.082	14.464
Subtotal	2.345.683	2.700.691	940.702	288.734	586.652	1.444.347	718.511	2.106.065	2.952.295	2.162.734	3.747.850	1.585.732	1.038.918	1.980.008	1.963.501	1.463.313	702.833
6. Net margin																	
Gross margin	2.616.622	1.248.770	-1.076.248	1.610.848	722.246	1.850.891	1.643.012	1.505.707	615.812	257.621	-1.431.563	716.491	-823.148	899.116	-2.478	1.214.645	888.196
Opportunity cost	2.345.683	2.700.691	940.702	288.734	586.652	1.444.347	718.511	2.106.065	2.952.295	2.162.734	3.747.850	1.585.732	1.038.918	1.980.008	1.963.501	1.463.313	702.833
Net margin	270.939	-1.451.921	-2.016.950	1.322.114	135.594	406.544	924.501	-600.358	-2.336.483	-1.905.114	-5.179.413	-869.241	-1.862.066	-1.080.891	-1.965.979	-248.668	185.362

Figure 11.4.10: Economic results of beef finishing farms (IDR per head)

Results on a per <> basis	NTT-OEB-1	NTT-KUP-3	NTT-TAP-4	NTT-TTS-15	NTT-KUP-100	NTB-LOB-1	NTB-LTM-4	NTB-LTM-12	NTB-SBW-2	SU-BON-1	SU-BAR-2	SU-BUL-2	SU-BAN-2	SU-PIN-2	EJ-PAM-1	EJ-NGA-2	EJ-JEM-2
1. Returns (sales)																	
Beef returns	12.453.440	4.199.676	4.546.849	3.989.692	5.480.577	4.549.649	6.089.531	7.253.986	2.799.784	7.699.406	6.173.524	7.799.367	11.092.978	11.519.969	7.459.675	11.545.060	11.832.408
Subtotal	12.453.440	4.199.676	4.546.849	3.989.692	5.480.577	4.549.649	6.089.531	7.253.986	2.799.784	7.699.406	6.173.524	7.799.367	11.092.978	11.519.969	7.459.675	11.545.060	11.832.408
2. Purchase																	
Animal purchases	4.423.887	2.186.749	2.722.392	2.041.794	3.986.321	2.041.794	3.557.075	4.239.513	2.188.969	4.764.186	3.402.990	4.339.087	6.201.505	6.297.264	2.702.655	3.387.676	7.292.121
Subtotal	4.423.887	2.186.749	2.722.392	2.041.794	3.986.321	2.041.794	3.557.075	4.239.513	2.188.969	4.764.186	3.402.990	4.339.087	6.201.505	6.297.264	2.702.655	3.387.676	7.292.121
3. Operating cost																	
Feed (purchase feed, fertiliser, seed, pe	1.218.698	404.250	3.084.284	6.774	297.829			106.678		1.757.285	3.318.265	1.215.862	4.386.776	2.425.086	4.541.944	5.469.361	1.334.723
Machinery (maintenance, depreciation,	34.824	10.966	8.360	2.116	1.429	11.196	8.922	21.110	768	4.117	22.401	5.556	11.033	6.631	18.559	29.371	91.404
Fuel, energy, lubricants, water						1.794		662.412		438.550	770.927	655.966	1.878.634	504.591	18.850	73.869	521.886
Buildings (maintenance, depreciation)	63.605	23.027	20.942	1.625	78.798	80.605	50.219	82.707	7.027	210.799	38.230	370.232	301.574	585.076	63.624	173.179	280.021
Vet & medicine	23.357	36.605	34.308	21.416	62.275	228.317	34.335	98.295	34.335	65.120	67.130	102.643	113.178	60.203	55.966	41.979	31.460
Insurance, taxes	18.429	14.774	4.095	9.689	11.403		115			2.429		17.448	4.861	1.974	5.572	154	15.892
Other inputs beef enterprise	88.435	23.658	28.540	11.416	158.263	59.203	230.657	22.355	36.624	81.921	26.658	33.958	22.803	24.837	56.051		
Other inputs	35.414	32.341		2.114	6.729	44.488		18.325		41.123				37.256			
Paid labour																	
Rents paid																	
Interest for liabilities	2	1	1	0	1			0		1	1	1	1	1	1	2	1
Subtotal	1.482.765	545.623	3.180.530	55.152	616.727	425.603	324.247	1.011.882	78.754	2.601.344	4.243.612	2.401.665	6.718.861	3.645.654	4.760.567	5.787.915	2.275.388
4. Gross margin																	
Returns (sale)	12.453.440	4.199.676	4.546.849	3.989.692	5.480.577	4.549.649	6.089.531	7.253.986	2.799.784	7.699.406	6.173.524	7.799.367	11.092.978	11.519.969	7.459.675	11.545.060	11.832.408
Purchase	4.423.887	2.186.749	2.722.392	2.041.794	3.986.321	2.041.794	3.557.075	4.239.513	2.188.969	4.764.186	3.402.990	4.339.087	6.201.505	6.297.264	2.702.655	3.387.676	7.292.121
Operating cost	1.482.765	545.623	3.180.530	55.152	616.727	425.603	324.247	1.011.882	78.754	2.601.344	4.243.612	2.401.665	6.718.861	3.645.654	4.760.567	5.787.915	2.275.388
Gross margin	6.546.788	1.467.305	-1.356.072	1.892.747	877.529	2.082.252	2.208.209	2.002.591	532.061	333.876	-1.473.078	1.058.615	-1.827.388	1.577.050	-3.546	2.369.468	2.264.899
5. Opportunity cost																	
Family labour	4.511.795	2.418.114	974.797	16.490	135.228	1.584.870	918.190	2.586.747	2.500.591	1.619.222	2.609.216	762.108	1.341.241	2.711.638	2.464.212	2.683.195	1.301.540
Own land	1.134.003	654.534	128.840	243.908	574.099		41.925	202.968		1.026.348	1.033.787	1.490.778	657.976	462.664	266.605	58.059	453.802
Own capital	223.099	100.664	81.647	78.865	3.456	40.019	5.565	11.351	50.119	157.334	213.534	90.032	307.181	298.631	79.248	113.304	36.883
Subtotal	5.868.898	3.173.312	1.185.284	339.262	712.783	1.624.890	965.679	2.801.066	2.550.783	2.802.903	3.856.538	2.342.919	2.306.398	3.472.933	2.810.065	2.854.558	1.792.225
6. Net margin																	
Gross margin	6.546.788	1.467.305	-1.356.072	1.892.747	877.529	2.082.252	2.208.209	2.002.591	532.061	333.876	-1.473.078	1.058.615	-1.827.388	1.577.050	-3.546	2.369.468	2.264.899
Opportunity cost	5.868.898	3.173.312	1.185.284	339.262	712.783	1.624.890	965.679	2.801.066	2.550.783	2.802.903	3.856.538	2.342.919	2.306.398	3.472.933	2.810.065	2.854.558	1.792.225
Net margin	677.890	-1.706.007	-2.541.356	1.553.484	164.747	457.362	1.242.530	-798.476	-2.018.722	-2.469.027	-5.329.615	-1.284.303	-4.133.786	-1.895.883	-2.813.611	-485.090	472.673