BEEF SUB-SECTOR[1]

THE MACRO ENVIRONMENT FOR THE SECTOR

POLITICAL

LIVESTOCK POLICIES AND LAWS

"Policies" that apply Indonesia's cattle and beef industry include a suite of laws, regulations, plans, programs and policies that can be ordered in various ways. For a policy hierarchy in the Indonesian context see Mardha (2009) and for feed-livestock systems see Brown *et al*. (2008). Together, the policies set the formal institutional environment in which industry activity takes place on multiple scales – from a long term horizon to day-to-day basis, from national down to household levels.

Signals emitted from central government are transmitted down to local levels. However, decentralisation and regional autonomy measures that began in the late 1990s have eroded national-level policy making and implementation power vis-à-vis local government. Local government set policy with considerable autonomy and discretion. This is particularly the case for powerful provinces like East Java (EJ) that account of large proportions of Indonesia's agricultural output. Formal policies – from the centre or regions – also interact with informal social rules (see Section 1.3 below), meaning that implementation and enforcement of formal policies can be variable, as seen in some of the sectoral policies discussed below

Examples of cross-sectoral policies that relate to multiple industries include beef include:

- Indonesia's Economic Masterplan (Masterplan for Acceleration and Expansion of Indonesia Economic Development) 2011-2025. Coordinating Ministry of Economic Affairs (2011).
- The Ministry of Agriculture five year plan 2010-14 (National Medium-Term Development Plan (NMTDP) for 2010-2014).

Examples of livestock specific policies include:

- Law No 18 of 2009 on Livestock and Animal Health
- Government Regulation No 22 of 1983 on Veterinary Public Health
- Government Regulation No 15 of 1977 on Rejection, Prevention, Eradication and Treatment of Animal Diseases
- Regulation of the Minister of Agriculture No 36/Permentan/Ot.140/8/2006 on National Breeding System, 31 August 2006.

Amongst the multi-faceted components of the NMTDP is the goal of self-sufficient in five agricultural commodities – rice, soybean, sugar, maize and beef. Self-sufficiency in beef is thought to be "easiest" to achieve because there is less competition for land (Prabowo, 2011). Targets of self-sufficiency and price stability arose out of the Asian Financial Crisis of the late 1990s (see ADO Socio-economic

[1] To be cited as: Waldro, S.A. and Kristedi, T. (2012) *Literature Review of the Beef Sub-sector*. A report prepared for Collins-Higgins Consulting Group for ACIAR Project AGB-2-12-004, EI-ADO SRA.

Review). Vanzetti *et al*. (2010) also attribute self-sufficiency policy orientation to the international food security debate – and the interpretation that Indonesia should respond by stimulating domestic production and trade barriers.

BEEF SELF-SUFFICIENCY POLICY

Indonesia has a long-standing program to develop the beef industry, including goals to build self-sufficiency.[2] However, policy attention has intensified in recent years, since the current cabinet included beef as one of the commodities that Indonesia will become 90% self-sufficient in by 2014.

The flagship policy for the beef sufficiency program is PSDSK (Program Swasembada Daging Sapi dan Kerbau) is implemented by the DGLAHS and effectively began in 2008. The program is otherwise known as the Beef Self-sufficiency Blueprint (PSDS-2014).[3] PSDS-2014 is one of the 21 programs of the Ministry of Agriculture pertaining to efforts to create cattle-source food security based on domestic resources.[4] A translated transcript of the blueprint is provided in Morelink (2010). Details on the heavily supply-sided policy appear in relevant sections below, but some of the "Strategies to Increase Domestic Beef Production" are to:

- Increase the population of productive cows
- Maintain the population of productive cows
- Maintain low rate of mortality (weaners and calves)
- Increase the weight of living beef cattle
- Improve the service quality of abattoirs

The aim of the self-sufficiency blueprint was to increase Indonesia's cattle herd to 14.23 million head and beef production to 420,200 tons, which would restrict imports to 32,000 tons (Prabawo, 2011).

[2] The GoI first included self-sufficiency targets into national government programs in 1999 to achieve self-sufficiency by 2005 (Ilham, 2006), and another cabinet aimed to achieve self-sufficiency by 2010. For details see Ilham (2006) p. 136; Sekretariat Negara (2007); Hadi *et al.* (2002); Sullivan and Diwantyo (2007).

[3] Direktorat Jenderal Peternakan. 2010. Blue Print Program Swasembada Daging Sapi. 2014. Direktorat Jenderal Peternakan, Kementan Pertanian, Januari 2010.

[4] The PSDS program is governed by:

- Regulation of the Minister of Agriculture Number 59/Permentan/HK.060/8/2007 "Guidelines for Achieving Self-Sufficiency Acceleration in Beef"
- Regulation of the Minister of Agriculture Number: 60/Permentan/HK.060 / 8 / 2007 Accelerating Achievement of Self-Sufficiency Unit Beef 2010.

Other measures related to PSDS include

- Agriculture Minister No.19/Permentan/OT.140/2/2010 about General Guidance on Meat Self-Supporting by 2014;
- Director General of Husbandry and Animal Health at Ministry of Agriculture issued the circular No.30018/SE/HK.340/ F/12/2010 (General Guidance on Meat Self-Supporting by 2014) about imported cattle to 2011.
- Commitment to the PSDS program was reiterated in the National Strategy and Plan (RenStra) document of Ministry of Agriculture 2010–2014.
- And further reiterated at the recent Ministerial Consolidation Meeting conducted by the Minister of Agriculture in Jakarta, 3–4 February 2012.
- The PSDS program is in accordance with Law no. 18 of 2009 concerning Animal Husbandry and Animal Health (UUPKH).

20 provinces with high potential in livestock have been nominated as centers of beef production, which include EJ, NTB and NTT.

In developing industry plans, policy-makers were working off data from the last agricultural census of 2003 (ST03). In order to check feasibility and progress of the self-sufficiency program, a bovine census was conducted in 2011 by the Ministry of Agriculture and the Central Statistics Agency, called Data Collection of Beef Cattle, Dairy Cattle and Water Buffalo (PSPK, Pendataan Sapi Potong, Sapi Perah, dan Kerbau). The census found that the national herd had already reached 14.8 million head, well above the figure used in annual reporting (12.6 million head) and already above the PSDS target for 2014. Furthermore, the proportion of females in the national herd was 3% higher than expected (to reach 68.15% for beef cattle). Based on these numbers, projections for 2013 and 2014 were increased to 16 and 16.8 million head.

While some industry groups in Indonesia (e.g. Indonesian Meat Importers Association, ASPIDI) question the statistics and methods used to derive them, the findings of the PSPK were used to pronounce that the PSDS program was on track and, indeed, that the budget planned for the program (Rp 10.65 trillion over 5 years) could be pared back (Prabawo, 2011). It has been reported that in 2013 alone, DGLAHS will spend approximately Rp1.5 trillion to implement the program (Kristedi). For assessments of policy mechanisms used to pursue self-sufficiency (import tariffs, production subsidies/credit, and research and development) see Hadi *et al.* (2002) and Vanzetti *et al*. (2010).

INTERNATIONAL TRADE POLICY

International trade policy is a major instrument by which the GoI is seeking to stimulate domestic growth. The sector is governed by a large number of trade, quarantine and SPS regulations policies and regulations. Morelink (2010) provides a list of these regulations, and the following.

- Import restrictions. Indonesia imposes total country bans (not based on area of freedom) for FMD. Brasil and India are not “allowable country of imports” for beef, while Australia, New Zealand and Uruguay are FMD free. Other major infectious animal diseases include anthrax and BSE. Brucellosis restricts that trade of live cattle within and into Indonesia
- Import tariffs. A 5% tariff is imposed on imported beef and offal. On the rationale that breeder cattle imports are used to grow Indonesia’s herd and produce beef cattle, a 0% tariff is applied to breeders. Feeder cattle were imported duty free, subject to the requirement of the maximum weight of 350 kg, on the basis that the value of weight gain is captured by Indonesian feedlots and fattening households. However a 5% rate was introduced in 2012 for cattle imports except “oxen and breeders” (which requires some interpretation). Under the ASEAN, Australia, New Zealand Free Trade Agreement (AANZ FTA) tariffs on bovines, beef and beef offal are to be eliminated or phased out.
- Quota. The issuing of import permits are the major instrument used to restrict beef and cattle imports under the PSDS beef self-sufficiency program.[5] This is effectively done through the use of an unofficial quota to restrict imports through reduced allocations (quantity)

[5] Director General of Husbandry and Animal Health at Ministry of Agriculture issued the circular No.30018/SE/HK.340/ F/12/2010 (General Guidance on Meat Self-Supporting by 2014) about imported cattle to 2011. In early December 2010, the Indonesian Government applied to WTO to have all offal imports except tongue and tails banned (Morelink, 2010).

when applying for permits. The DGLS issues import permits 6-monthly, and the monitoring of imports occurs at Customs and Quarantine (Morelink, 2010).

- For live cattle, in December 2010, the GoI imposed a limit of 520,000 head of cattle to be imported from Australia during 2011 and a stricter enforcement of the 350 kg weight limit of imported cattle. The quota was further reduced for 2012 to 283,000 head. At the peak of the trade (2009), Indonesia imported 770,000 head, up to one-third of the total (registered) cattle slaughter.
- From a peak of 51,000 tonne in 2009, imports of boxed beef have also declined due to quota restrictions. After additional quota was issued in 2012 (8,300 tonne and 7,000 tonne), the total allocation was 41,000 tonne, or about 10% of Indonesia's beef production.
- The GoI also aims to increase the population of breeder cattle by using ex-import cattle or through imports of breeder cattle, using government or private funds (see below)

THE BREEDING SECTOR

One of the aims of the Beef Self-sufficiency Blueprint (PSDS-2014) is to improve the productivity of local cattle. This is to be done through both optimising artificial insemination (IB, *Inseminasi Buatan*) and intensifying natural mating (InKA). Institutional measures to be taken include:

- Strengthening breeding regions (especially NTT and NTB);
- Development of Village Breeding Centre (VBCs);
- The provision of breeds through subsidies of interest (Cattle Breeding loans program/KUPS, Kredit Usaha Pembibitan Sapi)[6]; and
- And by using ex-import cattle or through import of breeder cattle from countries free from major infectious animal diseases. This to be done through government or private funds.

The vast majority of breeding occurs through natural and largely uncontrolled mating by bulls that belong to individual households or groups. Problems include genetic quality, long breeding season, and low conception rates. Measures have been taken to improve natural breeding including the dissemination of breeding stock, controlled breeding and spread of artificial insemination (AI).

Hadi et al. (2002) writes that in the past AI services were provided entirely by the government, at no charge to farmers. The AI officers from the OLS provided the service and received an incentive for each AI application. Problems with the AI included:

- Lags in farmers detecting if cattle are on heat and notifying local AI officers;
- Insufficient AI officer and transport; and
- Insufficient liquid nitrogen (so cold water often used to preserve semen).

Government maintains a role as both regulator and facilitator of the breeding sector, as well as acting as provider of semen or breeder cattle. However, genetic material for beef cattle (semen or embryos) is now provided through a wider range of channels: research centres; breeding centres (national and

[6] Minister of Agriculture No. 40/Permentan/PD.400/9/2000 Credit Guidelines for Implementation of Cattle Breeding

local); private/cooperative; or via the community through Village Breeding Centres (VBCs) (Morelink, 2010).[7]

Private inseminators purchased semen from the government AI stations and farmers are charged (Rp 25-30,000 in the past).

One of the measures that the GoI has used to strengthen breeding is to strengthen the Village Breeding Centre program, to support private breeding service providers, with the aim to provide 37,500 head by 2014. This will be achieved by three channels:

- The PUAP (*Pengembangan Usaha AgribisnisPerdesaan* – Village Agribusiness development) program, which aims to support 4,000 farmers group to develop their own good quality breeding cattle. Each group received Rp100 rupiah from the government.
- Integrated cattle – palm oil plantations projects (not relevant in EI)
- Through joint ventures (not common in EI?)[8]

Relationships between feedlots and small-holders are also relevant to the breeding sector. This was first developed in the 'nucleus estate and smallholder' (NES) approach in 1990 (Hadi, 2002). Feedlots, which have financial and management resources, are obligated to provide cattle, feed (esp. concentrates) and technical assistance to smallholders, and to purchase back their fattened cattle at prevailing market prices. Smallholders, who have land and family labour, are obligated to look after the cattle. All costs pre-financed by the feedlot are deducted from the sale price.

The use of imported cattle in the scheme stalled during the Asian financial crisis and depreciation of the rupiah. But by 2001, of the 1.5 million cattle fattened by smallholders, 99.9% involved NES partnerships and a further 252,000 cattle were fattened from live feeder cattle imports. Hadi *et al*. (2002) recommend that the scheme be more voluntary in nature.

Sullivan and Diwyanto (2007) write that under a previous self-sufficiency program (2010), the GOI continued the feedlot-smallholder partnership scheme. Feedlots were encouraged to retain pregnant females from live cattle imports, to distribute the females to small-holders, which raise the calf. The cow can then be sent to slaughter or kept for breeding. Sullivan and Diwyanto (2007) conclude that the scheme entails high costs on the GoI (because cattle are bought back by government at inflated/above market price) and that smallholders are not provided with bank loans to maintain the animals.

Credit schemes relevant to breeding are also discussed below

[7] Beef cattle breeding by the government are conducted through UPT (Technical Services Unit) that produces cattle seeds and another UPT that produces breeder cattle. Seeds are produced by three central UPT, the Cipelang Livestock Embryo Institute (BET), the Singosari Artificial Insemination Institute (BBIB) and Lembang Artificial Insemination Centre (BIB) and supported by several regional Artificial Insemination Centres. Currently, there are fourteen Regional Artificial Insemination Institutes (BIBD) located in West Sumatera, Central Java, Bali, North Sumatera, Jambi, South Sumatera, Bengkulu, Lampung, D I Yogyakarta, South Kalimantan, West Nusa Tenggara, South Sulawesi, South East Sulawesi and East Kalimantan (Morelink, 2010).

[8] Australian private investment was to work with their local partner to develop breeding centers. 6 Australian companies signed up a MoU in 2010, but had not materialised until February 2012, according the Minister of Trade Gita Wirjawan(Jakarta Post, 2012).

CATTLE PRODUCTION

Increasing productivity in the cattle production sector is by far the largest component of the PSDS-2014 program. The PSDS-2014 document specifies aims to:

- reduce calving intervals from >18 months to 13-15 months;
- increase the calving rate of productive cows from 55-57% to 75-80%;
- decrease calf death from 20-40% to 5-10%, and cow death from 10-20% to 2-5% (especially through provision of adequate feed and water in the dry season in breeding areas like NTT and NTB);
- These measures can increase calving rates by 30-40%; and
- Increase the cattle population by 10-15%.

In addition, the program aims to

- increase average daily weight gain, shorten the fattening period, improve cattle feed efficiency, and increase the percentage of carcasses as well as enhance beef quality; and
- Postpone slaughtering so the cattle reach maximum weight, which is expected to increase beef weight or beef production around 20-40%.

The activities that will be used to achieve these aims are listed as:

- Development of breeding and fattening of local cattle;
- Development of organic fertilizer and bio-gas;
- Development of integration of cattle and crops; and
- Postponement of slaughtering.

These cattle production activities are pursued through a large number of domestic and external RD&E programs and through slaughter policy (discussed below). One direct policy measure is to provide credit and cattle to small-holders.

Hadi *et al.* (2002) explains how the government provides assistance to farmers with breeder cattle through a revolving system designed to spread cattle to more farmers and reduce costs. The government provides an individual farm household with one breeder cow. Within five years, the farmer must return the first two calves to the government; the farmer keeps the rest (including the breeder cattle and the third calf). The two returned calves are redistributed to other farmers.

The government can also provide assistance to farmers with feeder cattle for fattening to increase liveweight. A number of male cattle are provided to farmer groups. Farmers must feed and maintain the cattle. A percentage of net revenue (total gross revenue minus total initial value of feeder cattle) returns to the government, while the rest goes to the farmer group. The initial value of feeder cattle also returns to the government. Relationships facilitated through government regulation and credit, between cattle importers and smallholder fattening operations / producer groups, are common in plantation systems in Sumatra (Morelink, 2010).

The major credit schemes are KUPS (Kredit Usaha Pembibitan Sapi) and KKPE (Kredit Ketahanan Pangan dan Energi). KUPS is intended for breeding cattle with a subsidized interest rate 5% for period 6 years with 24 month grace period (when market interest rates were around 14% in 2010).

Government has allocated a budget for 200,000 head per year (in a split of 80:20 between beef and dairy cattle enterprises). The regulations allow financing for up to 5,000 head of cattle with maximum loan capped at Rp66 billion per application. However by October 2010, expenditure on KUPS had reached Rp128 billion or about 3.3% from target of program credit in 2010 (Hadibrata, 2011).

The credit program is governed by several policies.[9] For an idea of how the funding is delivered through a development bank, see BNI Bank website http://www.bni.co.id/BankingService/Commercial/Kredit/KreditProgramBNI/KreditUsahaPembibitanSapi.aspx

In addition to national industry development plans, provincial government also set industry development plans. Examples include:

- East Java has implemented the Madura Sapi Berlian (Diamond Cattle) program with the aim of producing 5 million calves within five years. This program is an acceleration of a previous program that aimed for artificial insemination (AI) of one million cows. Based on a projected growth of 2.7% in beef production (source: Small-Scale Beef Cattle Production in East Java, Indonesia, cited by Priyanti *et al.*, 2012).
- The government of NTB has launched the BSS " Bumi Sejuta Sapi – land of one million cattle" program, which aims to make the province a key source of local breeds and to increase the beef cattle herd from 685,000 to 1million head by 2014. The NTB medium Term Development Plan (RPJMD) 2009-2013 is based around the 3 "qualified" commodities of cattle, corn and seaweed, associated with a multi-faceted industry development program (The Government of NTB, 2009).
- In NTT, provincial government has launched the "anggur merah" program to speed up economic growth and reduce poverty in which the beef cattle sector development is a strategic focus. Since 2010, provincial government has declared NTT a "livestock province" with a "one citizen, one cattle" program. This would return NTT to a position as one of the country's main suppliers of livestock, with 4 million cattle within the next 5 to 10 years (Fointuna, 2010).
- As an example of a district policy, East Sumba regency in NTT is preparing a total of 400,000 hectares of land across 140 villages to expand its cattle breeding industry (Fointuna, 2012).

THE SLAUGHTER SECTOR

PSDS-2014 states the aim to increase the supply of beef through the "empowerment and improvement" of abattoirs so that they can produce meat that is the equivalent quality of imported beef – and can even be exported.[10] This is to be achieved through "technical" measures including sanitation and hygiene, animal welfare, aging, cutting system and cold chain management.

[9] These include Ministry of Agriculture No.40/Permentan/PD.400/9/2009 and Regulation of Ministry of Finance No. 131/PMK.05/2009, while Vanzetta et al (2009) cite RENSTRA (Strategic Plan) of the Ministry of Agriculture and initiated under a Presidential Decree of Agriculture Revitalisation Plan in 2005.

