

2015 UPDATE
BEEF SUB-SECTOR GROWTH STRATEGY
IN
NUSA TENGGARA TIMUR

August 3, 2015

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Abbreviations

ADG	Average daily gain
AIP-PRISMA	Australia-Indonesia Partnership for Promoting Rural Income through Support for Markets in Agriculture
Anggurmerah	Anggaran untuk Rakyat Menuju Sejahtera (Red Wine: Budget for the People to Prosperity)
CAGR	Compound annual growth rate
ILAF	Intervention Logic Analysis Framework
KKPE	Kredit Ketahanan Pangan Energi (Credit for Food Security and Energy)
KUPS	Kredit Usaha Pembibitan Sapi (Cattle Business Credit)
KUR	Kredit Usaha Rakyat
MoU	Memorandum of understanding
NTB	Nusa Tenggara Barat (West Nusa Tenggara)
NTT	Nusa Tenggara Timur (East Nusa Tenggara)
Pasupet	Pakan Suplemen Pedet (Supplementary Feed Product for Calves)
PPL	Petugas Penyuluh Lapangan (Agriculture Extension Agent)
PSDSK	Program Swasembada Daging Sapidan Kerbau (Self-Sufficiency in Cattle and Buffalo Meat Program)
PUAP	Pengembangan Usaha Agribisnis Perdesaan
PUSKUD	Pusat Koperasi Unit Desa
RPH	Rumah Pemotongan Hewan (Slaughterhouse)
RPJMD	Medium-Term Regional Development Plan
SMD	Sarjana Membangun Desa – Graduates Building the Village
TTS	Timor Tengah Selatan
TTU	Timor Tengah Utara

Summary of key changes from previous GSDs

Year	August 2014 - June 2015
	<p>Over the past year, the team has engaged more market actors in the beef sector, as well conducted numerous field investigations and assessments. This has improved their understanding of the dynamics, constraints, and opportunities in the sector. This has resulted in more updated and accurate details around the core value chain, supporting functions/services, and supporting rules and regulation. In addition, the main changes to the GSD include:</p> <ul style="list-style-type: none"> • Adding East Sumba to the initial target districts: East Sumba is the fifth largest cattle producing district in NTT, and the main cattle production zone on Sumba Island. The team is also developing a partnership with Sumba Stock Feed to pilot a feed intervention in East Sumba. As a result, the GSD has been updated to include details on cattle farming in East Sumba. • Revising the details in the story behind the market potential for NTT: The previous version of the GSD noted that NTT's potential for supplying increased cattle to satisfy national beef demand was being restricted by annual live cattle export quotas set by the provincial government. Upon further investigation, the team found that the export quotas are not in fact binding. In previous years, actual export numbers have exceeded the initial allocation and the government tends to amend the quota during the year. Even if the quota was binding, farmers can now sell to PT Segarau Bahari, the new slaughterhouse which exports beef rather than live cattle. There are currently no quotas on the export of beef from NTT. • Highlighting the importance of sufficient drinking water intake by calves and cattle: The previous version of the GSD understated the importance of water in cattle rearing. This is now discussed in the market dynamics. The ILAF, analysis, and strategy sections have been updated to include an intervention area around promoting sustainable water services for cattle farming. • Invalidating the constraint around farmers being unable to access the regional export market because of difficulties meeting the export weight requirement: Upon further investigation, the team found that the minimum weight requirement is not actually being enforced. The ILAF, analysis, and strategy sections have been adjusted accordingly. • Invalidating the underlying logic behind the access to finance intervention and removing the finance intervention: According to the previous version of the GSD, farmers were selling productive female cows and prime bulls for quick cash needs because they had limited access to finance. Upon further investigation, the team found that contrary to the mainstream belief (which may be motivated by the political nature of the cattle sector and the desire for increased breeder imports by feedlots) female cows are only being sold by smallholder farmers when they are no longer productive. At the same time, they found that farmers sell prime bulls because traders are selecting prime bulls for their larger frame. This is associated with weaknesses in breeding information rather than financial services. The ILAF, analysis, and strategy sections have been adjusted accordingly. • Revising the focus of the breeding intervention: Whereas the previous GSD focused on developing breeding businesses (which tend to be commercially unviable as standalone businesses), the focus now is on developing prime bull rental services and breeding information services. Through better access to prime bulls and information on proper breeding management, farmers will be able to shorten inter-calving intervals and reduce calf mortality. This in turn will lead to an increased supply of calves. • Refining the strategy under the feed intervention area: As a result of a more nuanced understanding of the feed industry and feed practices of smallholder farmers, this has led the team to move away from their prior focus of introducing concentrates in NTT. Instead a more realistic strategy to overcome the lack of feed in the dry season involves (1) developing nutritious feed formulas with locally available raw materials (or through the production of new raw materials) that can be available year round and (2) developing technologies to conserve feed for dry season feeding. <p>The market growth potential in the sector has not changed, and there is still significant opportunity to expand NTT's production and inter-regional exports in order to fulfil national beef demand.</p>

The planned focus for July 2015-2016 is on:

- Piloting of three feed interventions with PUSKUD, YMTM, and Sumba Stock Feed
- Conducting an import quota and regulation assessment; water assessment; breeding assessment (with a focus on bull rental services); and a feed assessment for Flores to identify the sources and availability of raw materials and to develop the best feed formulas based on these materials

Year	July 2015 - June 2016

Year	July 2016 - June 2017

BEING UPDATED

1 Executive summary

Despite being the largest beef producer in Southeast Asia, Indonesia is a net importer of beef. Imports are estimated to constitute 32% of national consumption for 2015, with beef imports accounting for 41-55% of total imports each year. In 2014, beef imports were estimated to account for 13% of local consumption whereas live cattle imports (slaughter and feeder cattle) accounted for 17% of domestic consumption.¹ Import restrictions associated with Indonesia's beef self-sufficiency program have in previous years reduced the overall supply of beef and cattle. This has placed upward pressure on prices, which has helped to increase beef demand from local sources and promote inter-regional trade.

NTT was the Indonesian province with the 5th largest cattle population in 2014. Development of its cattle sector is being driven by domestic inter-regional cattle exports. Cattle play an important role in the provincial economy, as well as for household incomes, and sector growth is strongly supported by the national and provincial governments. NTT is characterised by vast unused grasslands but dry climatic conditions. Farmers rely primarily on grazing and natural breeding, and cattle are mainly used as a source of savings that can be sold for cash to meet household financial needs. Limited investments are made by farmers to improve their stock and ensure better productivity. Overall, cattle systems are unproductive.

There is a clear market opportunity to expand NTT's potential to fulfil national beef demand through increased inter-regional exports. Overall, there is strong potential to substitute beef imports, as well as imports of slaughter cattle to Indonesia. Demand for beef is expected to continue increasing as Indonesian income and middle class population grow. NTT, which has a cattle sector that is already being driven by inter-regional exports, has the opportunity to expand its domestic export potential in order to meet increased demands for beef from Jakarta, South Sulawesi, and Kalimantan.

Analysis of the market reveals a number of problems that currently constrain the ability of cattle farmers to take advantage of this market opportunity. Farmers are unable to increase production of calves because of long inter-calving intervals and high rates of calf mortality. They also experience low productivity because of slow weight gain in cattle. This arises from the lack of access to feed and water particularly in the dry season; information on good rearing practices; and services and information on proper breeding. Farmers also have low awareness of the benefits of quality feed and sufficient water intake.

The vision of change at the sector level is to: increase and maximise smallholder cattle production and productivity. At the service level, it is envisaged that farmers will have improved access to: (1) feed, (2) water, (3) breeding information and prime bull rental services, and (4) information services. To realise this vision, this report recommends three interventions areas:

- Introduce affordable nutritious feed for calves and cattle
- Promote sustainable water services for cattle farming
- Introduce prime bull rental and breeding information services

¹ Japfa Comfeed

We envision that feed services, including information on better feed practices, will be delivered through feed companies or fattening companies. Breeding information and prime bull rental services can also be provided by fattening companies. Finally, water services, along with better water practices, can either be provided by individual private companies (such as fattening companies or companies involved in the water sector) or in collaboration with the Dinas Public Works.

It is recommended that the intervention areas in the NTT beef sector be implemented in three phases. In the first phase, the focus will be on *introducing affordable nutritious feed for calves and cattle*. Better feed will lead to shortened fattening periods, as well as increased demand for calves (feed steers) for fattening. As a result, the second phase will focus on responding to this increased demand for calves by *introducing prime bull rental and breeding information services*. Since the focus is on prime bull rentals and breeding information services, this can likely be achieved without heavy investments and there are already a number of potential partners. The final phase will be on *promoting sustainable water services for cattle farming*, which is a more challenging intervention area as there are few potential partners.

2 Background

The Australia-Indonesia Partnership for Promoting Rural Income through Support for Markets in Agriculture (AIP-PRISMA) is a multi-year program that is a part of the Government of Indonesia's midterm development strategy to accelerate poverty reduction through inclusive economic growth. With the support of the Government of Australia, the program aims to achieve a 30% increase in the net incomes of 300,000 male and female smallholder farmers in eastern Indonesia by June 2017. PRISMA works in East Java, West Nusa Tenggara (NTB), East Nusa Tenggara (NTT), Papua, and West Papua.

This Sector Report aims to provide a logic and rationale for market-based interventions which can support the beef sector to the benefit of smallholder farmers in NTT.

3 Sector description

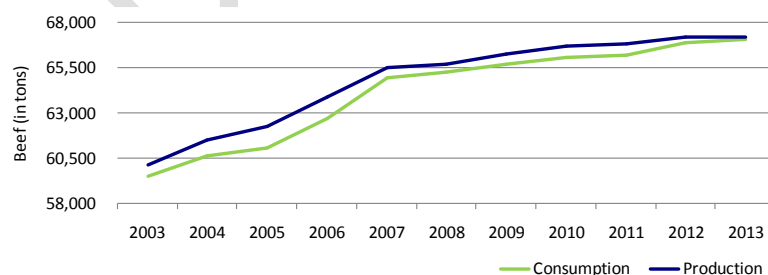
3.1 Sector profile

The sector profile provides information on the current status and potential of the target sector. This has been derived mainly from secondary data and literature relevant to the beef sector.

3.1.1 Overall context

Beef is an important agricultural industry globally, with world production and consumption steadily increasing over time. In 2013, international beef production was 67.21 million tonnes while consumption reached 67.07 million tonnes. World beef consumption has been increasing by 1.2% annually over the past decade. Strong global demand is expected to continue, driven by demand from the Chinese market.

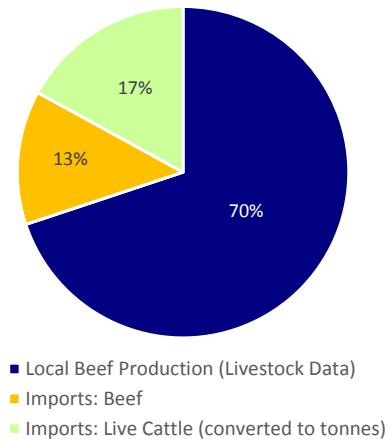
Figure 1: World beef production and consumption



Source: OECD-FAO 2013

Indonesia is a mid-sized beef producer in the global context. While it is ranked 27th in the world, it is the largest producer in Southeast Asia. In 2013, total beef production in Indonesia reached 545,621 tonnes, and the cattle population reached 16.6 million. Three provinces (East Java, Central Java, and South Sulawesi) account for half of the cattle population.

Figure 2: Local production vs imports for 2014 (% of total consumption)



Although beef and cattle production has been growing in Indonesia, consumption outstrips national production, and Indonesia is reliant on imports to sustain its demand for beef. The cattle population and beef production in Indonesia have been growing. While growth rates vary depending on the data source,² demand for beef is expected to continue increasing as Indonesian income and middle class population grow. Imports are estimated to constitute 32% of national consumption for 2015. Virtually all cattle imported into Indonesia are from Australia, and legal beef imports come mainly from Australia and New Zealand. Beef imports constitute between 41-55% of total imports, and in 2014, they were estimated to

account for 13% of local consumption.³ The recently signed China-Australia Free Trade Agreement is phasing out tariffs on Australian beef and cattle imports into China and is expected to stimulate exports of up to one million cattle per year to China. This could potentially impact the supply of Australian beef and cattle to other key export destinations, including Indonesia.