[10] PSDS-2014 states that domestic meat can be exported to Middle East and Asian countries because of: Indonesia is free from FMD; Halal guarantee; sanitation hygiene-based food security guarantee indicated with Veterinary Control Number (VCN) and implementation of Hazard Analysis Critical Control Point (HACCP) as a food security guarantee system.

PSDS-2104 states that 150-200,000 productive cows are slaughtered per year, taking place mainly in NTT, NTB, Bali and Java.[11] The GoI aims to prevent the slaughtering of productive female cows through slaughter bans and the "rescue" (buy-back) of productive females.

To enforce slaughter bans, local Dinas Livestock officials check for the slaughter of productive females, notionally in every slaughterhouse and slaughter place at every slaughter time. The GoI had a scheme to buy back these animals at the slaughter plant Sullivan and Diwyanto (2007).

However, the slaughter of productive females is widespread. Producers, traders and butcher have vested interests in selling their livestock and meat regardless of government regulations. There is not a sufficient budget to have an effective buy-back program. Cattle can be slaughtered through very small and mobile slaughter facilities, or can be declared as unproductive, sick or injured. This is especially common in periods of cattle scarcity (e.g. festivals, decline in imported feeder cattle).

The slaughter of productive females is widely thought to lead to further decline of the breeding herd and herd regression (Hadi, 2002). However, ACIAR project AS2/2000/099 (Strategies to improve Bali cattle—eastern Indonesia) involving geneticists from various Indonesian agencies, concluded that there was no evidence of genetic regression, and that low turn-off weights and fertility rates were due to under-nutrition (Winter, 2011; Copland pers comm).

The government has built some slaughter facilities as a public good service and to maintain some food safety standards (although these are reported to be not necessarily high). Under Act No.18 (1998), slaughter charges of Rp6,000 per head were to be abolished. However, autonomous local governments in most areas do apply a modest slaughter charge for cost recovery reasons (Hadi *et al*., 2002).

Morelink (2010) reports that the Government will aim to better regulate slaughterhouses by introducing two licenses covering: suppliers to local wet markets only; and suppliers to more distant markets that will need to have established cool chain systems. In 2009, there were 693 licensed slaughter houses and abattoirs in Indonesia which slaughtered 935,700 head of cattle. This probably accounts for less than half of the Indonesian cattle slaughter (depending on what set of slaughter statistics are used, see statistical section below). That is, unlicensed slaughter operations account for a large proportion of the Indonesian cattle slaughter. These small-scale and mobile operations have developed to avoid slaughter bans, inspection and slaughter fees or are able to slaughter stolen cattle.

Change in regulation of the slaughter sector may be driven by consumer or public demand or as a response to major disease, food safety, environmental or animal welfare concerns. Local government in particular may apply more stringent regulations in areas like registration, registered capital, tax, inspection, hygiene, building and bench materials, storage, water use and effluent management. These have a major influence on the activity in the sector and indeed the whole supply chain.

DOMESTIC TRADE AND MARKETING

[11] These figures are broadly consistent with earlier figures from the DGLS of 150,000 to 170,000 productive females killed per year (10% of slaughtered animals) (cited in Sullivan and, 2007). ACIAR data indicates that around 34% of all female cattle slaughtered are productive females (cited in Nimmo Bell and ICASEPS, 2007).

Indonesia has long used measures to manage the flows and conduct of domestic trade (Hadi *et al*., 2002), some of which have a legacy in the colonial era (Rutherford and Dahlanuddin, 2004). With the intent of controlling depletion of the domestic cattle herd through excessive slaughter, central government (the DGLS) specified the number and weight of cattle to be sent from each province to another for slaughter.

Following the financial crisis in 1998, Indonesia entered into agreements (including with the IMF, Presidential Decree No. 2/1998) to relax these trade restrictions and to eliminate tax and retribution on the trade. However, regional decentralisation measures have allowed local governments to impose their own trade management measures, to pursue local industry development and generate local revenues. The measures include:

- Export quotas on number of cattle;
- Weight and sex restrictions;
- Government purchases and cattle redistribution; and
- Restrictions due to disease status. e.g. Brucellosis in NTT restricts the movement of breeding females, but allows the movement of males for fattening or slaughter (not breeding).

As an example of inter-provincial trade policy, NTT has established quota and regulations related to the export for livestock. In 2012, the quota was set at 55,000 cattle (and 7,000 buffaloes). The limits are that livestock must be:

- Livestock for slaughter, not breeding stock whether it be male or female;
- From Timor and Rote, only bulls that are not for breeding may be exported (while non-productive female buffaloes and horses can be exported); and
- For Flores, Lembata, Alor and Sumba, exports are permitted for cattle, buffalo and horses that are either males not suitable for breeding or unproductive females.

The trade is to be managed by Dinas Livestock (at provincial and district levels) including the tasks of:

- Managing shipments and animal health;
- Regulating the export of breeding males and productive females; and
- And regulating provincial export restrictions on minimum liveweights. The minimum weights are: Bali cattle 275 kg; cow Sumba Ongole 300 kg, 350 kg buffalo; horses 250 kg.

Other procedural details are that provincial government issues export permits to eligible export companies, which report to Dinas Livestock which back to the Governor.

In NTB there is a ban on the import of cattle into Lombok that are not Bali cattle. There is also quarantine of animals moved from Bima to Lombok supposedly for 2 weeks. Bulls imported from Sumbawa are supposed to be for slaughter only (not fattening or on-selling).

Reforms at the end of the 1990s designed to ease restrictions on domestic trade flows, also involved the elimination of all taxes and retribution previously imposed on inter-province and inter-district cattle trade (Presidential Decree No. 2/1998). Again however, regional autonomy has seen local government increase taxes and retribution (Hadi, 2002).

Regulations on inter-island trade are complemented by a series of regulations on local trade and marketing. This is largely a policy arena of local government, as reported by Suharyo (2007, pp24-28) on the business environment in NTT. They document:

- The fees and levies associated with cattle marketing (Table 7). These include village retribution (leges), sub-district retribution, slaughter house (RPH) retribution, traditional market retribution, holding ground retribution, cattle's physical condition check-up, send-out permit, free disease authorization letter, quarantine port handling and services;
- The very long list of checkpoints from Atapupu Port (Belu) to Tenau Port (Kupang) and Wini Port (TTU) (Table 15); and
- Relevant regulations
    - The Governor Instruction No. 7, 1993 on the Implementation of the Prevention and Elimination of Brucellosis (a contagious disease causing still births), which supplements Governor Decree No. 13, 1993 on Directives for the Prevention and Elimination of Brucellosis in NTT Province.
    - Governor Decree No. 5, 2006 on Export Allocations for Slaughtered Large Livestock (beef cattle, buffalo and horse) in 2006.
    - The NTT Perda No. 13/2003 on *Retribusi* for the Payment of Administration Cost.
    - The quarantine and seaport regulation refers to the Government Regulation (PP) and Agriculture Minister Decree—both central government regulations. Central government officials based in the region render the services. The tariffs for quarantine services are determined in PP No. 7, 2004, on Changes to Tariffs on Non-Tax Government Revenue.
    - A large number of village/*kelurahan* administrations in the West Timor region also.
    - Enforce charges (*leges*) for the trade of large livestock, which vary between Rp5,000 and Rp25,000 per head. These village administration fees cover the cost of issuing ownership and origin certificates. These certificates are required by traders to prove that the livestock they are trading is legal and not stolen.

Nimmo-Bell and ICASEPS (2007) said that most regulations in NTT include charges, such as: the certification of calves and a permit to export, retribusi to cover the administration cost, a quota limit on the number of cattle exported, and the SPK charge for issuing a permit for import and export, the services of slaughtering houses, the services of livestock markets, the services of livestock health checks, and quarantine.

Benu (2011) outlines a series of costs and fees borne by farmers in selling cattle at markets in NTT like Camplong and Takari (transport, tax). Collectors also pay a tax for a legal document issued by KUD, pay farmers in cash then consign animals to port/quarantine in Kupang (Tenau), Atambua (Atapupu), and Kefa (Wini) and are exported by inter-regional traders.

In addition to regulation of the trade in live cattle, there were restrictions on the trade of beef. Jakarta for example restricted the import of beef presumably for food safety reasons, instead importing live cattle for slaughter locally. This restriction has now been lifted with value-adding benefits for producing regions, environmental benefits for Jakarta, and lower transport and other costs passed on to consumers (Hadi, 2002).

KEY INSTITUTIONS

Under the Ministry of Agriculture, the Directorate General of Livestock and Animal Health Services (DGLAHS) is the central government authority responsible on behalf of the Ministry of Agriculture (MoA) for the planning, implementation and monitoring of national livestock production. This includes the formulation of policy, planning and implementation of national livestock development programs, provision of technical support services, regulatory oversight and livestock quarantine, including responsibilities for livestock product testing and quality control, quarantine and food safety.

Directorates in DGLAHS are:

- Directorate General livestock and animal health;
- DG secretariat;
- Directorate for animal breeding;
- Directorate for animal feed;
- Directorate for animal husbandry;
- Directorate for animal health; and
- Directorate for veterinary community health and post-harvest.

DGLAHS have vertical line linkages to Dinas Livestock at province and district levels. Dinas at province and district level and report to report to provincial/district government.

Hadi *et al.* (2002) discusses the organisation of international and domestic quarantine facilities for fish, livestock and plants, and service charges. Quarantine has traditionally been under the jurisdiction of central government, but measures were taken to decentralise control to local levels. These were not formalised, instead remaining under central jurisdiction (Presidential Decree No. 66 of 23 November 2000 established the Agency for National Quarantine of Echelon I under the Coordinating Ministry of Economy) because of the need to coordinate with international regulations and inter-sectorally (between animals and plants). Further reorganisation of the international and domestic quarantine service is discussed by the Livestock Research and Development Team (2012).

Other important central government agencies include;

- Ministry of Trade is important due to its access to influence various border measurements. Agreement.
    - Directorate Generals include: Domestic Trade; Standardization and Consumer Protection; DG of Foreign Trade; International Trade Cooperation; and National Export Development.
    - Agencies include: Commodity of Futures Trading Regulatory Agency; and Trade Policy Analysis and Development Agency.

Within ministries, deputy-ministers and directors-general are key actors in shaping the decisions of ministers. Siloisation has meant limited communication across divisions, although steps are being taken in some cases to address this (Datta *et al*., 2011).

In addition to government agencies, the beef industry is comprised by a significant number of peak bodies and associations that play important industry roles. Details are provided in DGLAHS (2011) and Morelink (2010). These include:

- The MUI - Indonesian Ulema Council *(Majelis Ulama Indonesia*) set the *Halal* standard for Indonesia and is the only recognized authority to release *halal* label/certificate for a product sold in Indonesia, including food. *Halal* defines what is lawful according to Islamic law which in the context of beef supply chain include the slaughtering procedures, beef treatment, transportation and processing procedures. Abattoirs and meat processing in Indonesia should meet MUI's *halal* requirements if they wish their product to be labelled *halal* and reach Indonesia Moslem market. Similarly, all beef and processed beef entering Indonesia should be certified *halal* where appropriate. 88% of the Indonesian population is Moslem;
- Asosiasi Pengusaha Importir Daging Indonesia (ASPIDI) Indonesian Meat Importers Association;
- Asosiasi Produsen Daging dan Feedlot Indonesia (APFINDO) Indonesian Meat Producers and Feedlot. Though feedlots are few in number, the association is influential in communicating with the GOI on policy and industry issues;
- Perhimpunan Peternak Sapi dan Kerbau Indonesia (PPSKI). Cow and Buffalo Indonesian Cattlemen Association. PPSKI is integrally linked to APFINDO.
- National Meat Processor Association (NAMPA) Asosiasi Industri Pengolahan Daging Indonesia;
- Animal Husbandry Association of Indonesia (ISPI)

There are numerous cattle and beef associations at local levels.

ECONOMIC

STATISTICAL OVERVIEW

To provide a broad statistical overview of the Indonesian cattle and beef industry in regional context, Table 1 draws on a range of FAO data (FAOStat, July 2012).[12] The highly aggregated data must be interpreted with some caution but nevertheless provides some useful indicators on industry change, which are examined in more detail in the report below.

- Indonesia is a mid-sized player in the international cattle and beef industry, with the 20th largest cattle herd in the world, and the 27th largest beef output.
- Indonesia has the largest cattle herd in Southeast Asia with 13.63 million head in 2010. A more recent and detailed data collection process reports that Indonesia has 14.8 million head in 2011 (PSPK (*PendataanSapiPotong, SapiPerah, dan Kerbau* – Data Collection of Beef Cattle, Dairy Cattle and Water Buffalo). This represents an increase of more than one million head (7.7%) in one year. Growth of this magnitude was also reported for the previous year (2009) and is projected for 2012, before moderating to 5% for 2013 (musrembang document – DGLAHS website).
- This represents a rapid increase in growth over preceding years, where growth averaged 2.4% over the 2000s (and 1.4% since 1991). The modest long-term growth rate has been attributed to resource (esp feed) constraints and high prices that give incentives to farmers to slaughter productive breeders. This is especially pronounced in NTT and NTB that supply breeders to other regions (Hadi, 2002; Deblitz 2011; Nimmo-Bell, 2007). Note however, that these cattle population growth rates are lower from those reported in Indonesia's agricultural censuses in 2003 and 2011.[13]
- Slaughter rates record the number of cattle that are slaughtered per 100 head in stock. Indonesia's slaughter rate of 13% is relatively low even by Southeast Asian standards, and has actually reduced over the last decade.
- This is partially due to the under-statement of slaughter numbers by the FAO and other agencies.[14] Nevertheless, the rates are an aggregate indicator of low pregnancy, calving, weaning and growth rates, which are discussed below.

[12] FAO data on cattle numbers and beef production is consistent with national data, as it is derived from national agencies. Cattle population data is derived from the report of the Directorate General of Livestock Services and Animal Health (DGLSAH), obtained from reports submitted by government offices responsible for animal husbandry/livestock services throughout Indonesia. Another source of data is the National Livestock Survey (SPN, Survei Peternakan Nasional) carried out by BPS (Central Statistics Agency) in collaboration with DGLSAH in 2006-2008. As discussed below, there are large discrepancies between all three sources on slaughter numbers.

[13] Based on 2011 PSPK final result, the population of cattle (beef + dairy cattle) in Indonesia reached 15.4 million head of cattle. The 2003 Agriculture Census (Sensus Pertanian) indicated that the cattle population was 10.2 million head of cattle and this means that the average cattle population growth between 2003-2011 reached *5.33%* per year

[14] FAO slaughter numbers (1.82 mil) are higher than slaughter numbers reported by the Bureau of Stats (1.46 mil), but considerably lower than DGLAHS figures (2.07). DGLAHS slaughter figures derive from reports from staff of slaughter houses, and from Dinas officals who check slaughter based on interaction with village leaders, consumption patterns and retribution collection. They are not, however, able to report on all local-level

- Average carcass weights in Indonesia are reported as high, but this is skewed by under-stated slaughter numbers and the relatively high weights of imported cattle (521,000 head in 2010 of the 1.82 million slaughtered).
- Modest growth in cattle numbers and turnoff/slaughter rates have led to modest growth in beef production over the last decade of 2.4%.
- While Indonesia is a large beef producer in the Se Asian context, the very large population means that per capita production of beef is amongst the lowest in SE Asia (except East Timor).
- Limited supply and high demand has put upward pressure on prices, making it the most expensive in the region (Singapore and Brunei excluded).
- This has led to a large Indonesia having a high trade "dependency" ratio for beef (that varies depending on data and assumptions used).

Table 1, Table 2 and Figure 1 continues the statistical analysis on a provincial basis, with more specific reference to the three Eastern Indonesian provinces of East Java, NTT and NTB.

slaughter activity. As an indicator of the magnitude over under-statement of slaughter statistics, the Beef Committee DKI estimates the slaughter numbers in 2012 will be 2.52 million head (Kontan articles).

Table 1. Indonesia Cattle and Beef Indicators in Regional Context

	Cattle numbers		Turnoff rates		Cattle slaughter		Av carcass weights		Cattle meat		Population	Bovine meat per capita supply	Producer price cattle meat
	Mil. head 2010	Ann growth 2001-10	2001 (%)	2010 (%)	Mil head 2010	Annual growth 2001-10	2001 (kgs)	2010 (kgs)	Kt 2010	Annual growth 2001-10	2010 ('000 people)	2007	2009
World total	1,428.64	0.85	20.5	20.7	295.77	0.95	204.4	210.72	62,325.46	1.28	6,895,888	9.59	--
SE Asia total	47.57	2.38	12.7	14.3	6.80	3.99	163.58	194.48	1,322.56	4.45	593,414	4.22	--
Indonesia	13.63	2.24	16.0	13.3	1.82	0.17	189.8	231.74	420.60	2.42	239,871	1.93	5,422
Viet Nam	5.92	5.17	14.6	27.4	1.62	18.42	171.5	172.17	278.91	18.52	87,848	3.70	--
Philippines	2.57	0.30	31.3	32.3	0.83	0.65	234.4	226.62	188.25	0.29	93,261	3.95	3,234
Thailand	6.50	4.00	9.3	9.5	0.62	4.39	288.8	285.01	176.77	4.20	69,122	4.39	2,010
Myanmar	13.00	1.56	4.3	7.4	0.96	10.00	157.9	150.00	144.00	9.00	47,963	3.25	--
Cambodia	3.48	2.15	16.9	15.0	0.52	0.80	120	120.00	62.88	0.80	14,138	5.00	1,811
Malaysia	0.91	2.26	18.9	24.2	0.22	5.66	113.4	113.40	24.95	5.66	28,401	5.96	4,476
Laos	1.40	1.51	13.0	14.0	0.20	2.39	110	125.00	24.50	4.08	6,201	6.93	1,258
Timor-Leste	0.15	- 0.80	6.6	6.6	0.01	- 0.76	100	100.00	1.01	- 0.76	1,124	1.56	--

Source: FAO stats (http://faostat.fao.org/default.aspx). Retrieved July 2012.