Import restrictions associated with Indonesia's beef self-sufficiency program have in previous years reduced the overall supply of beef and cattle, thus putting upward pressure on prices. Import restrictions were introduced concurrently with very large government programs to stimulate domestic cattle breeding (e.g. through cattle rescue and re-distribution) between 2010 and 2012. These have led to high prices of beef on the local market, which are high when compared to both international and regional standards. While government data has indicated even tighter import quotas for 2013 and 2014, other sources (Japfa Comfeed) have recorded an increase in imports for both years.⁴ Data discrepancies may be political and associated with the election cycle, especially since the previous government had a target for beef self-sufficiency by 2014. The PRISMA team will be conducting an import quota study to clarify the trend and regulations around imports.

Import restrictions have increased beef demand from local sources, and inter-regional and inter-island trade is a significant market in volumes and as a proportion of local slaughter. Although increasingly protectionist trade policies have benefited producers across Indonesia, it has also depleted local inventory. There is also some concern that if policy measures are wound back, a price correction will occur that may reduce incentives for smallholder production and encourage some traders, butchers, and feedlots to switch back to sourcing imported cattle. Nevertheless, this is likely to have a modest effect over the medium

² There are large data discrepancies between government statistical data sets, which makes it difficult to estimate a growth rate for beef production. For example, according to BPS data, local beef production was 485,335 tonnes in 2011 but data from the livestock department is claiming that local beef production was only 292,450 tonnes. Depending on the data set and time period, calculations for compound annual growth rates for local beef production range between 6-16%.

³ Japfa Comfeed

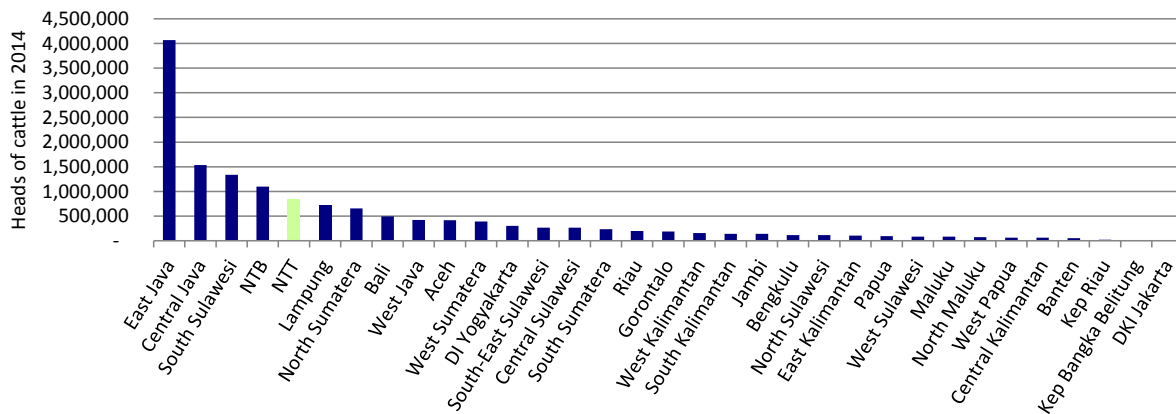
⁴ In 2013, government data indicated 75 tonnes of total beef imports whereas Japfa Comfeed reported 142 tonnes. In 2014, government data indicated 58 tonnes of total beef imports whereas Japfa Comfeed estimated 230 tonnes.

to long-term, and the fundamentals of a constrained supply and growing demand for beef in Indonesia will remain.⁵

3.1.2 Local context

NTT is a major cattle producing province with the 5th largest cattle population in Indonesia in 2014.⁶ It is characterised by vast unused grasslands but dry climatic conditions. With 839,598 head of cattle in 2014, NTT accounts for 6% of the national cattle population. The cattle population in NTT grew at a compound annual growth rate (CAGR) of 8% between 2009 and 2014.⁷ While this is higher than the national average of 3%, it is low when compared to at least 2 of the 5 top provincial producers where growth rates reached 13%. Policymakers in NTT cite large areas of unused grasslands that can potentially support a 38% increase in cattle population.

Figure 3: Cattle population by province in 2014



Livestock, including cattle, plays an important role in the provincial economy, as well as for household incomes. Livestock accounts for 16% of agricultural GDP in NTT and 2.8% of total provincial GDP. At the household level, there is evidence that in particular districts of NTT (TTS, TTU, Belu) cattle sales can make up over 80% of the family’s cash income. This is important given the high poverty rates in the province. NTT ranks as the 3rd province with the largest number of poor men and women, and a majority of cattle farmers, both male and female, are below the poverty line. There are an estimated 207,539 cattle producing households in NTT, accounting for 27% of all farming households in the province.⁸

Domestic inter-regional cattle export is the driving factor for the development of NTT’s cattle sector. The main regional export market is Jakarta, but demand from Sulawesi and Kalimantan is growing. NTT is a net exporter of live cattle, with exports of approximately 66,000 head of cattle in 2013.⁹ However, statistics from the quarantine division under the Department of Agriculture indicate that regional exports were likely to be closer to 76,250 head of cattle in 2013.

⁵ ACIAR Final Report on Eastern Indonesia Agribusiness Development Opportunities, Nov 2013.

⁶ BPS Indonesia

⁷ Calculations based on BPS Indonesia statistics

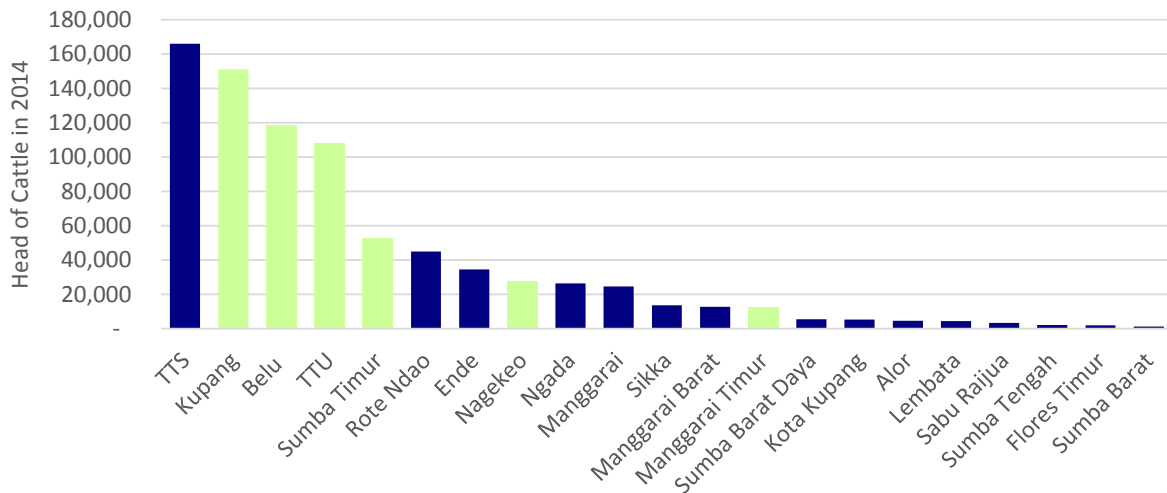
⁸ Rinkasan Hasil ST2013 Jumlah Rumah Tangga Usaha Pertanian Menurut Subsektor/Komoditas Strategis Provinsi NTT

⁹ ACIAR Final Report on Eastern Indonesia Agribusiness Development Opportunities- Beef Value Chains

Unlike some other provinces, until recently, NTT only exported live cattle and not beef. It is the 7th largest live cattle exporter among the provinces, accounting for 5% of total regional exports. When looking at exports of both beef and live cattle combined, NTT still accounts for approximately 5% of the total. To provide some perspective, East Java accounts for 25% of live cattle exports and approximately 21% of beef and live cattle exports. However, live cattle exports from major producers like East Java and NTB have remained flat while exports from NTT have grown at approximately 5% annually between 2004 and 2012.

At the district level, the 6 districts in which AIP-PRISMA is proposing to start its beef sector interventions account for 50% of cattle farmers in NTT (approximate 104,000 farmers). These districts are Kupang, Belu, TTU, Nagekeo, Manggarai Timur, and Sumba Timur (3 districts in Timor, 2 districts in Flores, and 1 district in Sumba). It will be important to start in the proposed districts because of the availability of entry points, along with high growth and outreach potential.

Figure 4: Cattle population in 2014 for initial target districts



All the proposed districts have port facilities that are currently exporting cattle. They all also have vast tracts of pastoral land that could potentially be used to expand cattle production. Kupang, which has the biggest port in NTT, is the main commercial centre for the cattle sector in Timor. It has the biggest cattle market in the province and the second highest cattle population. Most major fattening companies also have offices in Kupang. Belu and TTU have smaller port facilities and are key districts in terms of potential outreach. While TTS may have more farmers, it does not have its own port and is only linked to export markets through Kupang. As a result, TTS is not being targeted as an initial intervention district.

On Flores, Nagekeo has access to the biggest port, and cattle are exported mainly to South Sulawesi. Nagekeo and Manggarai Timur have the largest pastoral lands on the island, and thus are considered to have greater growth potential than other areas. They are also known for having more fertile land and a flatter terrain. On Sumba, Sumba Timur has access to the biggest port on the island, and cattle are exported mainly to Jakarta and Banten. Sumba Timur also has the largest pastoral lands on the island, and there are 3 state owned ranches (owned by Provincial Government and District Government) in the district. These signal the high growth potential for cattle farming in Sumba Timur.