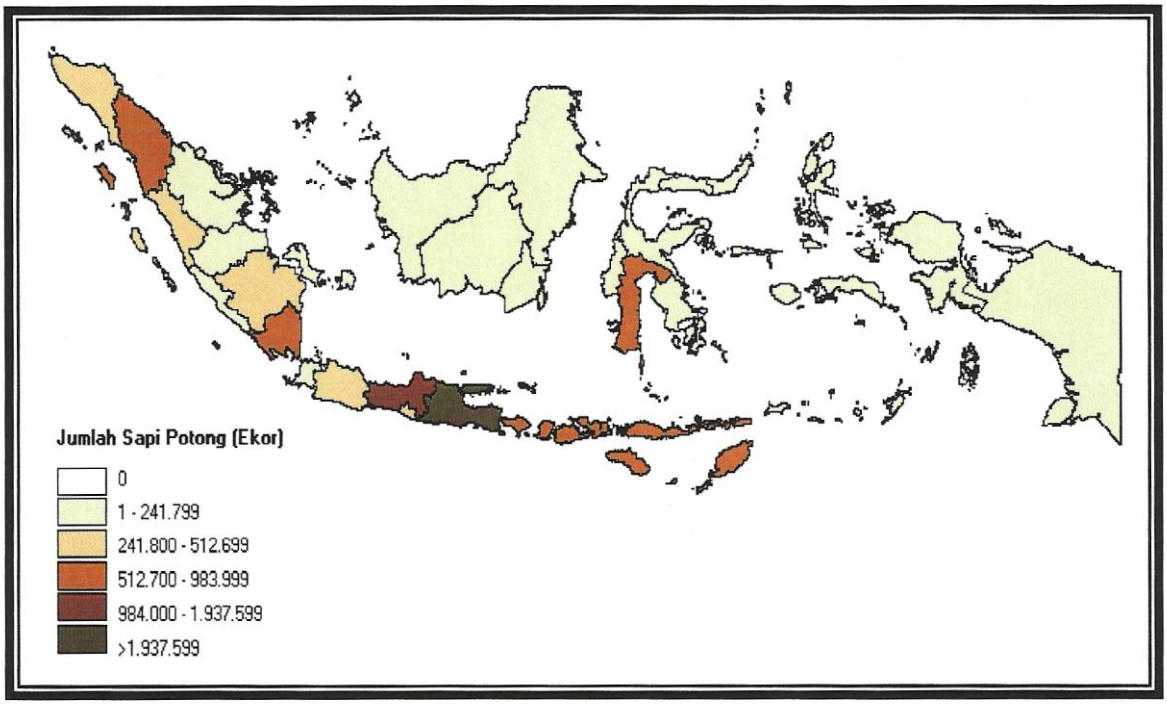


Figure 1. Distribution of Beef Cattle Population in Indonesia by Island in 2011.

Source: PSPK FINAL RESULT

Table 2. Production indicators of 3 Eastern Indonesian provinces in national context, 2011

	Cattle (head)	Slaughter rates (%)	Cattle slaughter (head)	Av carcass yields (kgs)	Cattle meat (tonnes)
Indonesia	14,824,373	15	2,239,149	208	465,823
East Java	4,727,298	11	528,050	207	109,487
NTT	778,633	5	42,279	109	4,595
NTB	685,810	8	54,476	191	10,418

Source: Livestock and Animal Health Statistics 2011 (DGLAHS)

Provincial statistics are subject to similar statistical biases as those outlined at national levels above. Never the less, the data provides some useful insights.

- Eastern Indonesia plays a major role in the Indonesian cattle industry. East Java holds the largest number of beef cattle in Indonesia (32%), followed by NTT (4th, 5.2%) and NTB (6th, 4.6%). The 3 provinces account for 42% of total national cattle herd inventory.
- Slaughter rates are under-stated but are still likely to be low by national and international standards, implying potential for productivity gains. The micro-level agro-climatic, social and economic drivers of these figures are explored below.

GDP AND EMPLOYMENT IN THE LIVESTOCK SECTOR

Disaggregated data on the role of cattle in economic development and employment are not available. However, data is available for the livestock sector more broadly (DGLAHS, 2011). The livestock sector accounted for 1.9% of Indonesia's GDP and 16.1% of agricultural GDP in 2010 at current prices. These proportions have increased modestly since 2006, and the DGLAHS forecasts that livestock will make increasing contributions to GDP growth of around 4% between 2012 and 2014 (Renstra Pertanian 2010-2014, p.65). Livestock is not however a major component of the Indonesian economy on national level.

Livestock play a more important role in the provincial economies of Eastern Indonesia. In 2010 preliminary figures report that livestock accounts for 22.3%, 16.2% and 30.1% of agricultural GDP in EJ, NTT and NTB respectively. Livestock accounts for 3%, 2.8% and 10.2% of total provincial GDPs. As an indicator of the contribution of cattle more specifically (rather than livestock on a sectoral level), cattle contributed 14% to agricultural GDP in NTB, about half of that of livestock, and the largest contributor to agricultural GDP (The Government of NTB, 2009).

These figures do not fully reflect the regional distribution of industry activity within provinces, which can be concentrated in geographical pockets. For example,

- In particular sub-districts of NTT (TTS, TTU, Soe, Belu) cattle sales can make up over 80% of the family's cash income (Nemmo-Bell and ICASEPS, 2007).
- In NTT, cattle are concentrated in Madura, Malang, Trenggalek and Situbondo. Priyanti *et al.* (2012) found that gross cash income from cattle exceeded the income from crops in two surveyed sites in EJ; a lowland site (Probolinggo and Pasuruan Districts) where cattle accounted for 61% of cash income and an upland site (in Malang District, 84%).

DGLAHS (2011) also report on the number of producers engaged in livestock production. Nearly 4.2 million farmers raise livestock in Indonesia, 1.98 million in EJ, 34,000 in NTT[15] and 165,000 in NTB. While fewer farmers raise cattle specifically, they are still likely to account for a significant proportion of total livestock producers. Using different figures, The Government of NTB (2009), estimated that the beef industry absorbed the labour of 182,000 people, but this may be across all industry sectors. The provincial medium term development plan (2009-2013) aims to increase this figure to 344,000 people.

The macro-statistics also fail to take into account the value added in downstream industry sectors. The GDP generated from cattle (number of head sold multiplied by average price) is subject to transformation along the supply chain. Based on adjusted cost structures of various level of a supply chain in NTB, Deblitz *et al.* (2011) report that the farm-gate value of the animal can increase by about 70% by the time it reaches slaughter level and another 70% by beef retail level. Value is created in the chain through margins of industry actors, while product transformation (space, time, form) generates value for providers of goods and services.

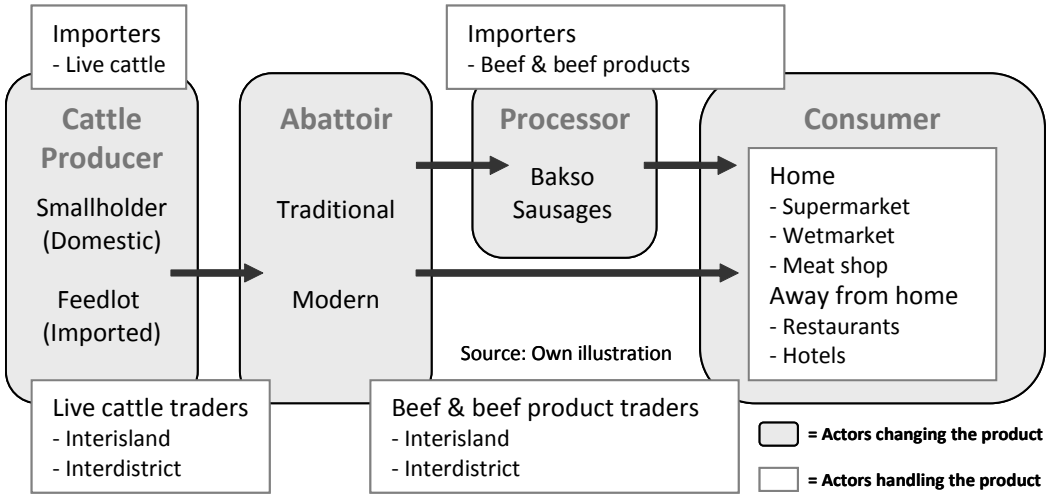
[15] The data for NTT appear under-stated. In 2003 there were approximately 330,000 smallholders (farming households) in the NTT district and around 136,000 smallholders farming cattle (Sensus Pertanian 2003, cited in Nimmo Bell and ICASEPS, 2007).

No figures are publically available on the number of participants in downstream sectors of the cattle and beef industry. However, like the production sector, the vast majority of the participants are small-scale, rural-based and operate in fragmented and labour-intensive structures. They include: feed providers and traders; cattle traders and collectors; transport providers; slaughter units and their workers; beef processors; beef retailers and stallholders.

THE BEEF VALUE CHAIN

Figure 2 below presents a stylised illustration of the value chain for beef Indonesia (Deblitz 2011).

Figure 2. Illustration of the Beef Value Chain in Indonesia



One of the features of the Indonesian beef industry is that all industry sectors have fragmented structures and are dominated by small-scale industry actors. However, each of the sectors also contains a limited number of larger-scale actors to form a continuum of industry structures by scale. Industry structures and change is a central determinant of value chain activity, industry participation, industry development and rural development outcomes. While detailed data required to build a detailed and quantitative picture of these structures are not available, categorisations required to do so are provided below based on secondary sources.

CATTLE PRODUCTION

The cattle production sector can be categorised in various ways.

Winter (2011) identifies two contrasting environments in Eastern Indonesia

- the wet tropics as characterised by Central Lombok and Bali, and
- and the dry tropics as characterised by parts of Lombok, Sumbawa, Sumba and West Timor.

The main cattle species in both areas is Bali cattle.[16] In Central Lombok, animals are tethered in either stalls (wet season) or in the fields (dry season) during the day and at night are confined in a communal

[16] The major breed in East Java is Ongole Cross (introduced from India) which accounts for 34% of cattle. Other breeds are Madura (21%), Bali (3%) and crosses including Ongole and Simmental, Limousin, or Brahman (42%)

pen (kandang), and fed mainly cut-and-carry feeds of shrubs and grasses. In Sumbawa, cattle spend a larger portion of their time free-grazing during the day, including rice straw on fallow paddy fields, but are confined to communal pens at night. Cattle are used for draught in both locations, with peak requirements from November to January. Animals older than 2 years are used for an average of 4 hours/day.

Scale of production. Data on scale of cattle production in Indonesia is not systematically kept. However, probably more than 90% of cattle in Indonesia are raised by small-holders, often with only 2-3 cattle per household (Dahlan, 2003; Priyanti *et al.*, 2012). That is, the production sector is dominated by small-holders. Scale increases in grazing systems – households with 50 head are common in places like Sulaweisi (Hadi *et al*., 2002).

Feedlots produced up to 570,000 head of cattle in 2008 (DG Livestock, 2010 cited in Deblitz 2011). While import restrictions may have reduced these numbers, feedlots account for a significant percentage of Indonesia's cattle slaughter, partly due to government schemes outlined above. There are however limited numbers of large scale feedlots in EI, which are concentrated around plantation systems or large end markets (West Java, Sumatra and Kalimantan). Commercial feedlots in these areas have preferences for imported cattle, but import restrictions may increase demand for feeder cattle from EI.

Cattle production systems can also be categorised by feeding systems:

- An intensive grazing system is where cattle are permanently kept in confinement and pens. Grass and other forages are cut, carried and hand fed (cut and carry system).
- An extensive production system is where cattle are grazed permanently. Depending on cropping regimes, animals are allowed to graze and scavenge around hills, roadsides, the home yard or village surrounds; and
- A semi-intensive production system is a mix of intensive and extensive systems that vary by season, feed supply and other farm activities (esp. cropping). In semi-intensive systems, cut and carry systems are usually dominant.

Extensive grazing occurs mainly when common land is available in areas including Lombok Timur (NTB), Sumbawa (NTB) and Timor Tengah Selatan (NTT). However, in the other areas of the provinces, most farmers run a semi-intensive production system

Cattle production systems can also be categorised by enterprise mix:

- Cow-calf (breeding) households that are specialised in selling weaners or calves out of the household system.
- Cattle fattening households that are specialised in buy feeder cattle for fattening or finishing.
- A mixed cow-calf and a fattening enterprise, usually as part of a broader crop-livestock farming system.

(Dinas Livestock East Java). Other local breeds include Aceh Cattle and Sumba Ongole (Morelink, 2010). Indonesia had a population of 700,000 Brahman crosses in 2009 (Hadibrata, 2011).

It is not possible to determine with any precision the relative importance of these cattle enterprises, but mixed cow-calf and fattening systems predominate. Priyanti *et al.* (2012) surveys in East Java found that 92% of lowland farmers produced calves, and 78% specialized in calf production, there being little capacity to grow (l*et al*one fatten) animals in this intensive land-use system. In contrast, only 18% of upland farmers specialized in calf production, most (82%) raised adult cattle. There were no specialized fattening operations in either site.

Other inter-related categorisations and continuums of cattle producers include:

- Between croplands and uplands (Winter, 2011);
- Subsistent vs semi-subsistent vs commercial cattle producers;
- Unspecialised vs specialised cattle producers – depending on the proportion of inputs and outputs that derive from a single activity; and
- Cattle keepers v cattle producers. Cattle producers are most likely to be receptive to new technologies and practices that focus on commercial efficiency (Luke, 1989; Neidhardt *et al*. 1996; Winter, 2011).

It is also important to differentiate between cattle owners, managers and owner-managers (Rutherford *et al*., 2004). Related arrangements include "contract breeding" operations where traders and other (wealthier) households in the community own breeding cows, which are raised by farmers and "wage only" fattening where trader supply store cattle to farmers for fattening. There are various profit-sharing arrangements, which were 50/50 in NTT (Nimmo-Bell and ICASPES, 2007; SADI, 2010).

CATTLE MARKETING

Various studies identify and categorise between actors engaged in cattle marketing

- Hadi *et al.* (2002) identifies: smallholders; cattle fatteners; cattle traders (which may be classified into village traders, inter-district traders and inter-provincial or inter-island traders); cattle markets (which are common in Java but less so in other provinces); beef wholesalers.
- Fauzi and Djajanegara (2004) reported 10 chain actors involved in the marketing beef cattle in Garut District, West Java.
- The chain actors used in surveys conducted by Mahendri *et al*. (2012) are: other farmer, village traders, sub-district trader, district trader and butcher.

To explore local level cattle trading activity, Mahendri *et al*. (2010) surveyed 184 farmers and 30 traders in two sited in EJ. They found:

- Most farmers sell cattle to village traders, who in turn mostly sold in the sub-district market-place. The cattle are then destined to fattening operations and slaughter-houses.
- Very few farmers sold their cattle directly in the public marketplace.
- In the lowland site about half the respondents sold to one regular trader, whereas in the upland site only a third did. Others varied their trader according to the best price they could receive or their assessment of the trustworthiness of the trader.

- All purchases were at the farm-gate and paid mostly paid in cash on the spot rather than by instalments or on credit. Marketing costs and risks are therefore borne by the traders.
- There was no significant difference in the price paid by traders coming from different locations. There were no price differences between lowland and upland sites, indicating an efficient and well-integrated regional market.
- Crossbreed animals obtained a higher price than Ongole Cross, and male cattle obtained a higher price than female cattle.

The survey of traders established the following profile.

- Most of the traders surveyed (53%) were categorized as village traders, 37% were sub-district traders, 7% were both village and sub-district traders, and only 3% was a butcher. (This profile mirrored that reported by the farmers).
- All traders bought and sold all types of cattle (calves, young cattle, and adults) each 81% and 82% respectively for village and sub-district traders.
- Most (77%) collected cattle from farmers in the village and all sold them in the sub-district marketplace.

A related but more extensive survey on the cattle and beef supply chain in East Java is presented in Mahendri *et al.* (2012)

In East Java, the livestock marketplaces are opened on the local market day (hari pasar). There are five local market days (*pon, legi, wage, kliwon, and pahing*) and most markets are open twice weekly. Hadi *et al* (2002) say that there is at least one cattle market place in every cattle-producing district or subdistrict. Most cattle sellers at market are village collectors (*blantik)* while most buyers are larger traders such as inter-district or inter-provincial traders. Other buyers include small breeders or fatteners also procure cattle in the local CMP. Sellers may try to sell cattle on several markets before a successful transaction takes place.

Hadi *et al.* (2002) said that were far more market places in Java, and that there are few in other provinces. However:

- There are 9 livestock markets in NTB open 2 days per week (The Government of NTB, 2009)
- In NTT, there is a large livestock market at Camplong and another at Takari (Benu, 2011), and 6 other periodic markets in NTT listed in Suharyo (2007) may also sell cattle in combination with everything else.

Market transactions and price formation occurs through a complex set of economic, social, institutional, regulatory and structural factors. These have been mentioned anecdotally in some studies, but have been the subject of little systematic research.

INTER-DISTRICT AND INTER-ISLAND TRADE

Local cattle marketing structures outlined above can link to local, intermediate and end markets. Deblitz *et al.* (2011) for example identifies:

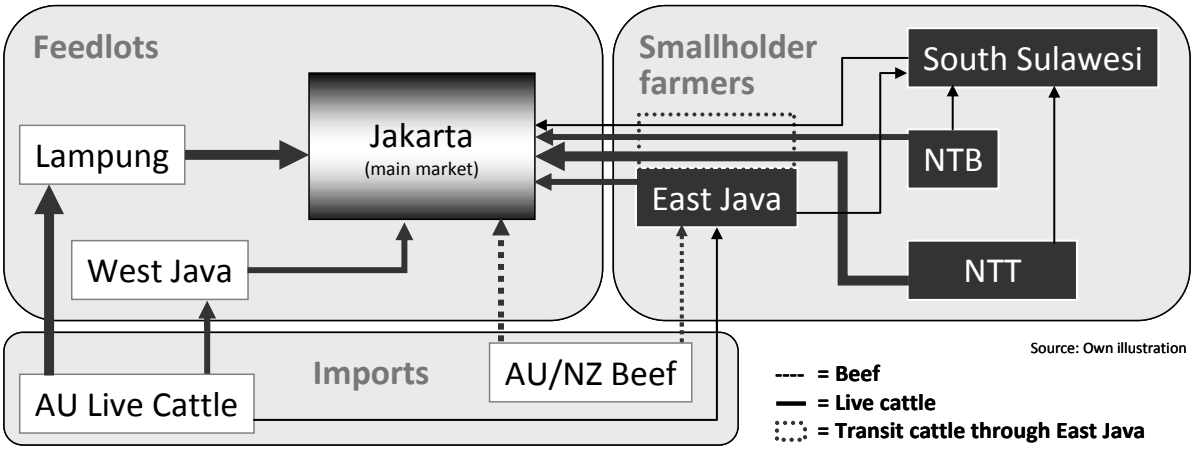
- NTT local flow. The flow of cattle within the Timor Island, from Kupang district, Timor Tengah Selatan, Belu, and Timor Tengah Utara to be slaughtered and consumed in Kupang.
- Lombok local flow. This supply chain represents the flow of cattle from Lombok Tengah, Lombok Barat and Lombok Timur to Mataram. Cattle are slaughtered and sold as beef in Mataram wet markets.

However, a significant proportion (to be assessed) of cattle especially from EJ, NTB and NTT are destined for inter-regional markets. This is particularly the case in NTB and NTT that have a comparative advantage in the supply breeder cattle and feeders to other areas and that have limited slaughter facilities that would enable the "export" of beef.

Reliable statistics on inter-island trade are available from Dinas Peternakan Propinsi and from Quarantine Services. However, various "channels" are identified in Deblitz *et al.* (2011).

Figure 3 provides a snapshot of the market structure of Eastern Indonesia beef supply chain and shows the main production area of Jakarta market.