3.2 Sector dynamics

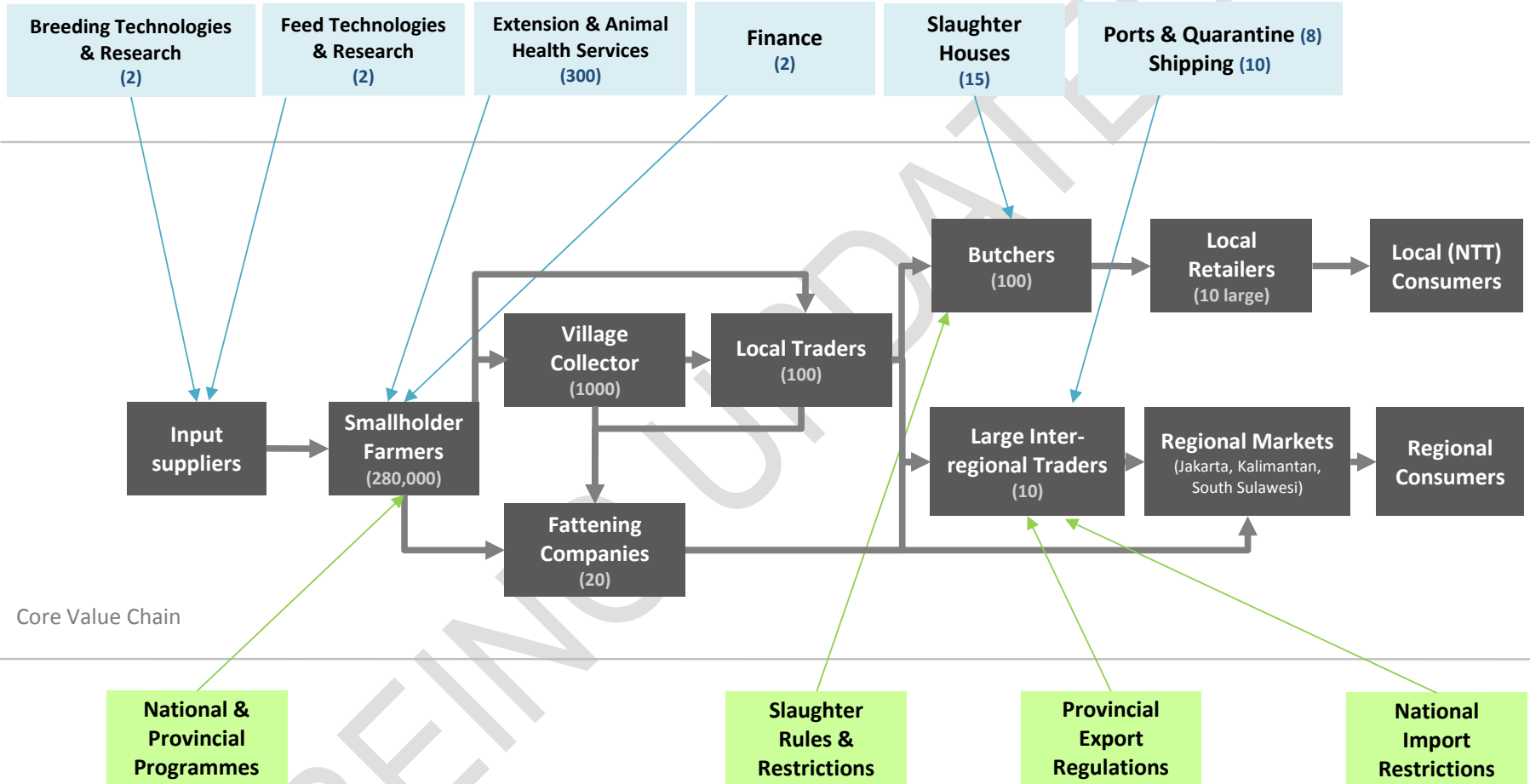
3.2.1 Market overview

Cattle farming in NTT involves production for two main markets: (1) the slaughter of cattle (mainly unproductive females) for local beef consumption and (2) regional export of live cattle to Jakarta, South Sulawesi, and Kalimantan for slaughter. Farmers rely primarily on grazing and natural breeding, and cattle is mainly used as a source of savings that can be quickly sold for cash to meet household financial needs. Limited investments are made by farmers to ensure better productivity of their livestock. Overall, cattle systems are unproductive when measured through key indicators. Inter-regional trading is controlled by an oligopoly which determines the price of cattle.

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3.2.2 Sector map

Supporting Services



Business Enabling Environment

3.2.3 Core value chain

Inputs

Feed is considered to be the most important input into cattle production, affecting reproduction, mortality, and growth rates of cattle. Good cow nutrition is essential for high reproduction rates in cattle. Cows need to be fed a sufficient quantity and quality of feed to maintain body condition, especially in the few months before and after calving when the energy demands of pregnancy and lactation are highest. Poor cow condition at calving results in increased calving intervals and reduced calving percentages. At the same time, inadequate nutrition in growing calves can delay the development of puberty in heifers. It can also reduce growth rates of fattening cattle, thus resulting in longer fattening periods. Good animal husbandry practices are also important for the average daily weight gain (ADG) of cattle.

Cattle farmers in NTT rely primarily on native grasses to feed cattle, with feeding practices varying depending on the district. In Kupang and TTU, where cattle are usually tethered or in pens, farmers will use cut-and-carry feeding systems or will allow the cattle to graze in a confined area while still being tied up. In TTS and Belu, most of the cattle are left to graze freely on pasture lands. This is also the main feeding practice in East Sumba where there are large tracts of pasture lands. Farmers will either use their own land or communal lands for cattle grazing. Finally, in Flores, cattle are typically tethered for grazing and are not allowed to graze freely. Women are responsible for collecting feed, feeding the cattle, or taking the cattle to and from the grazing fields.

Native grasses provide inadequate nutrition for cattle and are also limited in quantity due to NTT's dry climate and long dry season. The use of native grasses is particularly problematic given the length of the dry season in NTT, which can last between 7 to 8 months. East Sumba, where savannah grasslands predominate, is one of the driest regions in Indonesia. Grass is available for no more than six months, and the rest of the year there is no easily accessible native grass. While there is some grass in highlands that are covered by trees, cattle must travel over 8-10km to access these areas. This places considerable stress on the cattle and contributes to cattle mortality. The scarcity of feed during the dry season also means that women will also have to walk long distances to find suitable grazing land or collect feed. In addition to the seasonal availability of feed, invasive weed species have been reducing the size of grasslands by 20,000 ha/year. Available lands for planting cattle feed is also decreasing as a result of expanding agricultural activities.

At the same time, few farmers are using more nutritious grass and tree forages, many of which can be grown year-round. Quality tree forage that can withstand dry conditions include Lamtoro Terambah (*Leucaena*) and Turi. Lamtoro is actually widely available in Flores but farmers have only been using the stalk of the plant for firewood. As a result of an ACIAR project in 2008, there are also some farmers in several sub-districts in Kupang who are already planting and using Lamtoro to feed their cattle. Finally, while the majority of farmers have limited knowledge of feed requirements and sources, farmers associated with cooperatives or social enterprises (such as PUSKUD in Kupang, Setara in Amarasi, YMTM in TTU, and KSU Cinta Setia in Bajawa) are receiving better information on feed sources and practices. There are examples of farmer groups

in TTU which have planted quality forages such as Lamtoro Terambah (*Leucaena*), Gamal, King Grass, and Turi. Whereas native grass alone results in an ADG of <0.2 kg, a combination of native grass, *Leucaena*, and cassava can increase the ADG to 0.40-0.60 kg.¹⁰

Until recently, there have been no feed traders in NTT, and processed feed and supplements are still not commercially available or affordable for farmers. Crop residues and agro-industrial by-products (such as rice husks, palm oil and copra residues, and tofu waste) are often more nutritious than on-farm feed sources. Unlike in East Java, there are no plantations or commercial food processing companies in NTT that generate large amounts of crop residues or agro-industrial by-products that can be used for cattle feeding. Bumi Tirta, a vertically integrated cattle operation in NTT, previously produced a supplementary feed product called Pasupet for newborn calves (aged 0-6 months). This was only available for its own cattle farming operations. An ACIAR project in West Timor found that post-natal calf losses could be greatly reduced (to under 5%) by giving calves supplementary feed. This is particularly important given NTT's high post-natal calf loss rates of over 30%.

PT Soegio Sukses Sejahtera, a new feed producer based in Bogor, had a number of distributors in NTT who were promoting its concentrate feed product. Concentrate feeds are mixtures of grains, cereals, and minerals which are used to supplement the diet of cattle. They are used in high quality feed strategies mainly in commercial feedlots. The high price of the product (IDR 6,000/kg) makes this purchase prohibitive for smallholder farmers. Furthermore, PT Soegio Sukses Sejahtera is currently prioritising other provinces (West Java, Kalimantan, and Lampung) and big commercial farmers and feedlots. Sumba Stock Feed (SSF) in East Sumba has plans to start producing a premium commercial feed product using Tagasaste, a tree crop with high protein content and high demand as a stock feed crop in Australia. Sumba's topography and climate makes it ideal for Tagasaste cultivation. SSF has received a permit from the Minister of Agriculture to import Tagasaste seeds from Australia and will start producing Tagasaste on 5,000 ha in Tabundung. SSF plans to expand production to 50,000 ha over the next decade.