Figure 3. Snapshot of Beef Supply Chain Market Structure in Indonesia



Source: Deblitz *et al.* (2011)

As shown by the flowchart there are several marketing channel of beef to the Jakarta market. Smallholder farmers dominate the production flow from NTT and NTB and also East Java and the Lampung and West Java have strong feedlotters operation. On top of that Jakarta also relied on imported live cattle and boxed beef from Australia.

- Inter-island 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.
- NTB – Sumbawa inter-island 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 Sulawesi, Java or Kalimantan (the latter is a growing channel).

Other flows are discussed in detail in Livestock Research and Development Team (2012).

Inter-island flows add extra layers of actors, logistics and costs. Inter-island traders aggregate cattle through a range of channels – from purchases at markets, from local traders and by commissioning purchases from local collectors. It is widely reported that inter-island trade can be controlled by a few individual companies:

- In NTT one company reported to be dominating the trade is the Erick's Group. This company and its subsidiaries have locked up key components of the trade: boats, loading facilities and quarantine space for their animals (Sullivan and Diwyanto, 2007).
- Similarly, Nimmo-Bell and ICASEPS (2007) state that many of the existing cattle traders in NTT have been able to trade profitably and have the resources to buy, finish and export large numbers of cattle. A Kupang based trader exports approximately 1,000 head of cattle from Tenau Port (Kupang) per month with gross revenue of Rp5-6 billion per month.
- One trader in NTB is reported to control 60% of the cattle shipped out of NTB (Kristedi, person comm)

Cattle transport services include (from Hadi, 2002):

- Trucking. A major form of cattle transport. Provided by private operators. Used for inter-island transport where ferries are available. Freight charges minimised by back-loading.
- Rail. Used especially from Surabaya (East Java) to Jakarta, and links with cattle shipped from NTB/T. Facility is provided by the state-owned company called PT Kereta Api Indonesia ('Railway State Company');
- Domestic shipping. Used for inter-island transport, esp from Bali, NTB and NTT. Most sea transport from these provinces arrive to Java through the seaport of Kali Mas in Surabaya (East Java). The cattle are then transported to other destinations on Java, such as Jakarta, by truck and rail. Holding facilities are located near the port and rail. The sea transportation service is privately owned; and
- Animal quarantine. Local government in particular provinces provides quarantine services for animal health and infectious disease examination before cattle enter its territory. For live cattle imports, quarantine stations are available at international seaports where cattle disembark (including EJ). For domestic cattle, quarantine stations are available in many provinces (incl. NTB and NTT). Quarantine procedures involve the examination of shipping documents and cattle. Charges are paid for quarantine service, examination service and certification per truck. Feedlots pay the charges to the local quarantine office and also meet costs such as transport and meals for quarantine officers, vaccines and medicines.

THE SLAUGHTER SECTOR

While detailed data on the slaughter sector are not publically available, structures and actors have been overviewed in several studies

Hadi *et al.* (2002) identifies three types of slaughter units based on scale:

- Type A (> 100 head per day);

- Type B (50–100 head per day); and
- Type C/D (5–10 head per day).

In 2000, there were 5 type A units, 35 type B units and 724 type C units (DGLS 2001).

In 2009, there were 693 licensed slaughter houses and abattoirs in Indonesia which slaughtered 935,700 head of cattle. The slaughter houses and abattoirs are spread across Indonesia's 33 provinces with 50% located in Java, Within Java, East Java is the main province with 22% (162 sites) of all sites. Many of the almost 700 slaughter houses / abattoirs are inefficient. They slaughter an average of 1,350 cattle each per year (average of less than four cattle each per day) (Morelink, 2010).

Slaughter units can also be categorised into 3 ownership and management structures (Hadi *et al*., 2002):

- Regional Technical Service Unit (UPTD) – non-profit, government owned;
- Regional (local) State Business Enterprise (BUMD) – profit oriented, government owned;
- Private Business Enterprise. Despite being small, they are formally registered. Located close to cattle production, markets etc. to stop stealing and to meet supply/demand in a timely way.

Hadi *et al.* (2002) reports that government owned abattoirs are normally smaller than private abattoirs. They slaughter between two and a maximum of 200 cattle in normal days, while the private abattoirs slaughter between 30 and 120 cattle per day (2008 figures).

In addition to these formal abattoirs, illegal units are also common. These are small-scale, mobile and have formed so that owners can slaughter bans, avoid slaughter fees, inspection or are able to slaughter stolen cattle.

In addition to the above categories of slaughter units, other features of the Indonesian slaughter sector are:

- A distinction is made between unmechanised slaughterhouses (RPH) and mechanised slaughterhouses (TPH).
- Government slaughter houses in Indonesia operate on a service slaughtering basis, where slaughter workers are hired by traders that maintain ownership of cattle, beef and by-products. Service fees on a per-head basis are very low. Private abattoirs can also operate on a service basis.[17] There are important implications for industry development, rural development and policy.
- The GoI with support from JICA built slaughterhouses in many provinces of Indonesia including EJ and NTB[18] in the late 1990s. The abattoirs were built to centralise and control the slaughtering of cattle (Hadi 2002) and are unmechanised service slaughtering plants with limited or no cold storage facilities.

[17] Hadi *et al.* (2002) writes kill–only service plants charge traders are charged with a fee for each head of cattle they killed in the facility. The normal 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.

[18] Other provinces are Aceh, Lampung, South Kalimantan, West Kalimantan, South Sulawesi, Southeast Sulawesi, North Sulawesi and Papua (formally Irian Jaya), and East Timor when it was a province of Indonesia

- There are a limited number of large, modern, mechanised abattoirs in Indonesia (Santori, Elders etc.) listed for Java in Deblitz *et al.* (2011, Figure 7.17). Most beef processors produce various meat products which usually include beef and poultry. Companies like JapfaSantori are fully integrated from farm to processed product both in poultry and beef. Other companies combine their business with slaughter activities, imports and/or food distribution.
- At the time of writing, 15 abattoirs have accreditation under the under the (Australian) exporter supply chain assurance system (ESCAS), and can kill imported Australian cattle.
- There have been policy intentions or tangibles moves to upgrade abattoirs. For example the Meat Business Centre in Mataram integrates the abattoir with genetics (AI), feed mill and fattening operations.
- A private operation in Bogor is specialised in producing premium beef quality and slaughter cattle only from their facility in Lampung and sell the product only to a beef distributor (Kristedi).
- In NTB, there were two abattoirs with a slaughter capacity of 50-100 head per day located in West Lombok and West Sumbawa (The Government of NTB, 2009).
- According to Nimmo-Bell and ICASEPS (2007) NTT no longer has a functioning abattoir that can slaughter bulls and ship frozen or chilled beef to Jakarta markets. The industry lacks investment in slaughter and freezing facilities and downstream cold chain facilities and therefore market outlets are restricted to the live cattle trade.
- The sale of offal and hides are a major source of revenue for traders and butchers.

THE PROCESSING SECTOR

The beef processing sector is an important part of the beef value chain. Processed products account for a large proportion of Indonesia's beef production and imports, with important implications for cattle and beef demand. The processing sector is comprised of actors that range from multinational companies to small-scale household operations (for a list of large integrated operations see Deblitz, 2011).

Small-scale beef processors produce products like dried shredded meat (abon), smoked beef (dagingse'i), beef jerky (dendeng), and 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 (dagingse'i) is a NTT specialty and difficult to find in other regions while meatballs are prominent in all regions.

Respondents to surveys in Deblitz *et al.* (2011) claim that they use local beef (Bali or Ongole) to make processed beef products. Rendang requires a particular type of beef – which must be firm and dry (i.e. tenderness not required/desirable).

Most small-scale beef processors 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) and convenience (because they can buy other ingredients at the same kiosk). Another 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. Small scale meat grinder and mixer factory appears as new business opportunity in wet markets or at home industry scale. Most buyers, particularly bakso processors, prefer fresh to chilled or frozen beef (Hadi, 2002).

Large beef processors make products that include corned beef, sausages, meatballs, burgers, salami and cold cuts. However, bakso is likely to be the main processed beef product of most processors. Most of beef processor get their supply from beef importers or direct import (Deblitz *et al.* 2010 , Table 7.17). It also indicates that beef processors use only imported beef and/or beef from feedlot production, which was confirmed by ASPIDI and NAMPA on interviews (Kristedi, personal communication). Some of the processors own abattoir facilities and source their beef from there. Choice of input channels is driven by price, consistency (of cuts and quality) and hygiene/food safety considerations.

The main processed beef product is meatballs (Bakso). The majority of respondents to surveys by Morelink (2010) agreed that demand for bakso is increasing, due mainly to its affordability compared to other meat protein sources. Bakso is produced on a wide range of scales from households to large-scale multinational companies. Bakso is consumed in restaurant and at home and is widely available in wet markets, food stalls and supermarkets.

The 12 bakso manufacturers surveyed for Morelink (2010) purchased from 4 to 80 tons of meat per month, compared to the 10 home industry manufacturers, which purchased 15-200 kgs per day. The major bakso manufacturers sell their bakso through the modern retailers (supermarkets) and catering outlets whereas the home industry manufacturers sell their bakso to the wet markets and hawkers.

The National Meat Processor Association Indonesia (NAMPA, Assosiasi Industri pengolah daging Indonesia) is the peak association for large scale beef processors in Indonesia. NAMPA estimates that its members (big processors) have a workforce of 12,000 and a sales value of Rp2 billion (although this seems low).

Indonesia has a large tanning and leather industry. Hide standards are set on the number of scratches, ranging from prime (minimal to no scratches) to fourth grade (over 40% scratches). Local tanneries have stopped using the international standards and have resorted to pass or no pass. Sullivan and Diwyanto (2007) argue that this grading system is too subjective for shoe manufacturers, and it is hardly a system that improves price discovery or sends proper pricing signals to producers. Cattle in EI are often branded and marked to certain degrees, so more education could help to reduce the markings on animals and improve hide standards.

BEEF RETAIL AND MARKETING

Three retail channels are discussed below: wet markets, supermarkets and meat shops

As established, the majority of slaughtering is done on a service basis, where traders maintain ownership of the cattle and the beef. Beef can be distributed by these beef wholesalers (*jagal*) (Hadi, 2002). The abattoir can be the meeting point for specialised traders including: meat, bones and foot, skin, offal, and head (Deblitz, 2011). The wholesalers sell the beef to retailers at wet markets, supermarkets, and meat shops.

The daily processing of cattle and distribution to local wet markets is the traditional meat marketing method in Indonesia and other parts of South East Asia (MLA and Livecorp, 2011). The markets are characterised by the display of fresh meat in open air stalls with little or no refrigeration. Selling beef in this way overcomes three barriers that are faced by beef in supermarket cabinets:

- It is more affordable to lower income residents;
- It doesn't require refrigeration – there is limited availability of cold chain infrastructure and domestic refrigeration beyond urban areas and more affluent households, resulting in practices whereby generally beef is processed, marketed, purchased, prepared and consumed in the one day; and
- It allows beef to be available in remote rural areas of the country as transporting cattle to the point of slaughter in remote regions, and then processing the cattle and distributing the beef within close vicinity, requires less infrastructure than distributing chilled or frozen beef to remote regions.

The majority of Indonesian consumers still prefer hot boning of meat as it is considered to be fresher compared with imported frozen or chilled boxed beef. Many consumers who buy their meat supplies at wet markets are used to buying "warm" (freshly cut) meat.

Wet markets. There are wet markets in all cities. Two levels of beef traders (large and small) operate in wet markets. A large retailer sells directly to customers and to small retailers. On average, large retailers sell 2–3 head per day on normal days, while small retailers sell less than one head per day. Small beef retailers in wet markets or small meat shops freeze their unsold beef. (Hadi, 2002).

Hadi *et al.* (2002) estimates that 60% of beef customers in wet markets were household consumers and 30% are meatball soup peddlers. This is especially the case in Java where meatballs are very popular. About 10% of customers are restaurants and supermarkets.

Most consumers shop at wet markets in the mornings on work days while those that shop at supermarkets and hypermarkets do so mainly on the weekends and in the afternoon. Trends in shopping at wet markets have not changed over time with most respondents going three times per week versus once per fortnight for hypermarkets (Morelink, 2010).

Supermarkets. While wet markets remain the dominant outlet for beef sales, supermarkets are thought to be increasing their market share (Sullivan and Diwyanto, 2007). The Modern Retailer Association (APRINDO) estimates that "modern" retailers sell 12,700 tonnes of beef per year, of which hypermarkets and supermarkets account for about 50% each. Beef sold through modern channels accounts for a small proportion (less than 3%) of overall beef production. Hadi *et al.* (2002) noted that in the late 1990s, the amount of beef sold by supermarkets declined by 25–80%, mainly due to increased beef prices and reduced consumer purchasing power as a result of the economic crisis.

Hadi *et al.* (2002) writes that most provincial capital cities and some district capital towns have supermarkets, but not all sell beef. Most buyers are households (65%); the others are restaurants (25%) and catering firms (10%). Some consumers prefer supermarkets to wet markets because they sell meat that is more tender, leaner and more hygienic; they are a more convenient shopping venue; the weight of beef purchased is indicated exactly on the label; the price is only slightly higher; and the meat is packed to a size to suit the consumer.

The amount of beef sold in supermarkets varies (from 35 to 500kgs) depending on the size of the city and the location of the supermarket. Beef is sourced from domestic cattle, imported cattle and imported beef.

Meat shops. There are meat shops in most provincial capital cities and some district capital cities, though in limited numbers. The share of beef sold through meat shops is very small, with only 1–3 head of cattle sold per day per meat shop on normal days. Households are the main customers.

The existence of meat shops reflects the demand by customers for quality domestic beef. Customers buy beef from a meat shop because they can buy native cattle (particularly PO); because they can select the quality and freshness of beef; because the price is not significantly higher than in wet markets, but is still lower than in supermarkets; because they can buy beef at any time during the working day (whereas wet markets operate only until 10 a.m.); and because they are near their home.

Timing/availability. For wet markets, supermarkets and meat shops, sales increase on big holidays (Idul Fitri, Idul Adha and Christmas), by 50% up to 400%, depending on the province/area. Since 1998, it has been increasingly difficult for meat shops to procure cattle as native cattle have become more scarce (from Hadi, 2002).

Cuts. The market segments for beef according to types of meat can be classified as follows (Morelink, 2010):

- prime cut meat for five star hotels, cafés, catering and supermarkets
- secondary cut meat for meat shop, traditional market and households
- variation meat, particularly trimming meat dominant, used as raw material in meat processing industry e.g. corned beef, sausages and meatball
- offal is used for processing industry and traditional culinary industry, e.g. ribs stew (*konro*), Makassar stew (*coto*), salad with water buffalo/cow snouts (*rujak cingur*), oxtail soup (*sop buntut*) and meatballs (*bakso*). Heart is used in bakso, and liver in traditional meals like "Padang".

SOCIAL

Cattle play a major role in the lives of many Indonesians, and social issues impact on all aspects/sectors of the industry including productivity, adoption of technology and innovation and marketing.

PRODUCTION

Cattle play multiple roles in farming systems and livelihoods throughout the world. They provide cash income from sales of animals and animal products, food from animal products, provide farm inputs (manure and draught), and as are a source of savings, security, insurance and social status (Moll, 2005). The roles of livestock vary by production system, area and between individual households. These factors have to be accounted for in investments and interventions (Winter, 2011).

NTT, NTB and EJ have a long history of cattle production where cattle have strong cultural values. Beef (and sometimes a whole beast) has the highest cultural and social value of any meat at traditional ceremonies (*adat*) including weddings, funerals, and religious events which in Muslim areas is

especially Hari Raya Idul Fitri and Idul Adha. The ability to serve meat at these events, and to hold large numbers of cattle is a source of social status in many areas of East Indonesia.

However, cattle production is primarily an economic activity, especially as a source of cash income. Deblitz *et al* (2011) asked famers about their motivation, reasons and incentives for keeping cattle. The vast majority named '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'. One of the implications is that the price of live cattle typically drops at the beginning of a new school term when households sell cattle to pay school fees.

Mahendri *et al.* (2010) also found that the main reason for selling the animals was to meet the farm-household's needs for cash for consumption, including schooling and health care, as well as acquiring durable assets such as a motorcycle.

Patrick *et al*. (2010) produced similar findings from a detailed survey of cattle farmer decision making and business priorities in Lombok and Bali. Households raise cattle primarily to increase household welfare and only secondarily as a source of wealth for events or emergencies. The main determinant of the timing of cattle sales was to meet an immediate cash need, followed by other bio-physical and market determinants (age, weight and price of cattle).

Group (kelompok) activities are also another social dimension of cattle production. Groups are common in the beef industry. There are for example 778 groups on Lombok alone, mainly in cow-calf/breeding activities, but significant numbers in mixed cow-calf and fattening operations, and fewer in fattening only (The Government of NTB, 2009). These figures do not reflect the actual functioning, viability and sustainability of the groups.

Patrick *et al*. (2010) explored the reasons for the establishment of cattle groups in Lombok and Bali. He found that security of cattle (i.e. to stop theft) was important in Lombok and that access to government and NGO funding through groups was important in both Lomok and Bali. The production and marketing efficiencies from group formation was of low significance. However, the groups that do engage in markets have higher levels of group capital formation including trust within the group and leaders who are confident and have the support of group members.

There were examples of successful group activities. For example, the National Program for Community Empowerment (2010) where a strong pre-existing group of 15 farmers in TTS in West Timor entered into integrated activities including commercial bull fattening, forages, organic fertiliser, biogas converters (from Dinas).

Another socio-economic dimension of cattle production is the extent to which cattle are kept to fit into farming systems. Priyanti (2012) found that use of cattle for draught power was less common than in the past, especially in the upland site. Likewise the production of manure was not as important. Rather, cattle production was a market-oriented activity, generating significant cash income for the household, often in excess of the income from cropping. While cattle production in NTT and NTB may be less market-oriented than in EJ, EJ provides an indicator of increasingly market- and objective-oriented systems.

The place and movement along the continuum of cattle “keepers” and “producers” have a strong social dimension too.

MARKETING

Social relationships and networks are particularly important in the marketing sector. For example,

- Transaction costs and risks are minimised if trading is based on social ties and trust. Farmers can (but not always – see Mahendri 2010) develop relationships with local traders, which impact on various dimensions of exchange including prices, credit and forward-payment.
- Farmers rarely sell their own cattle on market themselves, partly because of social norms (exclusion) and because of confidence in dealing with traders. Brokers can play a bridging role in price discovery and formation
- Ties between traders are often said to be strong and can extend to collectors, shippers, local authorities and buyers in end markets. This entails some positive aspects (integration, logistics, finance and credit) but also negative externalities (exclusion, collusion and information asymmetries).
- Institutional measures and industry initiatives should be utilised with this in mind.

SLAUGHTER

- *Halal* defines a range of industry practices including beef treatment, transport, slaughter and processing procedures. Abattoirs and meat processing in Indonesia should meet MUI’s *halal* requirements if they wish their product to be labelled *halal* and reach Indonesia Moslem market.

RETAIL AND CONSUMPTION

- Beef an important source of protein in the Moslem diet
- Festivals etc. of Ramadan (Muslim fasting period) and during the festive period (Idul Fitr and Idul Adha).
- Beef prices increase during the month where the demand of beef is high, can be beef shortages, can lead to protest and disruption.

TECHNOLOGICAL

PRODUCTION

- Policy-makers are very interested in breeding technologies (breeding for multiple birth traits, embryo sexing, semen screening etc.).
- Policy-makers are also interested in the commercial feed sector (pre-mixes and concentrates) to boost productivity. Other on-farm feed treatment technologies include straw treatment
- ACIAR research suggests that emphasis on “high-tech” interventions such as these are misplaced and that practice change is best achieved through simple, low-cost, low-risk interventions that fit into existing farming systems. Practices discussed include the provision of bulls, feed and sanitation.

- Feed storage can be appropriate
- Cattle housing, including pens and concrete floors can be integrated with composting and household biogas converters, which is another area of interest for the GoI.

SLAUGHTER

Processing activities consist of slaughter, skinning, cutting, grading, chilling, freezing and packing. All of these have potential for technological and infrastructure upgrading. As established above:

- Beef grading, chilling, freezing and packing (with labelling) is mainly done by supermarkets and some big meat shops. Only a few slaughterhouses use modern processing technology, involving automated equipment. Most use manual labour (Hadi *et al.*, 2002).
- There are another group of 10 service slaughtering abattoirs built in the 1990s (GoI/JICA, including in NTB and EJ). The abattoirs are small-scale with basic facilities (unmechanised, limited cold storage) but are nevertheless purpose-built on a fixed site. There have been moves to upgrade these facilities, especially in NTB. The Meat Business Centre in Mataram integrates the abattoir with genetics (AI), feed mill and fattening operations. This provides a model for what technological upgrading might involve in the EI context.
- The vast majority of the Indonesian slaughter sector is decidedly "low tech", occurring in rudimentary and low-cost operations.

There is therefore large "technical" scope to upgrade technological levels in the sector, but these are subject to underlying economic and policy factors discussed below. Technological areas include:

- Beef standards, training of slaughtermen and butchers, tender-stretching of electronic stimulation.
- Tenderness and colour can be improved through better cattle handling and slaughter procedures.
- Cold storage and transport facilities, cold chain management.
- Food safety, inspection and certification.
- Technological change driven by regulation will involve minimum standards in areas like: registration, registered capital, tax, inspection, hygiene, building and bench materials, storage, water use and effluent management.

INFRASTRUCTURE

Marketing and inter-regional cattle trade is constrained by the under-development of livestock selling and market infrastructure, cattle handling and purpose-built transport facilities (truck and sea), cold storage/transport facilities, and slaughter facilities. The poor infrastructure imposes costs on the cattle value chain that reduces competitiveness with imported product, leads to high priced beef and constrained demand, and puts downward pressure on prices that can be paid to prices. In-depth research is required to understand infrastructure constraints and the costs and benefits of addressing them at critical control points along the beef supply chain, including livestock handling on farm, road and sea transport and at ports, markets and slaughterhouses. Examples of infrastructure bottlenecks are raised below.

Hadi *et al.* (2002) identifies two main problems in shipping cattle. First, ships are not specifically designed for shipping cattle; they are designed for other agricultural products, with cattle regarded as return cargo. Such ships have limited space, so cattle do not have enough food and drinking water. As a result, cattle become stressed, resulting in substantial weight loss. For example, when cattle were shipped from the quarantine examination premises in Mataram (NTB) to Jakarta, there was a weight loss of 11-12%. Second, ships have limited capacity and no regular schedule. This makes the per unit shipping cost (per head or per kilogram liveweight) high and makes it time-consuming to gather large numbers of cattle. Inefficient cattle procurement from eastern Indonesia has been one of the factors discouraging feedlots from using domestic cattle in their business operations.

Deblitz *et al.* (2011) writes that in the beef sector, cold chain infrastructure is critical to improve value chain efficiency. The lack of cold chain facility in most abattoirs, transport facilities (trucks/ships) and wet markets limit the 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. Delitz *et al.* (2011) also note that that in general, the costs of interisland cattle trading business are rising rapidly.

In a survey of cattle markets in 10 provinces, the Livestock Research and Development Team (2012) found that infrastructure in livestock markets is variable. All animals at market have a source of water and sufficient food. Some markets have a market courtyard, wet soil and offices that range from bad to good. Animal markets there are not fenced or gated. The average market animals only have a limited storage enclosure, which did not even have a shelter cage. At the average market, weighing scales are usually in working order but are not used, and loading and unloading facilities are inadequate.

ENVIRONMENTAL

(Animal welfare and food safety issues are discussed in this section too)

PRODUCTION

Significant environmental problems are associated with cattle production that can be alleviated through changes in production systems and practices.

In particular, livestock keepers in “traditional” systems operating in “survival” mode are most likely to keep cattle on feed for long periods with low input-output (conversion) efficiencies. Livestock keepers are most likely to over-graze land that exacerbates already widespread degradation in NTT and NTB (pers comm Dahlan and Mulik). The transition from livestock keepers to producers can mean fewer more productive animals, with higher input-output efficiencies (Kemp and Michalk, 2011).

There are also implications for methane emissions. The four main approaches to reducing CH4 emissions in livestock production are: (1) improving livestock productivity; (2) changing the management system; (3) managing the outputs more efficiently; and (4) reducing livestock numbers (Garnett 2009).

Policy-makers in NTT and NTB often have ambitious industry expansion plans and refer to large amounts of unused land and potential for growth (see below for details). However, stocking rates and degradation levels are already high in some parts of NTT.

The planting of new forages for beef cattle production around household cropping areas and backyards can substitute for grazing upland areas unsuited to cropping (and relieve grazing pressure) and also substitute for cut and carrying of local species (Martin, 2011). Tree forages and other legumes fix nitrogen.

The use of feed residues for cattle production (LPS/2008/038) also utilises resources otherwise lost from the carbon cycle. Rice straw otherwise burnt causing (solid particle) pollution, can instead be used for roughage. There are numerous other crop by-products (coca residues / pods, peanut stalks etc.)

Cattle penning is a significant environmental issue. Concentrations of animals can have high effluent (manure, urine) emissions (water flows, water tables etc.), which cause problems especially in peri-urban areas (common throughout EI). Better design of kadangs can reduce the impacts and bring environmental benefits. Concrete floors provide drainage for animal sanitation but also increase the capacity of farmers to manage effluent flows. Manure and urine can be used for compost and for methane / biogas converters (for household gas cooking etc.). Indonesia has a national program to promote this (with China).

Pen design (sanitation) and tethering practices (nose ropes vs rings) are also animal welfare issues.

MARKETING AND INTER-ISLAND TRADE

Animal handling in transport can be poor.

- At many markets, cattle are loaded and unloaded from trucks without ramps.
- Few ships used for cattle transport are purpose built.
- Cattle are often be lifted by rope on to ships.
- Can be inadequate feeding, watering (or over-watering).

There are animal welfare and productivity effects including mortality, stress, weight loss and sickness.

SLAUGHTER

Environmental issues in the slaughter sector are not the top priority of government or industry. However, the slaughter sector emits effluent (slaughter wastes, water, manure) that if not treated or managed can cause significant pollution and adverse health effects. This is particularly the case in areas with concentrations of slaughter units, in peri-urban areas.

In addition, animal welfare issues becoming more prominent in some beef chains (for imported cattle). Beere and Pettiford (2005, MLA report) look at the relationships between better cattle handling and product characteristics and profitability. Inappropriate pre-slaughter management and slaughter techniques result in dark cutting beef, reducing shelf life and overall product value, leading to meat being discounted by as much as 30% in the wet market. There is enough evidence to suggest that if management is improved from the holding yard to the point of slaughter, Australian cattle will produce meat with a lower pH and more optimal meat colour. This product will not be discounted in

the wet market and will have a longer shelf life. An extra three hours shelf life is significant in the Indonesian wet market. Processors of Australian cattle are more likely to respond to and implement introduced techniques that improve shelf life and meat colour because it will result in an increased financial return

The slaughter bans on breeding females provide incentives (that are often acted on) for farmers to damage the animal (e.g. break their legs) and then sell them as injured cows.

LEGAL

Many of the policy, trade, industry structure and industry conduct issues discussed above have a base in laws and regulation. However the issue of land tenure at household level is however a major area of legal contention in many studies.

Many studies (including Deblitz, 2011) highlight the difficulties that farmers face in securing loans because of a lack of collateral certified by for example land or building certificates, or vehicle (car, motor bike) ownership documents (BPKB). As result, farmers have limited access to local credit systems, which farmers deal with by entering into credit-sales relationships with traders, or by entering into forced sales when cattle have not yet met (marginal) growth potential.

At the farm level, some farmers are still practicing permanent grazing; particularly in areas with strong communal systems such as in Sumbawa and certain regions of NTT. In these areas, grazing pasture are communal land, in which commons arrangements are used to manage the cattle. Without legal certainty, the land a potential source of conflict for the communities (and at the same time also limiting their ability to invest in more intensive farming system) (Kristedi).

In some areas of Sumbawa in NTB, the allocation of grazing areas for village breeding farms is very important. The status of land allocated for grazing is set in a letter from the district head. The letter requires that, of the available potential grazing areas, each village has to allocate land for communal grazing. The Sumbawa office of livestock services (OLS) plans to provide fences and animal drinking water to increase cattle production and district income. Where land is plentiful, particularly in Sumbawa, farmers own individual grazing land (“lar”) (Hadi, 2002).

Cattle security is another important issue in EI. In Sumbawa and West Timor, for example, cattle have to be registered (for a fee) and documents/permission must be issued (by Dinas Livestock) to sell and transport cattle. Cattle are branded and tagged in different ways in EI, and some farmers can be adverse to the practices. However, tagging would seem to be useful for a range of industry activities including disease monitoring, traceability, grading, marketing and research.

SECTOR POTENTIAL FOR DEVELOPMENT

POTENTIAL FOR VALUE-ADDED

The fundamental settings for industry development appear sound. On a macro-level:

- Demand for beef appears robust (see section below “Impact Potential – Market Demand”).
- Beef supply has increased only slowly in recent decades due to resource, productivity and institutional constraints.

- If these constraints can be addressed, and if price signals are effectively passed on to producers to give them incentives to respond through changes in production practices, then sustained industry growth could be expected.

There is also potential for the development of particular market segments.

- For example targeted promotion and marketing of higher value primal cuts and improved utilisation and value adding of sub-primals.
- Innovative marketing in traditional wet market and modern retail can capture latent demand for beef with particular quality, brand, food safety or animal welfare characteristics/standards.
- There is also a large range of products generated from cattle and beef products (processed beef products, offal, hides, medicinal etc.)
- There is significant potential for domestic beef to compete with imported beef markets in particular market segments (for specific dishes, niche markets, quality characteristics).
- There is high demand for breeding stock, in which NTT and NTB have a comparative advantage.
- Deblitz *et al.* (2011) argue that market shares and preference for beef from eastern Indonesia in the main market Jakarta decreased in the last years and that new markets (in Kalimantan and Papua) should be explored.

PRODUCTION

For the purposes of discussion, discussion on potential for development of the production sector is divided into 2 sections – land use and cattle production.

LAND USE

Policy-makers in NTT and NTB often refer to large amounts of unused land and potential to increase cattle numbers

- Based on provincial Dinas livestock data, Nimmo-Bell and ICASEPS reported that NTT had 534,000 head in 2005 on 888,000 ha of grazing land, with stocking rates double in districts like TTS and Belu.
- Government sources in NTT cite an area of 750,000 ha. in unused land in NTT (Nimmo-Bell and ICASPES, 2007).
- In NTB, government estimates that 1.69 million ha. of “feed land” can potentially be used for cattle production, and natural resources can support an increase of 51.5% in cattle numbers (The Government of NTB, 2009).
- Grazing land is a particularly important source of potential development in NTT and NTB because of the comparative advantage of the region in cow-calf production and the production of breeders (8-12 m.o, >250kgs so not much fattening done). Only 5% of Lombok cattle go to Jakarta and the main market is for breeder cattle to EJ, Kalimantan, Irian (Deblitz, 2011). The eastern islands of Indonesia have struggled to meet their quotas for beef cattle exports for some years, due to supply side constraints (discussed below).

- While government in NTT and NTB often cite land availability as a source of potential industry development, this has to be interpreted critically. Environment costs outlined above are associated with grassland degradation and industry concentration. Invasive weed species (Jack in the Bush, Chromolaena odorata) has been reducing the size of grasslands.

East Java poses a very different land use problem. The World Bank (2011) writes that there is only little scope for agriculture land to expand with 74% of land has already been used for agriculture. Improvement in land to farmer ratio can only happen if numbers of farmers are reduced by helping some farmers move out to other non-farming activities and helping other farmers into higher value-added agricultural activities. Livestock is cited as one such activity.

This supported by interviews with EJ Dinas Agriculture (pers. comm. 120314) who emphasise that EJ is short of land, has very intensive agricultural systems and where the poor have small land areas. So there is a need to specialise in commodities produced in intensive systems – e.g. cattle and fruit. Cattle not are not land intensive and can be held by smallholders using low value household resources and residues.

This issue is noted also by Priyanti *et al*. (2012) who write that cattle production and farming systems in EJ are intensified, commercialised, and mechanised – and that the need for draught power and the availability of grazing land has declined. Never the less, livestock income in East Java is the highest of any province in Indonesia and increased at the rate of 3.7% during the period 2006-2010.

That is, especially in EJ, extremely high human, livestock and land use densities means that higher incomes is driven by improved animal productivity and market efficiency and development. Here the feasibility of larger-scale or more specialised feeding operations is determined by the availability of and access to feed (crop residues, agro by-products, cut and carry forages, tree legumes), other inputs (credit, extension) and output markets

As also noted below, industry growth and change will also be driven by the developments in the broader economy. As countries and regions develop economically and opportunities arise for farmers to work off-farm, then the higher value is less likely to be allocated to small-scale cattle production. This is shown through the household budgeting and the valuation of (opportunity costs) of labour in the case of China (Longworth *et al*., 2001; Waldron 2010) and Indonesia (Deblitz, 2011; Rutherford, 2004; Sullivan and Diwyanto, 2007). Deblitz *et al.* (2011) show that when opportunity costs of labour, land and capital are valued, producers in NTT and NTB are more profitable (and therefore competitive) that producers in Sulawesi (and EJ?). Rutherford (2004) produce similar findings in the cases of Sumbawa (less developed) and Lombok (more developed).

FORAGES

As a major component of the cattle sector, a series of ACIAR projects looked at crop-livestock systems especially forages:

- AS2/2000/125 Optimising crop-livestock systems in West Nusa Tenggara Province, Indonesia (Sumbawa, IAT modelling).

- AS2/2000/ 124 Prospects for improved integration of high quality forages in the crop-livestock systems of Sulawesi, Indonesia (APSIM modelling).
- Economic impacts are reported in MacLeod *et al* (2007).
- These projects were continued in LPS/2004/005 Improving smallholder crop-livestock systems in eastern Indonesia (further IAT modelling to explore options/strategies and communicate with farmers). Findings are reported in the final project report.
- Other forage projects include LPS/2008/054 Improving smallholder cattle fattening systems based on forage tree legume diets in eastern Indonesia and northern Australia.
- In cross-country studies that include Indonesia, a series of ACIAR publications report on the identification of forage varieties (ACIAR Monograph No. 62), technical information on how to grow, manage and use forages (ACIAR Monograph No. 88), action–research approaches needed to integrate forages on smallholder farms (ACIAR Monograph No. 99) and on case studies in Southeast Asia where households developed agricultural systems through the introduction of robust forage varieties and sound management practices (Connell *et al*., 2010).
- Hadi *et al.* (2002) argues that the feedlot sector has a number of commercial advantages in beef production relative to smallholder producers, although the applicability of this to NTT and NTB would have to be examined. Nimmo-Bell and ICASEPS (2007) discuss and budget small-holder fattening operations in NTT, especially those associated with the TLM program.

CATTLE PRODUCTION

The GoI has ambitious plans to expand cattle numbers and turnoff. There is widespread consensus amongst government, research and industry sectors in both Indonesia and Australia that production efficiencies are low and can be increased substantially. This section provides some perspective on the scope and magnitude of what these technical gains might be, while the economic impact on producers is left to Impact Potential – Producers and Processors.

Livestock Research and Development Team (2012) identifies the major reasons for low productivity as:

- The availability and quality of feed especially during the dry season, high prices for supplementary feeds, and declining livestock health die to malnutrition.
- Animal health problems are still encountered in some areas, including parasites (worms, ticks), SE, brucellosis, etc.
- Other management systems that don't conform with good farming practice.

While productivity was found to be low, there is also high potential for increase:

- Pre-weaning calf mortality in the province during the dry season can reach 40-45%, while in other regions varied in the range of 15-20% to 25-30%. The application of GFP and the provision of adequate feed can reduce calf mortality to 5-10%.
- Calving rates can be can be increased from 40-50% (pessimistic) to 60% to 70% (optimistic)
- Slaughter weights for local cattle can be increased from 200-300 kg (pessimistic) to 300 kg (realistic) or 400 kg (optimistic).
- Slaughter weights for cross-breeds can be increased from 400-450 kg (pessimistic) to 500-600 kg (realistic) or> 700 kg (optimistic).

- These weight changes will increase dressing percentages from <50% (pessimistic), to 51-52% (realistic) or > 53% (optimistic).

A series of ACIAR cattle and forage projects in EI provide evidence on achievable productivity gains. It is not possible to report on the large repository of project data, so this section paraphrases findings from ACIAR project AS2/2000/103 "Developing an integrated production system for Bali cattle in the eastern islands of Indonesia".

The project aimed to improve cattle productivity through simple changes in management practices that fit within existing systems and as an "integrated village management system". The project was conducted in NTB (Lombok and Sumbawa).

Research from the project in two villages each in Lombok and Sumbawa showed that cows are highly fertile but bull supply is erratic and feed supply and quality in the late dry season can be extremely low. Weaning removes nutrient demand from the cow. Scarce resources of high quality feed can then be directed towards the calf. Amongst the interventions used in the IVMS were controlled mating (one bull, 3 month mating period) and weaning calves at 6 months, improved feeding and penning. More specifically, in the Lombok site:

- Better management has achieved astounding improvements in weaner output.
    - Before the project, the annual weaning rate from cows in Kelebuh was approximately 60%, compared with approximately 90% with the new management system.
    - In the first year of observations at Kelebuh, the pregnancy rate achieved in 2-year-old maiden heifers was 40% compared with up to 100% with the new management system.
    - Calf mortality rate across other sites, and from anecdotal reports, appears to be at least 10%, which is far higher than seen in Kelebuh with the new system.
- Cattle fertility. The adoption of the integrated management system in Kelebuh, Lombok, in late 2001 and early 2002 shifted the calving and weaning patterns for calves born in 2002 and 2003. In both years, calving started in late March but was 75% complete in June 2003, in contrast to only 50% complete in the previous year at the same time. The average calving date moved from mid July to mid June.
- Cattle growth. Pre-weaning calf growth averaged about 0.3 kg/day before the new management system, but has since risen to more than 0.4 kg/day. One outcome of the new management system was the significant increase in the average size of progeny (by 20–40 kg) by December when the average age was approximately 6 months. Post-weaning, growth in yearling female cattle was approximately 0.2 kg/day, but increased by 0.1 kg/day in heifers aged 1.5–2.5 years. The average growth rate of yearling bulls increased from 0.25 kg/day to 0.3 kg/day.
- Since implementation of the new management system at Kelebuh, a combination of better calving and weaning times and improved growth rates has indicated that males would reach target weights approximately 6 months earlier than previously, and that females would reach mature size up to one year earlier (i.e. at 3 rather than 4 years of age). This has substantially improved the value of cattle and resultant cash flow.