Drinking water is also important to prevent stunting, mortality, and low growth. Unfortunately, the extended dry season results in water shortages for most of the year. All cattle require water for normal biological functioning, such as kidney functioning. Cows require water for milk production, and calves dehydrate at up to 7% of bodyweight per day, which can mean a daily requirement of 10 litres per day. Lack of water stunts liveweight gain, reduces growth potential, and increases mortality. Both underground and surface water is limited during NTT's long dry season, which is particularly long in NTT, and the burden of sourcing and carrying water usually falls upon women. During the rainy season, women are usually able to find water within 1-2km. In the dry season, women may have to walk 5-10km to source water. If cattle are tethered or kept in pens, women will also have to carry back the water from these distances. Since the carrying of water can be extremely labour intensive, it is common for farmers to bring back less than the daily requirement for cattle (for example, 20 litres instead of at least 60 litres per day). Women may also bring the cattle to the water sources. In East Sumba, water is

¹⁰ ACIAR (2009). Strategies to increase growth of weaned Bali calves; BPTP Trials

sometimes available in small ravines, but there are often difficulties getting to these locations with the cattle.

The provincial government has tried to address the lack of water for livestock and crops through a 5-year program from 2009 to 2013. This program constructed mini dams, reservoirs, irrigation systems, dug wells, and pumps. Lack of proper management and maintenance of the equipment has meant that many of these water pumps are no longer functional. In East Sumba, the government has also installed water pumps, which are powered with solar or gasoline and are being managed by farmer groups or the local government. Some of these are being used for cattle farming, but the coverage of these services is low. Overall, water continues to be insufficient for cattle farming, agriculture, and household needs.

In terms of breeding inputs, farmers rely on natural breeding using group bulls, and to a lesser degree own bulls. However, poor prime bull selection and management affects the supply of calves. Approximately 1/3 of cattle productivity improvements are derived from better genetics, mostly from the use of superior bulls. In NTT, farmers often keep prime bulls tied up for fattening while inferior bulls are left to roam the pastures and mate freely with female cows. The use of inferior bulls, coupled with high incidences of in-breeding, has led to low quality offspring that are characterised by low weight growth and high mortality rates. The current breeding cycle also leads to low quality offspring because the natural cycle of the Bali cattle (the most common breed in Timor and Flores) is to conceive at the end of the dry season and calve in the middle of the dry season when feed supplies are low.

Breeding methods and technologies to expedite the breed improvement process (such as cross-breeding and Artificial Insemination) are not commonly practiced in NTT. Unlike East Java where artificial insemination (AI) coverage is 90%, only 10,000 cattle are AI-ed annually in NTT, mostly around Kupang. The provincial government has a yearly budget to procure semen and straws for AI from the national breeding centre in East Java. The AI fee per attempt is approximately IDR 50,000-75,000 per cattle regardless of whether the attempt results in a successful insemination. Alternatively, farmers can pay a higher fee of IDR 300,000 for a guaranteed conception. The large distances and time involved (which leads to reduced semen survival) place constraints on how widely AI can penetrate NTT.

PUSKUD, a social enterprise working on cattle and agricultural commodities, has previously bought semen from the government to distribute to its contract farmers. They found that AI was not profitable and are no longer using it. Previously, Bumi Tirta, which has the only private breeding operations in NTT, also had staff who would do AI for its own cattle operations. Bumi Tirta also did research and trials on cross-breeding, which can increase genetic potential of cattle (for example by mating the smaller Bali type female with a Sumba/Rote Ongole bull to achieve larger framed, healthier calves with higher growth potential). The company now only does natural breeding, using strong systems to select and manage superior bulls and female breeders.

As a result of distances, AI infrastructure, and agro-climatic conditions, natural mating is considered more appropriate for NTT. However, there is a shortage of prime bulls as a result of the current trading practices and poor breeding management. Since provincial

government regulations only allow for the export of male cattle, there is a high demand for bulls. This is reflected in the price differential of IDR 0.5-1 million between bulls and female cows of the same weight. Prime bulls are often selected by traders because they tend to have a larger frame. The government receives a small amount of breeding stock from NTB, which produces and exports breeders to 10 provinces in Indonesia. Breeders are purchased through the regional budget and distributed to cattle groups. In 2012, 3,000 breeders were imported from NTB.

Aside from Bumi Tirta, there are no other breeding centres in NTT. A few fattening companies and traders have, however, expressed interest in vertically integrating into breeding in order to expand their fattening operations. The low commercial viability of a stand-alone breeding business is related to the long growth period of calves before they can be sold as feeder cows to feedlots and fattening companies or households. Moreover, provincial restrictions on the export of female breeders would mean that any breeding operation could only serve the NTT market, which could make it difficult to achieve the economies of scale required to break even. However, there are some fattening companies which see vertical integration as a means to increase the supply of calves for their fattening operations, which are aimed at the regional export market. There is also a state owned company of the DKI Jakarta government, PT Dharma Jaya, which has recently received a budget allocation of IDR 20 billion in the 2015 fiscal year for cattle breeding and fattening in NTT. PT Dharma Jaya will be collaborating with the provincial government of NTT and is exploring partnerships with firms (including Bina Prima Taruna and PUSKUD) and livestock cooperatives.

Production

NTT cattle systems are unproductive from breeding until fattening, and low productivity is evidenced by low calving, growth, and turnoff rates. As previously discussed, mortality rates among newborn calves can reach over 30%. Calving intervals are long and can potentially be halved through better cow condition and mating management. Productivity of farmers involved in fattening is also low (ADG of <0.2kg). This leads to long fattening periods of 18-24 months for Bali cattle. In contrast, fattening companies in other provinces (such as NTB) have achieved fattening periods of 4-6 months for Bali cattle.

Smallholder farmers typically regard cattle as an important means for saving money and are not necessarily focused on profit maximisation and expanding cattle operations. This means that there is often no pressure to increase the weight gain of cattle, shorten fattening periods, and increase overall turnover. While it can take a lot longer, farmers can eventually achieve the slaughter weight for cattle through traditional husbandry practices. This, of course, is as long as they can keep the cattle alive under conditions of insufficient feed and water intake.