Economic analysis of the improved production systems is provided in the Impact Potential section. Research is continuing in EJ through ACIAR Project LPS2008/038 "Improving reproductive performance of cows and performance of fattening cattle in low input systems of Indonesia and

northern Australia". The management changes from AS2/2000/103 were also scaled out in Lombok in ACIAR project SMAR2006/096 through a three-step approach (Martin, 2010).

- Improvement of existing kandang facilities (drainage in particular and construction of a bull and calf pen—encouraged by a small contribution of project funds, but mainly funds/labour from member farmers) and provision of a communal bull rather than free mating (thereby ensuring controlled mating with an emphasis on a calf from each cow every year)
- Improving forage resources, starting with nurseries and small demonstration areas established by the OGT and farmers at each participating kandang to demonstrate new forages, forage management, and balanced rations and other aspects of animal nutrition for improving productivity
- Introduction of additional breeding and management strategies shown to be successful in previous ACIAR projects (in particular early weaning and preferential feeding of calves).
- Economic impacts are also cited in the Impact Potential section.

Modelling reported in Hadi *et al.* (2002) found that improving technical efficiency can do much to improve Indonesia's beef cattle production and the incomes of smallholders. The constraint on expanding breeding cattle numbers severely curtails the development of a smallholder beef industry in Indonesia. There is a need to develop production systems that will allow for larger-scale and more specialised breeding. More efficient native cattle breeding will deliver significant improvements in beef self-sufficiency and smallholder fattener incomes. Consumers also gain substantially through lower beef prices and increased consumption. More efficient native cattle fattening will also deliver significant gains to consumers, though its effects would be much less pronounced than is the case with smallholder breeding efficiency improvements.

Other issues are (Nimmo-Bell and ICASPES, 2007):

- Training and extension services to smallholders are very limited. Traders also need to be engaged in improving the quality and productivity of local cattle. The economic benefits for all industry players need to be clearly identified in this process to create buy-in. The network of regional DINAS offices have a crucial role to play in extension and do not currently engage with research providers; and
- Lessons from research are not often integrated into policy.

PROCESSING AND TECHNOLOGY

SLAUGHTER

PSDS-2014 aims to "improve the service quality of abattoirs to be able to produce meat equivalent with the quality of ex-imported meat are conducted. Therefore, domestic meat production can compete with ex-imported meat and can even be exported to Middle East and Asian countries because of: Indonesia is free from FMD; Halal guarantee; sanitation hygiene-based food security guarantee indicated with Veterinary Control Number (VCN) and implementation of Hazard Analysis Critical Control Point (HACCP) as a food security guarantee system. This is to be achieved through "technical" measures including sanitation and hygiene, animal welfare, aging, cutting system and cold chain management".

There is large scope to technologically upgrade the slaughter sector. However, the question of whether there is to potential to generate value through technological upgrading has to take into account both economic and policy factors.

Economic factors include economies of scale, capital and labour costs, input-output markets, transport costs of beef vs cattle etc. A priori, numerous factors constrain technological upgrading on a sector-wide basis.

- Service slaughter costs in Indonesia are very low (the highest reported to be Rp200,000 in Mataram). Even at these low fees, service slaughter plants struggle to attract traders to slaughter at the fixed plants/facilities, and most are reported to operate well under capacity.
- Labour costs in Indonesian plants are very low, which reduces incentives and competitive advantage to invest in capital-intensive technologies
- The vast majority of beef in Indonesia is destined for generic beef markets – with undifferentiated cuts, few quality characteristics and used for heavily sauced and cooked dishes, or for processing. Technologies designed to improve quality characteristics of beef are unlikely to be viable for the majority of plants
- There are still strong consumer preferences for fresh beef, negating incentives to invest in cold storage and requiring small, localised operations located close to market

There may however be growing demand for beef that requires particular types of beef over time, space and form. For example:

- NTT and NTB abattoirs may see opportunity in the inter-island beef (as opposed to live cattle) trade or for particular areas or niche markets (e.g. mining operations in Kalimantan). Rising live cattle transport and marketing costs, fees or disease protocols may make this an increasingly viable option.
- Targeted promotion and marketing of higher value primal cuts and improved utilisation and value adding of sub-primals.
- Innovative marketing in traditional wet market and modern retail can capture latent demand for beef with particular quality, brand, food safety or animal welfare characteristics/standards. Inappropriate pre-slaughter management and slaughter techniques result in dark cutting beef, reducing shelf life and overall product value, leading to meat being discounted by as much as 30% in the wet market. Improved handling and slaughter techniques through training and infrastructure investment will not only improve animal welfare, but will result in increased financial returns through improved meat colour quality and shelf life.
- Particular branding programs – e.g. “Bali beef” (reportedly done in Bali, and planned for the Amarta project).
- Demand for safety assured product (through facilities, certification, inspection, cold storage and transport facilities, cold chain management etc.).

In addition to technical change induced by customer and consumer preferences, technological upgrading may also be induced by regulatory change, or a major disease outbreak, food safety or environmental concern. Effective implementation of slaughter bans would require more centralised slaughter structures. Local government in particular may then draft and implement more stringent

regulations on the slaughter sector that include minimum standards in areas like registration, registered capital, tax, inspection, hygiene, building and bench materials, storage, water use, effluent management, slaughter facilities and processes. Implementation of these measures can effectively consolidate and centralise slaughter activities in a particular locality, but this raises issues of preferential licencing and local monopolies/monopsonies in the sector (Waldron *et al*., 2010) although this would seem to be less likely in service slaughtering structures.

PROCESSING

Other products include offals, hides, pharmaceutical products, and processed beef that generate value and employment accessible to small-scale actors.

Cattle in EI are often branded and marked to certain degrees, so measures to reduce the markings on animals and improve hide standards could increase hide value.

MARKETING

The Indonesian cattle marketing sector is undeveloped. Addressing issues in the sector has the potential to stimulate cattle production, increase producer incomes, and help realise the policy objectives of the GoI.

Discussion on cattle marketing here is split into 3 sections: cattle marketing systems; levies and fees; and inter-island trade

Before looking at these sections separately, some observations on marketing from Deblitz *et al.* (2011) that span these sectors are worth noting. They conclude:

- 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.
- 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, 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.

Recommendations from Deblitz *et al* (2011) include:

- Improve data quality and quantity (statistics, cattle weights, market reporting including price information);
- Target policies and projects towards incentives and driving forces (cash requirements of farmers, consumer needs, infrastructure deficits);

- Improve communication and information in the supply chain (creation of an Indonesian Beef Forum); and
- Creation of new markets for eastern Indonesian produce.

CATTLE MARKETING SYSTEMS

Problems in the marketing sector are commonly framed by industry stakeholders in the following way. Farm-gate prices for cattle are low, not due to the underlying demand or prices of beef (which is firm), but because of high costs and margins in intermediate sectors of the chain (especially traders) (Hadi, 2002; Deblitz, 2011; Sullivan and Diwyanto, 2007). This squeezes margins in early stages of the chains (especially farmers). That is, traders accrue a disproportionately large share of value in the chain, compared to producers who are regarded as passive/inactive participants in the chain as "price-takers".

While these claims require empirical testing, there are other reasons why the Indonesian cattle value chain could be argued to be trader-driven (Gibbon, 2001).

- A large hierarchy of traders exchange cattle numerous times along the chain – more than in comparable countries – which provides opportunities may exist to shorten chains.
- Traders commonly control activity across multiple stages of the chains by retaining ownership of product through beef wholesaling, slaughter and sometimes (contract) production stages. Traders generate profit not so much through trading activities but the integration of multiple activities (Deblitz *et al*., 2011).
- Traders have a much better knowledge of cattle attributes, market preferences and markets, than do farmers. While this is as expected, even larger feeding households in Indonesia appear to be largely passive market actors.
- Farmers rarely have the knowledge or confidence to pro-actively discover prices and market their own cattle, even at nearby livestock markets. Rather, the vast majority sell to traders at farm-gate, to traders with whom they have established relationships or who forward credit in "tied" / reciprocal obligations.
- Accessing alternative forms of credit appears to be a significant factor in opening up marketing choices, as well as building more productive systems. Subsidised finance has been allocated (through banks) for cattle producers, but is not readily accessible to all households and has been divisive in communities.
- Rather than maximising cattle prices, households very often sell to traders on a cost-recovery basis, where prices are set to cover costs, and then add a profit margin. This price may be lower than the "real"/market value of the animal. Furthermore, budgeting does not account for all "real"/opportunity costs of production (labour, depreciation, feed inputs, finance).
- Information asymmetries (between farmers, local traders and larger traders) are a feature of the Indonesian cattle value chain. Another often-cited form of market failure (that again would need to be tested) is uncompetitive markets due to oligopolies (especially for inter-island trade) and collusion (a so-called "mafia" of traders).

Thus, the cattle marketing sector may contain cases of market failure (information asymmetries, collusion).

While industry stakeholders regard cattle marketing as a serious constraint to industry and rural development, few effective solutions have been devised or implemented. Most measures are interventionist in nature (trade barriers, slaughter bans, processing investments). More relevant to this proposed project, some localised marketing measures have been trialled, including cattle auctions,[19] scales in markets, and guidance prices have been developed for inter-regional trade.[20] While these measures provide some useful lessons, they have not been taken up or used. This may be because they are not critical intervention points, are not seen as industry- and community relevant, have not been "connected" with users of the services, or are not based on in-depth research.

Amongst the measures that offer high potential to upgrade the cattle marketing system are:

- Market reporting systems, especially price reporting linked to cattle grading systems;
- Training and information for producers to produce for target markets, and assist with more direct integration into those markets;
- Linking group production activities with marketing activities; and
- Linked to increased access to formal credit channels (to break sales obligations to traders, and reduce forced sales, and increase marketing options).

These observations conform with the findings of other studies

Deblitz *et al.* (2011) in a benchmarking study:

- argues that beef prices, sometimes costs and in most cases profitability are high throughout the supply chain.
- recommends improving information about cattle and markets to farmer, building confidence in dealing with traders and reducing reliance of credit from traders that tie them into reciprocal sales arrangements will increase farmer's access to and competitiveness in cattle markets.
- However, Deblitz *et al.* (2011) also show that the margins of traders are thin, as a single trading activities (not integrated with up or downstream activities)

Hadi *et al.* (2002) writes that:

- live cattle fattened for slaughter by traditional smallholders have to pass through a complex and inefficient and "imprecise" marketing chain, incurring transport costs and marketing costs. A number of trader operations may be involved — village trader, subdistrict trade, interregional trader. Many farmers must sell their cattle to a village collector rather than to a cattle market place because they lack access to a cattle market place.

[19] Auctions have been tried in NTT and NTB (SADI initiative). They didn't work because they are too confrontational for households that are used to working with one or two traders, no forward crediting; and because traders don't want to work with government

[20] Each year in December/January the Governor of NTB set, via government decree, an official standard minimum inter-island trade and export price per head for breeder cattle by age/sex (young bull, heifer) and by grade (grade A, B, C based on height) and for beef cattle by sex and live-weight. These prices are utilised less strictly as a guide for intra-island and intra-province trade prices but are not common knowledge amongst farmers at least. Apparently, the price is determined by taking the annual average of all the average daily livestock market prices for cattle recorded as a range by Dinas officials in the livestock markets. Some staff mentioned that the Department of Trade also collected this information (Rutherford and Dahlan, 2004).

- Marketing costs for cattle sold by traditional smallholder non-partnership fatteners came to 2,483,632 million Rp in 2001. This represents a mark-up of 44% over the ex-farm value (although this may include other costs including fees and transport).

Suharyo *et al* (2007) point out that the presence of many middlemen and traders at the village and sub-district (kecamantan) levels in NTT has very limited impact on price information, since product prices are mostly determined by a small number of inter-island or large traders that form a monopsony market structure. The recent increase in the number of traders and exporters coming to Kupang, has not fully benefited farmers, due to the limited information on product location and excessive inspections that give rise to informal charges and uncertainty.

Similarly Sullivan and Diwyanto (2007) report:

- That the inter-island transport of livestock is reported to be controlled by a few individual companies, and costs are high. They recommend that the GOI has a role to play in opening the marketing channels to competition.
- Marketing mark-ups of around 33%.
- Write that the market channels for beef cattle are crowded with large numbers of livestock traders. These traders serve an important function; however, their costs contribute to lower prices for producers. It will be important to better coordinate the transfer of cattle from producer to feedlot or slaughter plant with the most efficient marketing method. Traders are important to livestock smallholders. They provide the necessary liquidity and outlets for a farmer's livestock. At the same time, traders can be a cause of concern. A number of trade exchanges occur as animals move from farm to feedlot or direct to slaughter. For example, in West Timor the main live animal market is Camplong and there are traders who extract rent from buyers and sellers just by their presence during negotiations. The market has no weigh scale. They offer no value added services. It was interesting to hear a livestock trader in Yogyakarta report that he would lose Rp.500,000/head if he buys in the market because of unnecessary middlemen. The individual traders' margins are small but when added together can be relatively high.

Rutherford and Dahlan (2004) write that:

- There is potential for both marketing chains to be made more efficient and a larger proportion of the profits to be distributed to farmers as a group by increasing their market power - particularly by reducing the number of middlemen (i.e. brokers) on Lombok.
- Simple things such as means of weighing cattle, regular updates of market information from a trusted source and some grading system to define price premiums would enable farmers to capitalise on their product.
- For farmers, the major marketing constraints to improving their returns were not having access to timely and accurate market information and having to be 'price-takers' rather than 'price-makers' – particularly in relation to accurately estimating the weight (for beef cattle) and height (for breeder cattle) of their cattle. This situation is exacerbated by not having access to credit and thus being forced to sell even when prices were relatively low.
- Cattle prices reflected various events in the cropping, religious, school and inter-island and export calendar. These are generally well known with prices reportedly varying by 25-30%.

The farmers' ability to capitalise on higher prices and avoiding lower prices is constrained by financial capital (as discussed in more detail in the recommendations below).

Recommendations are to:

- Improve the availability and/or accuracy of government information related to the number of cattle.
- Improve the availability and/or accuracy of government information related to the price of cattle by type and trade.
- Increase the marketing power of farmers via the provision of timely, accurate, and widely accessible marketing information.
    - cattle price information (e.g. chalk boards at market, television, visits to production areas by government officials).
    - Cattle measurement (scales at market or production areas, girth measurements and weight conversion tables and education of farmers, height of breeders).
- Increase returns to farmers via the following:
    - improving the efficiency of marketing chain by reducing the number of middlemen and simplifying government charges and procedures;
    - developing and utilising grading standards to obtain price premiums for breeders in addition to developing specialised breeder markets;
    - improving the quality of cattle by using selected best quality bulls (and castrating the rest);
    - providing and utilising tailor-made micro-finance schemes (e.g. village and sub-district cooperatives contributing to 'rice banks') to reduce farmers need to sell and therefore increase their ability to capitalise on higher prices at the same weight, or grow the cattle out longer and obtain greater profits.

Benu (2011) cites Barlow (1990) that puts marketing costs at 25% of the value of a 300kg animal sold to Jakarta, which is deducted from the farm-gate selling cost to farmers. Benu argues that while 25% marketing costs may seem high, the traders provide numerous services, in a competitive market and weigh up returns against alternative trading opportunities. As many traders have mobility to operate across commodities, many have taken up other more lucrative non-cattle trading activities

SADI (2010) write that with a lack of investment in slaughter facilities and marketing of NTT beef, bulls are sold in Jakarta alongside Bali bulls from other regions. Anecdotal evidence suggests that NTT Bali bulls have a strong demand although it is very difficult to differentiate NTT beef from other suppliers.

FEES AND LEVIES

Hadi *et al.* (2002) writes that since regional autonomy in 2000, all local governments impose taxes and levies on cattle which pass through their territory. Model results are that changing restribusi payments do not have large impact on the industry or it's actors (presumably because fees do not form a large proportion of overall marketing costs) but the authors do point out that the fees reduce the competitiveness of domestically produced beef relative to imported beef.

Writing about the NTT business operating environment, Suharyo (2007) found that the NTT cattle industry has been the subject of various regulations and excessive charges, starting at the village level. The study found that the regional governments in NTT persist with imposing charges and regulations

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

Nimmo-Bell and ICASEPS (2007) write that close coordination is needed between local governments within the same province to avoid double taxation and retribution impositions on the same cattle. The varying rates of tax and retribution across provinces need to be made uniform.

[In addition, there are revenue and statistical issues associated with about where retribusi is paid – in the production, trading or "export" areas].

Suharyo (2007) document in detail in NTT the numerous costs and regulations associated with cattle trading. The argue that costs are high, and that show the existence of charges (retribusi) to fund local government services in accordance with the regulations, even if the service is not provided. Several charges, like the 'holding ground' (livestock receiving yard) service fee in
TTU and Belu, the health inspection fee, and quarantine fee in Atapupu, are charged
although the local government or government do not provides any services.

INTER-ISLAND TRADE

Hadi *et al.* (2002) writes that inter-regional cattle transport is expensive, especially between islands.

- So to reduce transport costs, traders make use of back loads where possible.
- Ships are not specifically designed for shipping cattle; they are designed for other agricultural products, with cattle regarded as return cargo. Such ships have limited space, so cattle do not have enough food and drinking water. As a result, cattle become stressed, resulting in substantial weight loss. For example, when cattle were shipped from the quarantine examination premises in Mataram (NTB) to Jakarta, there was a weight loss of 11-12% of bodyweight.
- Ships have limited capacity and no regular schedule. This makes the per unit shipping cost (per head or per kilogram liveweight) high and makes it time-consuming to gather large numbers of cattle. Inefficient cattle procurement from eastern Indonesia has been one of the factors discouraging feedlots from using domestic cattle in their business operations.

Deblitz *et al.*, (2011) finds that

- Industry development and investment is necessary to improve: physical and institutional access to markets; cattle handling facilities; inefficient road, port, market and sea infrastructure; efficiency, professionalism, food safety and animal welfare standards of beef slaughter and processing facilities; and simple innovations in wholesale and retail meat marketing and value adding.
- Deblitz also conducted feed trials to test effects on weight loss in shipping. Findings were inconclusive as weight loss is caused not just by feed regimes but also 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. This it appears that a more comprehensive approach needs to be taken to reduce these losses.

- 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. It should be remembered that the transport is carried out for the sole purpose of slaughtering the animals once 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 be 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; and
    - The use electrolytes solutions (Na, K, Ca, Mg) for reducing transport stress should be considered (Schaefer *et al*, 1997).

The Livestock Research and Development Team (2012) recommends:

- Soft loans for cattle shippers to invest in purpose built ships (scale) with multiple decks. Also can use temporary enclosure facility that is made of bamboo on the condition the vessel carrying only cattle.
- Transportation is expensive, involves risks (bourne by owners or in some cases shipping companies) and cattle lose weight.
- Quarantine stations – are good for international quarantine Under IKHS) but there is large variation in hygiene, sanitation and animal welfare standards in inter-island quarantine stations (RPH), which requires increased education of managers, workers, and business diversification, and law enforcement. This needs firm government policy, to reduce underutilized assets.

QUALITY STANDARDS AND CERTIFICATION

There appear to be limited industry standards to report on.

Quality standards. There is no public beef grading system in Indonesia (Kristedi, per comm.). This is largely a function of the generic product and uses that dominates the Indonesian beef industry. Large private abattoirs use their own in-house, private systems for particular markets.

However, even given largely generic markets, there would appear to be scope to develop a set of standards on product, cuts and language, which can vary across regions, islands and plants, and industry sectors, in order to facilitate and normalise trade. This, however, must be weighed up against

the considerable costs in developing such a system and the incentives of industry actors to adopt on a widespread basis.

Compliance with halal requirements is an important factor for consumers and beef producer particularly in predominantly Islamic region. In government managed abattoirs, the government regularly provides training for selected traders to conduct Halal - slaughtering in their facility. Those trained traders then receive a certificate and have "the right" to use the abattoir. Non-typical abattoir (typically owned by private sector) normally has one or more dedicated staff to do Halal slaughtering, trained by the government and receives halal certificates from the government.

Recording of cattle history and cattle tagging system is not common. As a result is very difficult to differentiate the purity of breed, and to trace back the cattle (origin, owner, breed type etc).

IMPACT POTENTIAL

Areas identified in the Sector Potential for Development section above have the potential to generate value and employment throughout the beef value chain. Due to the structure of the industry, these opportunities are largely accessible and predominantly available to small-scale actors (producers, traders, slaughterers, processors, retailers). Another dimension is the distribution of value – especially through prices – to different actors along the chain. Data that may be useful in assessing the economic impacts on actors and distribution of value is provided.

PRODUCERS AND PROCESSORS

PRODUCERS

Data on the numbers of producers that could potentially be impacted include:

- Nearly 4.2 million farmers raise livestock in Indonesia, 1.98 million in EJ, 34,000 in NTT[21] and 165,000 in NTB (DGLAHS, 2011). More disaggregated data is required to quantify the number of cattle producers.
- As reported above, cattle can make up a significant part of agricultural income in some areas and households.
- In many cases, these households are poor. Patrick *et al.* (2004) argue that the agricultural sector in NTB is under mounting pressure to become more productive due to population growth, relatively low education levels and increasing landlessness. Over 35% of farmers collaborating in ACIAR Project SMAR/2006/096 were landless.

Technical innovations leading to income gains appear highly scalable and transferable.

- EJ, NTT and NTB contribute to more than 40% of national herd inventory. The beef sector produces over 120,000 tons of beef, mainly from smallholders, which accounts for more than half (52%) of total Indonesian beef production.
- Recent research has demonstrated more profitable management practices e.g. Integrated Village Management Systems are readily adopted by farmers.

[21] The data for NTT appear under-stated. In 2003 there were approximately 330,000 smallholders (farming households) in the NTT district and around 136,000 smallholders farming cattle (Agriculture Census, Sensus Pertanian (SP) 2003, cited in Nimmo Bella nd ICASEPS, 2007).

- In a review of SMAR2006/096, Martin (2010) estimated that if agency ownership (of cattle) could be achieved in Lombok, a 5% adoption rate (equivalent to 11,000 farmers) could be achieved by 2023. With effective extension, he estimates that this figure could be achieved by 2018. At a 16% adoption rate, 34,000 farmers could be impacted by 2023. Integration of ACIAR research into the policy process (and relatedly the extension system) will mean that these upper level estimates – and perhaps above – could be expected to be achieved.
- However, ongoing adoption requires strong technical and policy support.
- Similarly LPS/2005/005 (Improving smallholder crop-livestock systems in eastern Indonesia (Sulaweisi, Lombok, Sumbawa) say that "The feedback from farmers and the results from monitoring the on-farm trials indicate that the participatory, farming systems approach was successful".

Economic research reported in Rutherford *et al.* (2004) quantifies economic impacts of management changes trialled in ACIAR project AS2/2000/103 (Developing an integrated production system for Bali cattle in the eastern islands of Indonesia)

In sum, economic analysis of the IVMS indicated a 65% increase in farm cash flow if the IVMS was introduced (weaning, seasonal mating, natural mating, strategic supplementation) and weaned calves were retained and grew at moderate levels of 0.2 kg/d, as recorded in village studies under prevailing management practices. However, a 120% increase in farm cash flow was generated if the weaned calves were retained until 12 months of age and grew at 0.36 kg/d. An owner/manager was much more profitable than a manager (who does not own the cow).

In more detail, Rutherford constructed two partial budgeting models (gross margin and cash flow) related to two different production systems (owner/manager and manger) on two different islands (Lombok and Sumbawa) to test the economic impacts of the following technical/management options:

- Current system with sale of calf at 12 months.
- New integrated management system adopted which involves bull supply, weaning at 6 months with 86% weaning rate and modest live weight gain (LWG) based on current village records and sale of calf at 6 months.
- New integrated management system as above but calf retained after weaning until 12 months old with current LWG.
- New integrated management system as above with calf retained until 12 months but LWG increased by 50% with and without a 20% price increase.

The economic impacts on the household are shown in Table 3 below.

Table 3. Summary of major economic, financial, and social impacts for Bali cattle production systems in Kelebuh, Lombok and Boak, Sumbawa

Village	Production System	Gross Margin in steady state ($/breeder/yr)	Cash Flow in steady state ($/breeder/yr)	Labour requirement change from base (hrs/hd/mth)
Kelebuh, Lombok	Current system – owner/manager	-1	185	Base = 0

	Current system – manager*	-89	97	Base = 0
	Basic mgt - owner/m	35	205	-9 x 6 mths
	Basic mgt - manager*	-63	107	-9 x 6 mths
	Extension 1 – hold calf to 12	91	289	0
	Extension 2 – hold + LWG	189	397	0
	Extension 2 + 20% price rise	267	475	0
Boak, Sumbawa	Current system	65	114	Base = 0
	Basic mgt	41	91	- av. 2 x 6 mths
	Extension 1 – hold calf to 12	123	177	0
	Extension 2 – hold + LWG	212	267	0

* Average of year 3 and 4 due to calf and breeder value sharing

The key points are that arise from the budgeting are that:

- "Current" (pre-project) systems can have positive cash flow in both locations, but are lower in Sumbawa ($185 v's $114/breeder/year in the steady state). This is a very significant proportion of av per capita rural income in NTB.
- But the relatively is reversed when looking a gross margins that take into account opportunity costs, especially of labour. As the less developed area (low opp costs of l), gross margins are higher in Sumbawa ($65 / breeder / year) than Lombok ($-1).
- In the case of Lombok, breeder production becomes a viable ($35) activity if basic management interventions are made (bull selection, controlled seasonal natural mating, strategic weaning, sell calf at weaning at 6 months).
- Introduction of new integrated management package is beneficial especially if calf is not sold until 12 months of age. Gross returns increase to $91 if calves are held until 12 m.o.
- Increasing the LWG of calf after weaning (6-12mths) is extremely beneficial. Gross margins are $189 if those calves have a 50% increase in LWG.
- In this system, interventions that increase cattle prices by 20% have a major impact on returns ($267).
- Holding and feeding a calf increases (or saves if wean and sell) labour requirements, mostly for men, by nine hours/month (or 25% during wet season) in Kelebuh and two hours/month (or 25% during dry season) in Boak.
- The incentives apply to owners/managers of cattle, but not to managers (because they do not gain proportionately to productivity increases in every second calf). Measures to convert managers into manager-owners especially through credit are important.
- Economic benefit is high to retain calf with improved LWG to 12 months but barrier of need for cash and sale would be removed through credit access or some such scheme.

- Results are sensitive to price and transaction costs which are sensitive to policy and supply and demand of animals. Policy and market analysis is needed.

Other economic analyses include:

- SMAR-2006-096 final report. The key economic impact is generated by production practices that increase household returns from cattle sales (through breeding, nutrition, conception, calving intervals, mortality, birth and weaning weights, and growth). Analysis in SMAR-2006-096 estimates that (compared to existing NTB figures) project groups could over five years increase the number of animals sold by over 80% and more than double the quantity of beef produced and sold.
- Sullivan and Diwyanto (2007) report that the economics of cow/calf operations are not as favorable to investors as short term feeding of beef cattle. Smallholders of livestock may invest their time in cattle breeding if other alternative employment opportunities for household labor are not available. Smallholder fattening schemes being undertaken by the National Cooperative Business Association (NCBA) in Central Java and West Timor are attractive investment opportunities because of the short time period (less than a year) to fatten and sell feeder cattle.
- Nimmo-Bell and ICASEPS (2007) discuss and budget small-holder fattening operations in NTT, especially those associated with the TLM project).

MARKETING

Cattle marketing supports to livelihoods of a very large (but unknown) number of traders, brokers, transport operators and other service/input providers. Provides a path for mobility for households – to move into cattle trading or to operate speculative fattening/ trading operations. Provide credit, information and trading services for rural communities. Have to be considered as part of any development initiatives. Shorter chains will have employment effects, but can shift value toward producers.

Hadi *et al.* (2002, Table 8.1) simulated the impacts of "Reducing the costs of marketing native cattle" of Table 8.1. Measures to reduce native cattle marketing costs provide a big boost to the incomes of smallholder fatteners and significant flow-on effects to smallholder breeders, but not feedlotters (so a distribution issue). The main points are that:

- Because the current marketing margin is high, the reduction causes a substantial (10%) increase in the farm price of native fattened cattle, some of which is passed back as higher prices to native cattle breeders (price increase of 4.6%), resulting in a big boost to the incomes of smallholder fatteners (income gain of 39.1%) and to native cattle breeders (gain of 7.3%);
- Commercial feedlot operators are disadvantaged because they do not participate in these cost savings, so production in the feedlot sector falls (by 2.3%) and feedlot value added falls (by 5%);
- All the gains are captured by smallholder fatteners and breeders; and
- There is no change in beef retail prices and consumption.

Amongst other findings from Hadi *et al.* (2002) are that:

- Presumably because retribution does not form a large proportion of overall marketing costs, a doubling of the retribution charge on marketing cattle would have only a minor impact on the beef industry. Domestic beef production would fall slightly and beef imports would increase slightly. Live cattle imports would fall, as would beef consumption. That said, it is important to acknowledge that the retribution charge is a tax on internal trade. Trade, both internal and external, provides the means through which wealth is created. A tax on trade is not an efficient way of raising government revenue.
- Adopting a weighing system to replace the old guess-weighing system is estimated to save around 10% of the producer selling price and would reduce 22.7% of trader margins

More generally, the costs of investment in shipping and transport infrastructure would have to be weighed up against the benefits especially on weight loss, mortalities and stress of cattle and transit. It is said that feedlots that buy cattle at the landed weight/price gain from the poor transport procedures. Cattle that lose weight in transport can put it back on quickly as they compensate for the losses (compensatory feeding).

SLAUGHTER

Hadi *et al.* (2002) simulated the effects on the beef industry of a 10% improvement in the efficiency of processing beef. They found that there are gains for consumers (retail prices for beef decrease (by 0.2%) and consumption increases (by 0.3%) and producers (cattle producers gain through higher farm prices for fattened cattle (an increase of 1.2% for native fattened cattle, 0.3% for lot-fed cattle and 0.7% for native feeder cattle); and beef producer incomes increase by 1.9%, with the largest gain (4.2%) accruing to smallholder fatteners.

Upgrading can bring about public welfare benefits (food safety, environmental and animal welfare impacts).

However, delivering these benefits involves imposing minimum standards in areas like registration, registered capital, tax, inspection, hygiene, building and bench materials, storage, water use, effluent management, slaughter facilities and processes. Implementation of these measures can effectively consolidate and centralise slaughter activities in a particular locality. This raises issues of preferential licencing and local monopsony issues in the slaughter sector that can be linked to up- and down-stream sectors [but this less likely in service slaughter structures?].

The vast majority of slaughtering in current systems (in service slaughter plants or backyard operations) is done by in unmechanised facilities, with a high division of labour (for each slaughter activity), and links up with a vast number of downstream actors (hide, offal, beef traders and processors). The sector is therefore highly labour-intensive and generates a lot of employment. Measures to mechanise or centralise slaughtering in particular localities can reduce labour intensity, but his can be minimised – e.g. the provision (for a service fee) of large, centralised, hygienic slaughter areas, where traders continue to run labour-intensive slaughtering.

MARKET DEMAND

A literature review revealed no English-language beef consumption studies based on primary data (surveys). Data in most studies is drawn from the (triannual) Household Food Expenditure and

Consumption Surveys reported in national socio-economic household survey (SUSENAS) conducted by the Bureau of Statistics (BPS). Not presented here, but studies that use the data are overviewed.

Per capita beef consumption in Indonesia is low by world and regional standards (even though Moslem preferences mean that pork is not a substitute for beef). However, beef consumption increased at 4.2% per annum during the period of 2005-2009, from 1.08 to 1.18 kg/capita/year
(Direktorat Jenderal Peternakan dan Kesehatan Hewan, 2009)

Consumption is widely expected to increase (Morelink, 2010, citing the Animal Husbandry Association of Indonesia and the Indonesian Meat Importers Association) due to factors including:

- Population growth of 1.3% per annum; an extra 3 million people,
- Tourist growth target of double the current 7 million people in a few years,
- Economic growth,
- Expatriates populations,
- High demand during religious holidays,
- In response to rising incomes and the influence of western style foods, Indonesian diets have diversified to a wider range of products, including beef and dairy products,
- Consumption of fresh food is increasing due to availability (logistics from supplies) and storage (incl. refrigeration) at home,
- City consumers are becoming more conscious of health and food safety issues,
- There are substantial and growing niche beef markets for beef – for example in mining operations in Kalimantan, and

Many of these demand drivers appear to be relevant and strong. However, the impact on consumption is also determined by price and supply. As discussed above, Indonesia faces constraints to growth of the domestic supply and has restricted imports. Beef prices – already high by regional standards[22] – may be under further upward pressure. Alternatively, stimulating domestic supply and easing import restrictions on imports could be expected to have the opposing price effect. Either way, understanding the way that consumers respond to changes in beef prices and incomes is a crucial.

A review of studies on food demand in developing countries (Abler, 2010) shows that most studies aggregate food groups beyond the individual commodity (e.g. beef) level. Demand elasticities for the meat food group in Indonesia vary considerably over study, method, time are sample area. Most studies draw on consumption and socio-demographic data from the triannual Household Food Expenditure and Consumption Surveys reported in national socio-economic household survey (SUSENAS) conducted by the Bureau of Statistics (BPS).

Several studies do however estimate demand elasticities for beef. While the review below is not exhaustive, the literature on beef demand in Indonesia appears to becoming dated.

[22] While consumer beef prices increased rapidly between 1995 and 2009, Deblitz et al (2011) point out that prices increased in line with the CPI, and were lower than income increases in some periods in the 2000s. This makes beef no less affordable compared to other consumer goods or for the average consumer.

Using 1981 SUSENAS data, Deaton (1990) estimates a very high income elasticity for beef of 2.30, which regarded by Abler (2010) as "consistent with recent trends".

Hutasuhut *et al* (2001) drew on SUSENAS data from 1990, 1993 and 1996 to estimate demand elasticities for meats in Indonesia, in particular in Jakarta and West Java, and two between two meat groups: MG-1 dominant meat beef; and MG-2 dominant meat chicken. They found that:

- Expenditure elasticities of both major meat groups were positive (i.e. if income increased, consumption increased). However expenditure elasticities were lower for beef (0.51 to 0.74) than for chicken meat (1.11 to 1.15). This was attributed by the authors to the poor quality of beef. This is in contrast to Puslitbangnak (1992) who finds that beef is more of a luxury than chicken.
- Results also suggested that the estimated expenditure elasticity is greater for urban households that rural households, and that demand growth for beef would be smaller in the rural areas than in the urban areas. This was at odds with the findings of Olivia and Gibson (2005).
- The estimated own-price elasticities are negative for both meat groups. The demand for beef is own-price inelastic (-0.91 to -0.93) whereas chicken is own-price elastic (-1.08 to -1.09). An inelastic demand for beef suggests that it has fewer close substitutes compared to chicken meat.
- The estimated expenditure and own-price elasticities are comparable to recent previous Indonesian studies that use similar commodity coverage and similar methods (see Appendix 1 of Hutasuhut (2000)).
- The cross-price elasticities estimated in this study suggest that MG-2 is an unambiguous substitute for MG-1 (Table 4). For example, the estimated value for MG-2 in Jakarta in 1996 (0.17) suggests that if the price of the chicken group increases by ten per cent then the quantity demanded of products in the beef group will increase by 1.7 per cent.

Olivia and Gibson (2005) drew attention to biases that arise from household survey data such as SUSENAS that equate unit values with prices.[23] Adjusting for these biases lead to lower elacsticities. A series of other methods were used, which had significant effects on demand elasticities.

In other studies, Hadi *et al.* (2002) estimated an own-price elasticity for retail beef demand in Indonesia of –1.09 (short run) to –1.43 (long run). Another study in Bali suggests a demand elasticity of –0.9 (Ambarawati *et al*. 2003).

Further, MLA consumer research in Indonesia (conducted in late 2007, MLA feedback 2009) suggests that beef is still viewed as a luxury good, and thus consumer are sensitive to price. The MLA consumer

[23] Unlike developed countries where meat demand studies tend to use aggregate data and market prices, Indonesian studies rely on household surveys to derive unit values (expenditures divided by quantities purchased). These unit values are used as proxies for price – which are used to estimate price elasticities. Unit values, however, are not prices, because household surveys typically aggregate different varieties, so even if consumers faced the same prices, as the mix of varieties changes, the unit values change. Unit values will tend to vary less than prices if consumers react to high prices by choosing lower quality, and this is likely to create a systematic overstatement in the absolute value of estimated price elasticities (Deaton, 1988).

research also suggests a lack of awareness of how to cook beef in a way that is perceived superior to meat and fish.

POTENTIAL PITFALLS

There are a number of low to moderate risks that could jeopardise the likelihood of achieving significant income benefits to the poor.