Cattle farming in NTT is mainly extensive although there is some semi-intensive production systems in Timor. Households tend to own the cattle, but this can also vary depending on the region. As discussed above, extensive production systems, where cattle are allowed to graze freely, are prevalent in East Sumba and parts of Timor (primarily TTS and Belu). Cattle are tethered on Flores Island and in Kupang and TTU districts in Timor. Finally, there are a limited number of pens mainly in Kupang and TTU. Women tend to be highly engaged in animal

rearing. They generally spend more time than men with cattle and hence are more knowledgeable about cattle condition and health.

For the most part, farmers in Timor and Flores own the cattle that they rear. The exception is if farmers are participating in a contract fattening scheme in which case the fattening company retains ownership over the cattle. On Sumba, most farmers manage cattle owned by large farmers or traders. The owners tend to be Chinese, Arabic, or from the elite caste in Sumba (maramba). Small farmers are usually given several cows and a bull and are expected to breed more cattle. In return, the owner will allow them to keep approximately 30% of the herd.

Whereas the Bali breed accounts for most of the cattle in Timor and Flores, the Ongole breed is prevalent in Sumba. Bali cattle have low growth rates and are smaller than other breeds. This has implications on how quickly they can gain weight. They are, however, more adapted to harsh climates and low input systems and are able to maintain high fertility and conception rates despite unfavourable conditions. This is particularly relevant for NTT since it is characterised by low input-low output cattle production and long dry seasons. Ongole cattle, on the other hand, tend to have longer inter-calving intervals and are larger framed cattle than the Bali type. They are able to achieve higher ADG but also need more feed.

Most households are involved in 'mixed' breeding-fattening systems, where households produce their own breeding stock and raise and fatten offspring until they reach slaughter weight. In Indonesia, newborn calves (0-6 months old) are called pedets, and young bulls and heifers (7-24 months old) are called bakalan. Bakalan are raised to be breeders or feeder yearling for fattening. As previously noted, the fattening process can take between 18-24 months. Only few households specialise in cow-calf production, where they raise calves and sell them off at a young age to feedlots, fattening companies, or fattening households. Feedlots, fattening companies, and specialised fattening households currently account for only 5 to 6% of the total cattle population in NTT.

While there isn't a significant feedlot sector in NTT, there are a number of fattening companies that are experimenting with contract fattening models in NTT. Private companies have tended to focus on the cattle fattening business (rather than breeding) as it has higher and quicker returns. Bumi Tirta is the only private feedlot in NTT. It has its own plantation where it uses labourers to fatten Bali cattle, after which it exports these cattle to its sister company in Jakarta (Great Glorious Farm) where they are further fattened. Since the business has not been doing well, they have been looking for an investor over the past year. They are currently negotiating to rent out their feedlot and breeding facilities to the owner of SMTJ. There are also a number of private companies (mainly large trading companies like UD Timor Permai in Belu, STMJ in Kupang, CV Triyo Bakti in TTU, Al Jufri and Mawar in Sumba Timur) and farming cooperatives or social enterprises (PUSKUD, YMTM, TLM, Kop Setara, etc.) with cattle fattening operations.

In Timor, these companies and social enterprises employ various contract fattening models in which the organisations typically purchase feeder cattle and distribute them to the contract farmers. Farmers are expected to provide land and cover their own production costs (feed, labour,

pens, and veterinary products), and there may be profit share arrangements between the farmers and companies. Social enterprises are more likely to share risks with the farmers and hence have incentives to provide embedded services such as training, veterinary support, and market information. There are also other arrangements where cattle raisers bear the risk of cattle mortality and no additional assistance is provided to these farmers. Currently the largest contract farmer is SMTJ with 9,000 members. PUSKUD has 7,150 contract farmers through 139 farmer groups and 45 livestock cooperatives.

Cattle Marketing

The majority of independent farmers sell their cattle through village collectors and rarely sell directly to livestock markets. The decision to sell cattle is made jointly by both men and women and is usually based on household financial needs. Negotiations and trading are done exclusively by men. Village collectors will sell slaughter cattle to other sub-district or district traders and butchers (including through live cattle markets). In the case of feeder cows, they can either sell them to local traders or directly to feedlots and fattening companies. Most of cattle sales are not through livestock markets, and there are over 50 private companies which are associated with inter-island traders, who have a network of small and large district traders which buy directly from farmers. There is an estimated 1,110 cattle traders involved from village traders to inter-regional traders.

There is limited competition between inter-regional traders and inter-island traders, and inter-regional trading is dominated by four influential families who control cattle prices in NTT. The Hartono Family (which is based in Jakarta) controls inter-regional cattle trading from Timor Island. They source mainly from four large inter-regional traders in Timor. In Flores, inter-regional trading is dominated by two big businessmen from Makasar, Haji Alimuddin and Haji Liong, who receive most of their cattle through 5 large inter-regional traders. In Sumba, this is controlled by Al Djufri. Since the current unit price of live cattle in Timor is 45% less than in Jakarta, these trading families will likely be earning significant margins from cattle trading, even after taking into account shipping costs and losses on the journey from NTT to Jakarta. Weight loss during the journey is around 10%.

Jakarta is the main market for cattle exports from NTT, followed by South Sulawesi and Kalimantan. Timor Island has higher export volumes than Flores, with a majority of its cattle targeting the Jakarta market. Of the 66,000 slaughter cattle exported from NTT in 2010, Kupang accounted for 40% and TTU for 12% (although this is likely to be significantly understated). Exports to Kalimantan and Lampung have been growing over recent years and are considered new growth markets for Timor. Sumba Island also exports mainly to Java. Flores, on the other hand, exports primarily to South Sulawesi.

Processing and Beef Marketing

NTT has the most underdeveloped slaughter sector compared to East Java and NTB. Prior to 2014, all of the beef produced in NTT was being consumed locally. Men are responsible for killing animals, supervising slaughter to halal specification (Modin), and working on the slaughter line moving heavy carcasses. There are approximately 15 certified slaughterhouses

across 21 districts in NTT. PT Segarau Bahari, which started operations in Kupang in June 2014, is the only modern slaughterhouse in NTT. The slaughterhouse is built to international standards. It has the capacity to slaughter up to 50 cattle daily but currently only slaughters between 10-20 cattle. All of the beef produced is frozen and exported to PT Dharma Jaya in Jakarta. PT Segarau Bahari is the only company in NTT that exports beef rather than live cattle.