- Several production-side technical innovations are proven and relatively simple, however will require significant institutional resources to support scaling-out and widespread adoption across huge numbers of farmers.
- The risk of reduced support for the domestic industry at national and provincial levels is probably low. However there is a moderate risk that changing trade policy, policy distortions and policy inconsistencies occurring at district, provincial and national levels. These will impact on prices of inputs, cattle and beef, slaughter rates for breeding females and incentives for farmers to invest in cattle production.
- There is a low risk that institutional barriers will hinder farmer access to credit, and ability to form functional beef marketing groups.
- There is a low to moderate risk that little progress will be made on efficient policy measures to promote public private partnerships and an efficient business enabling environment necessary to promote private sector investment and overcome infrastructure, institutional, market and supply chain inefficiencies.
- The risk of major disease outbreaks (e.g. FMD, brucellosis) that could disrupt production and inter-regional trade is currently low but could be enhanced by policy decisions that lead to increasing unofficial and official imports from less bio-secure markets.

CURRENT DONOR ACTIVITIES

Australia, by far, is the largest donor supported the beef sector in Indonesia. In the past some donors provide intermittent support to the sector which includes:

- The World Bank conducted a study and have the FEATI project which includes a livestock component;
- JICA support the development of abattoir; and
- DFID have the DELIVERI project that focus on livestock.

In NTT, the following activities are listed in SADI (2010) Provincial Profile: Nusa Tenggara Timur, SADI publication:

- PUSKUD Kupang – Project Location: Kupang, Kupang, Timor Tengah Selatan, Timor Tengah Utara, and Belu Districts; Program: Cattle fattening (production sharing); Result: production sharing with farmers on 2,262 cows fattened in 2008 giving 70% of the profit to breeders and 30 % of the profit to PUSKUD. Partners further expect the following support programs: calf management, forage management, and forage bank development, veterinary health and water provision facilities (wells, check-dams, and lakes). Partner: NCBA through the USAID-AMARTA Program (see Sullivan 2007).
- Tanaoba Lais Manekat (TLM) – Program: working capital for cow fattening and trading business through breeder associations (with 25 members minimum) giving 60% of the profit

to breeders and 40% to TLM; Location: West Timor; Result: -/+ 4,000 cows/year are managed through TLM; International Partner IFAD – Bali.

- USAID AMARTA (NCBA) – Program: Bali cattle calf and demplot development; Location: A small area in West Timor; Partner: PUSKUD Kupang.
- Directorate General of Rural Community Development– Program Name: National Program for Poverty Reduction – Rural Agribusiness; Location: Timor Tengah Selatan (Mollo Utara and Kuan Fatu Subdistricts); Result: some intensive cattle fattening dem plot locations; Local Partner (s): BPPT NTT, LPM Undana, Politani Kupang, and Dinas Pertanian of TTS District.
- BPTP – Program Name: PUAP.
- CRS (Catholic Relief Service) – Program: Market Value Efficiency Chain (Common Market); Location: throughout continental Timor.
- ACIAR-SADI & BPTP: Research & development on practical technology and management model of integrated maize-cattle programs to support rehabilitation of dry land farming system in NTT (Pilot Roll-Out): Tuapanaf and Oebola, Kupang.

The overall goal of USAID's AMARTA livestock project is to improve the beef value chain in Indonesia. The best course of action to achieve this goal is through better integration and vertical coordination within the beef value chain. The implementing agencies are P3Bali, National Cooperative Business Association (NCBA), Pusat Koprasi Unit Desa (PUSKUD), and BPTP-Bali. Activities to be conducted are (Sullivan and Diwyanto, 2007):

- Establish Prototype Breeding Units for Bali Cattle;
- Training of Lead Farmers in Good Management Practices;
- Production of High Performance Bali Bulls;
- Seal of Quality for Kupang Feeder Cattle;
- Improved Handling and Transporting of Cattle; and
- Improve Feeding of Bali Cattle on Java.

Recommendations by Nimmo-Bell and ICASPES (2007) for the SADI and IFC TA program fall into the following areas:

- smallholder credit conditions;
- smallholder trading conditions and bargaining position;
- animal nutrition, cattle productivity and farm management practices;
- smallholder management of crops; to be grown with beef to improve ability of the whole farm system to generate cash for smallholders; and
- the genetic base of the industry and reduce the decline in regional herd numbers.

The more specific recommendations for the SADI/IFC project are:

- IFC SADI should collaborate with the BEE program to investigate the needs and requirements of existing beef processors and traders. Investigate opportunities to work with existing SME's involved in trading and local processing to test the economics and feasibility of investing in cold chain facilities for added value export to Jakarta. This process may identify opportunities to improve supply chain channels, provide opportunities to link smallholder farmer groups to traders and processors and provide improved insight on industry issues and the social networks that the industry relies upon for successful trading.

- Conduct a detailed study of NTT social structures and how this affects the growing and trading of cattle in the province. Incorporate the new knowledge of social structures into project planning and implementation and develop methods of utilising the favourable aspects of this structure for the benefit of smallholder beef farmers.
- Investigate new models of smallholder cattle finance and investigate opportunities to partner and develop commercial livestock financing operations with new and existing finance providers.
- Collaborate with ACIAR and BPTP to establish a demonstration farm with selected farmer associations or groups to identify key on-farm productivity barriers to improving smallholder returns.
- Collaborate with BEE to verify whether current regulations and taxes are in-fact a barrier to further investment in the industry (i.e., processing and cold chain).
- Evaluate the impact of local taxes (retribution) on internal trade (trade being essential for generating wealth) explore more efficient means of raising government revenue through BEE.
- Conduct a feasibility study, including market analysis and capacity study, for an investment in a Kupang abattoir and cold chain to the Jakarta market for chilled and frozen meat trade.
- Collaborate with KDP Sub-program 1 to improve NTT road infrastructure to overcome wet season supply constraints and provide technology to clustered farmers (e.g., village based weigh stations, AI services).
- Conduct a survey of Jakarta based live cattle buyers to identify key requirements for NTT beef industry to improve bull prices and returns to smallholders.
- Collaborate with ACIAR to evaluate current practices for live shipment of cattle to Surabaya and handling of cattle at central markets to develop improved practices for shippers to reduce live-weight losses and minimise animal welfare issues.
- Engage local DINAS to review current services to smallholders and encourage DINAS extension workers to become involved in demonstration farm trials to develop improved extension services to smallholders and improved local policy development.
- Establish a nucleus breeding operation that can access superior Bali genetics and encourage farmers to become involved in commercial beef breeding enterprises.

REFERENCES

Ambarawati I.G.A.A., Zhao, Xueyan., Griffith, G. and Piggott, R. (2003) *Distribution of gains from cattle development in a multi-stage production system: the case of the Bali beef industry*. Paper presented to the 47th Annual Conference of the Australian Agricultural and Resource Economics Society, Fremantle, Perth, Australia, 11¨C14 February 2003.

Anon. (2012) Rumusan Rapat Konsolidasi Kontrak Kinerja Program swasemab dadaging sapi/kerbau (PSDS/K) 2014 Jakarta, 3 – 4 Pebruari 2012

Abler, D. (2010), Demand Growth in Developing Countries, OECD Food, Agriculture and Fisheries Working Papers, No. 29, OECD Publishing. Available at http://dx.doi.org/10.1787/5km91p2xcsd4-en

Barlow, C., Gondowarsito R., Birowo A.T. and jayasuriya S.K.W. (1990) *Development in eastern Indonesia: The Case study of Nusa Tenggara Timur*. Australian Government Publishing Service, Canberra.

Benu, F (2011) *Agribusiness Constraints and Opportunity in NTT; The Existence of Farmer in the Global Market*. Paper presented in the Forum of Planning and Inception Workshop of AIPD-Rural, ACIAR, Canberra 15th and 16th December 2011.

Brown, C.G., Waldron, S.A., Longworth, J.W. (2008), *Sustainable Development in Western China: managing people, livestock and grasslands in pastoral areas*. Edward Elgar Publishing, Cheltenham.

Connell J., Stür W. and Horne P. (2010) *Forages and farmers: case studies from South-East Asia.* ACIAR, Canberra, and CIAT, Vientiane. ACIAR Monograph No. 142, 120 pp.

Dahlannuddin, Tien, D.V. Liang, J.B. and Adams, D.B. (2003) *An exploration of risk factors for bovine spongiform encephalopathy in ruminant production system in the tropics*. OIE Revue Scientifiqueet Technique no 22 vol 1 pp 271-281.

Datta, Ajoy., Jones, Harry., Febriany, Vita., Harris, Dan., Dewi, Rika Kumala., Wild, Leni. and Young, John (2011) *The political economy of policy-making in Indonesia Opportunities for improving the demand for and use of knowledge*. Overseas Development Institute, December 2011

Deaton, A. (1988) Quality, quantity, and spatial variation of price. *American Economic Review* 78(3): 418-430.

Deaton, A. (1990), “Price Elasticities from Survey Data: Extensions and Indonesian Results.” *Journal of Econometrics*, 44, 281-309.

Deblitz, C., Kristedi, T., Hadi,P.U., Triastono, J., Puspadi, K. and Nasrullah (2011) Benchmarking the beef supply chain in eastern Indonesia. Final Report SMAR/2007/202, The Australian Centre for International Agricultural Research.

DG livestock (2010) Blue Print Program Swasembada Daging Sapi, 2014

Direktorat Jenderal Peternakan dan Kesehatan Hewan (DGLAHS) (various years) *Statistik Peternakan dan Kesehatan Hewan (Livestock and Animal Health Statistics)*, Jakarta

FAOSTAT (2012) http://faostat.fao.org. Accessed June 2012

Fauzi, A.S. and Djajanegara, A. (2004) Kajian Pemasaran Sapi Potong dalam Pengembangan Sistem Integrasi Tanaman-Ternak. Prosiding Sistem Integrasi Tanaman-Ternak. Bali, 20-22 Juli 2004. Puslitbang Peternakan Bekerjesama dengan BPTP Bali dan CASREN. hlm 554-569

Yemris Fointuna (2012) "E. Sumba gets ready to expand its cattle industry", *The Jakarta Post*, July 03 2012. http://www.thejakartapost.com/news/2012/07/03/e-sumba-gets-ready-expand-its-cattle-industry.html

Garnett T. (2009) Livestock-related greenhouse gas emissions: impacts and options for policy makers. *Environmental Science & Policy* 12, 491–503.

Gibbon, P. (2001) Upgrading Primary Production: A Global Commodity Chain Approach. *World Development*, 29, 345-363.

Hadi, P.U., Ilham, N., Thahar, A., Winarso, B., Vincent, D. and Quirke, D. (2002*) Improving Indonesia's Beef Industry*, ACIAR Monograph No. 95, pp.128. The Australian Centre for International Agriculture Research (ACIAR). Canberra.

Hutasuhut, Maradoli., Chang, Hui-Shung., Griffith, Garry., O'Donnell, Chris., Doran, Howard (2001) *The Demand for Beef in Indonesia: Implications for Australian Agribusiness*. University of New England Working Paper Series in Agricultural and Resource Economics, Graduate School of Agricultural and Resource Economics & School of Economics. No. 2001-4 – December 2001

Ilham, N. (2006) *Analisis sosial ekonomi dan strategi pencapaian swasembada daging 2010*. Analisis Kebijakan Pertanian 4(2):131-45.

Indradie, A, Poerwoto, Happy., Hidayat, N.S. (2012) Pasokan Berkurang, Konsumen Berang. *Kontan* p.4. 23-29 April, 2012.

Kementerian Pertanian. (2009) *Rancangan Rencana Strategis (renstra) Kementerian Pertanian Tahun 2010-2014*. 30 December 2009

Kemp D.R. and Michalk D.L. (eds) (2011) *Development of sustainable livestock systems on grasslands in north-western China*. ACIAR Proceedings No. 134. Australian Centre for International Agricultural Research: Canberra. 189 pp.

Kristedi. T. (2011) Indonesia Livestock Consultation – 2011 (unpublished)

Livestock Research and Development Team, PSE-KP, Balitnak dan Bbalitvet (2012). *Performance Culture and Marketing Efforts in Cattle and Buffalo SDSK Achievement – 2014.*

Longworth, J.W., Brown, C.G. and Waldron, S.A. (2001) *Beef in China: Agribusiness Opportunities and Challenges*. University of Qld. Press, St Lucia, 422 pp.

Luke K. (1989) Die Entwicklung der Tierhaltung in Deutschland bis zum Begin der Neuzeit. Forum 19, Saarbrücken–Fort Lauderdale. Cited in Kemp and Michalk (2011)

MacLeod, N.D., McDonald, C.K., Lisson, S.N., Rahman, R. (2007). Modeling for Scenario Analysis for Improved Smallholder Farming Systems in Indonesia. In Oxley, L. and Kulasiri, D. (eds) *MODSIM International Congress on Modelling and Simulation* (2007). Modelling and Simulation Society of Australia and New Zealand, pp. 109 - 114.

Mahendri, I. G. A. P., Priyanti, A., Hanifah, V. W. and Cramb, R. A. (2010) Marketing practices of smallholder beef cattle producers in East Java, The 5th International Seminar on Tropical Animal Production, Community Empowerment and Tropical Animal Industry, October 19-22, 2010, Yogyakarta, Indonesia

Mahendri, I. G. A. P., Priyanti, A. and Cramb, R. A. (2012) Characterising the Marketing Chain for Beef Cattle in East Java, Indonesia. Paper to be presented at the 2012 AAP Animal Science conference, Bangkok, Nove 26-30.

Mardha, A. (2009) 'The Process of Legally Drafting Regulations in the Development of the First Nuclear Power Plant (NPP) in Indonesia'. *International Journal of Nuclear Law* 3(2): 243-249.

Marsudi, B., Indradie, A, Hidayat, NS. (2012) Kurang Persiapansaat Menjadi Andalan. *Kontan* p.6-7. 23-29 April, 2012.

Ministry of Agriculture of The Republic of Indonesia and Central Statistics Agency of The Republic of Indonesia (2012). *Release of 2011 PSPK Final Result*.

Moll, H.A.J. (2005) Costs and benefits of livestock systems and the role of market and non-market relationships. *Agricultural Economics* 32, 181–193.

Morey, P. (2011) *The Indonesian Cattle and Beef Industries*. Morelink (unpublished)

Neidhardt, R., Grell, H., Schrecke, W., and Jakob, H. (1996) Sustainable livestock farming in East Africa. *Animal Research and Development,* 43/44, 44¨C52.

Nimmo-Bell and Company Ltd and Indonesian Center for Agriculture Socio-Economic and Policy Studies (May 2007) *Value chain analysis for SADI agri sectors: The NTT Beef Industry*. IFC SADI Agri Sectors

Patrick, I.W.,; Marshall, G.R., Ambarawati I.G.A.A. and Abdurrahman, M. (2010) *Social capital and cattle marketing chains in Bali and Lombok Indonesia*. The Australian Centre for International Agricultural Research (ACIAR)

Puslitbangnak (1992). Estimasi Parameter Sistem Permintaan Komoditas Ternak dan Hasil Ternak di Jawa, Pusat Penelitian dan Pengembangan Peternakan, Badan Penelitian dan Pengembangan Pertanian, Departemen Pertanian, Jakarta. Cited in Hutasuhut (2000).

Prabowo, Hermas E. (2011) *What's Up With Beef?* Centre for Indonesia Veterinary Analytical Studies. Posted Friday, 09/09/2011, sourced/translated from Kompas. http://www.civas.net/content/what%E2%80%99s-beef

Priyanti, A; Hanifah, V.W., Mahendri1, I.G.A.P. Cahyadi, F and Cramb, R.A. (2012) *Small-Scale Beef Cattle Production in East Java, Indonesia*. Contributed paper prepared for presentation at the 56th AARES annual conference, Fremantle, Western Australia, February 7-10, 2012

Rutherford, A., Tanda Panjaitan, Fordyce, G., Poppi, D (2004) *Economic analysis of production system interventions* in Final Report ACIAR Project AS2/2000/103, Developing an integrated production system for Bali cattle in the eastern islands of Indonesia.

Rutherford, A. and Dahlanuddin (2004) *Market analysis*, in Final report ACIAR Project AS2/2000/103 Developing an integrated production system for Bali cattle in the eastern islands of Indonesia

SADI (2010) *Provincial Profile: Nusa Tenggara Timur*, SADI publication

Sekretariat Negara (2007) *Mentan Canangkan Percepatan Swasembada Daging Sapi 2010*. Sekretariat Negara Republik Indonesia. Jakarta. http://www.indonesia.go.id/id/index.php?option=com_content&task=view&id=5611&Itemid=699

Widjajanti I. Suharyo, Nina Toyamah, Adri Poesoro, Bambang Sulaksono, Syaikhu Usman, Vita Febriany (2007) *Improving the Business Climate in NTT: the Case of Agriculture Trade in West Timor,* SMERU Research Institute, Jakarta

Stanton, E.S (2010) Competitive Industry Report on the Indonesian Cattle and Goats Sectors: Opportunities for Canadian Animal Genetics. Report prepared for Prepared for the Embassy of Canada in Indonesia, and Office of Southeast Asia Regional Agri-Food Trade Commissioner, Agriculture and Agri-Food Canada.

Sullivan, G and Diwyanto, Kusuma. (2007) *A Value Chain Assessment of the Livestock Sector of Indonesia*, US Agency for International Development AMTARA (Agribusiness Market and Support Activity)

The Government of NTB (2009) *Qualified Commodities of West Nusa Tenggara: cattle, corn, seaweed.*

The National Program for Community Empowerment (2010) "10. From Subsistence to Business in TTS in West Timor" in *12 Success Stories of Successful Farmer Groups in Eastern Indonesia* FINDING PATHWAYS TO BETTER INCOME WITH PNPM - AGRIBUSINESS PEDESAAN. (program nasional pemberdayaan masyarakat mandiri) June 2010.

The World Bank (2011) *East Java Growth Diagnostic: Identifying the Constraints to Inclusive Growth in Indonesia's Second Largest Province*, Washington DC.

USDA (2009) Livestock and Poultry: World Markets and Trade – October 2009. Foreign Agricultural Service Office of Global Analysis.USDA.http://www.fas.usda.gov/dlp/circular/2009/livestock_poultry_10-2009.pdf

Van Diermen, P., Sahan, E. and Basri, C. (2011) *Trade, Aid & Development in Indonesia: A discussion paper For AusAID*. Prepared by Economic Development Services Pty. ltd.

Vanzetti, D., Setyoko, N., Trewin, R. and Permani, R. (2010) *Home grown: cattle and beef self-sufficiency in Indonesia.* Working Papers. Crawford School of Economics and Government. Australian National University, Canberra.

Waldron, S.A. (2010). *Modernising Agrifood Chains in China: implications for rural development.* Cambridge Scholars Publishing, Newcastle upon Tyne.

Winter B. (ed.) (2011). *Beef production in crop–livestock systems: simple approaches for complex problems.* ACIAR Monograph No. 145. Australian Centre for International Agricultural Research: Canberra. 160 pp.

World Bank, 2005*. Public Private Partnerships for Agriculture in Eastern Indonesia: A Comparative Study of the Beef Cattle and Cocoa Industries.* East Asia Social and Rural Development unit. World Bank.