Official statistics record 56 certified and uncertified slaughterhouses in total but most of these are inactive. For example, none of the 4 recorded facilities in TTU are active. Certified slaughterhouses (RPHs) are mostly owned and operated by local government and are service kill slaughterhouses where butchers retain ownership of the product. Uncertified slaughterhouses account for 17% of slaughtered cattle and this can be as high as 41% in areas like Sumba. Illegal slaughtering involves obvious problems with hygiene and disease and ensuring halal status of the beef. It also affects the viability of certified slaughterhouses.

The export of live cattle is higher than the number of cattle slaughtered for local consumption, and almost all of cattle slaughtered locally are unproductive female cows. In 2012, 63,449 head of cattle were exported from NTT compared to 52,100 head of cattle slaughtered for local consumption. The peak demand periods for the slaughtering of cows are during key holidays (Idul Fitri, Christmas, New Years, etc.). Beef and by-products are sold to stallholders in wet markets, street vendors, meat shops, and supermarkets. Women play a significant role at the retail end of the market. End consumers purchase beef from these retail channels, and the vast majority of beef is consumed in a highly cooked or transformed form.

3.2.4 Supporting functions / services

Research into feed conservation technologies is being conducted by several universities and BPPT, a government agency for the assessment and application of technology. The planting of tree forage that can withstand dry conditions is not the only means by which to bridge the nutrient gap for cattle during the dry season. Feed conservation technologies can include drying (to make hay) and fermentation (to make silage). The benefits of these feed options are that they can be stored for long periods and can be used during months when other sources of feed are scarce. BPPT (Badan Pengkajian dan Pengembangan Teknologi Pertanian) based in Kupang has been doing research and experiments on feed for cattle. In addition to producing Lamtoro seeds and training farmers on growing Lamtoro for cattle, BPPT has also been doing research on hay and silage technologies. It currently makes fermented feed for research purposes, as well as for the government ranches in NTB.

The University of Mataram has also developed a fermented feed technology which costs approximately IDR 1,500 kg and relies on locally available raw materials. Approximately 10-12kg of the product is required to meet the daily feed requirements of a cattle. The Centre for Tropical Animal Studies (CENTRAS) at Bogor University in collaboration with CV Anugrah Farm has developed a number of products for beef cattle and dairy cows. For example, Hi-fer+ a fermented feed product can achieve an ADG of 1.48kg when used to replace fresh forage grass. YMTM, which has already visited CV Anugrah Farm, has expressed some interest in developing a silage product for farmers in NTB. But there are some key challenges around the storage and

distribution of silage, as well as getting farmers to collect forage during the months when the supply of raw materials is sufficient. These months tend to coincide with when farmers are busy planting maize or other crops. The production of hay may be a more feasible long-life feed option since it does not require additional investments in storage containers.

The government also provides some technical and animal health extension services, including animal health centres (Pukeswan) at sub-district levels. The provincial and district level governments provide extension agents who monitor animal health, provide trainings and information to farmers, and supply veterinarian services, vitamins, supplements, and medicine. There are an estimated 291 extension officers, which means that there is approximately 1 extension agent per 669 cattle farmers. Agents are expected to conduct all duties related to livestock, feed, forages, statistics, administration, and certification. This places major constraints on their expertise and ability to do commodity-specific work. Furthermore, many of the extension agents are not sufficiently trained in animal health, which is important given the prevalence of diseases such as brucellosis, surra, anthrax, SE (ngorok/ snoring), and bacterial infections (scabs, red spots). Disease can inhibit cattle growth, increase mortality, and lead to restrictions on inter-island and inter-regional cattle trade flows.

Only a few private companies, social enterprises, and NGOs have extension staff but these services are only accessible to targeted cattle farmers. Fattening companies such as PUSKUD, UD Timor Permai, STMJ, and CV Triyo Bakti provide vitamins, medicines, and information to contract farmers. They also have technical extension agents who train contract farmers on good feeding practices and monitor the health and growth of cattle.

Financial services are limited for cattle farmers, and farmers mainly get credit through moneylenders, NGOs, cattle traders, fattening companies, and government programs. The process for obtaining loans from moneylenders is relatively simple and does not require collateral. However, interest rates are high, and moneylenders will take the farmer's cattle if the farmer cannot pay back the loan. Cattle traders or fattening companies have contract farming schemes with farmers where the price of cattle and inputs are deducted from the final sale price of the cattle. For example, credit under PUSKUD's contract farming scheme is provided through a collaboration with Lampung based PT Djuang Jaya, one of the biggest feedlots in Indonesia. PT Djuang Jaya has a CSR program where it provides credit to cattle farmers via PUSKUD.

While the government provides subsidised loans that can potentially be accessed by cattle farmers, only large farmers or traders have been able to access these products in NTT. Kredit Usaha Pembibitan Sapi (KUPS) and Kredit Ketahanan Pangan Energi (KKPE) loans are distributed through national and provincial banks (Bank BRI, Bank Mandiri, Bank BNI, and Bank NTT). KUPS is targeted at the breeding sector, and breeders must form groups in order to access this product. Low disbursement and uptake of this loan product is related to the underlying financial viability of breeding operations.

On the other hand, KKPE is targeted at smallholder fattening operations where faster turnovers could make these businesses more commercially viable. Other loan facilities for agriculture are Kredit Usaha Rakyat (KUR) and Pengembangan Usaha Agribisnis Perdesaan (PUAP) – Village

Agribusiness Development Program. However, requirements for collateral and proper business plans make it difficult for farmers to access these loans. Village grants are also available under the provincial government's Anggurmerah Program to support the beef and cattle sectors.

At present, there is limited lending from formal banking institutions as banks are not yet convinced by the commercial viability of cattle farming. Bank NTT, a state-owned bank, has signed a MoU with the governor to provide credit for livestock farmers, and it has 2 loan products for livestock farming: (1) a credit scheme for micro-businesses with a loan ceiling of IDR 50 million without collateral and (2) a credit scheme for small and medium-scale businesses with a loan ceiling of IDR 500 million with a collateral requirement. They are currently providing credit for pig farmers in collaboration with CV Veny, a private pig farming business. However, they have reservations about lending to cattle farmers.

Shipping infrastructure is rudimentary but generally well-constructed, large, and stocked well below capacity. Loading/unloading facilities, quarantine facilities, and holding yards are usually provided by the local or national government while private sector companies own and operate the ships and trucks needed to transport cargo. There are 8 ports in NTT which are used for shipping live cattle (3 in Timor, 4 in Flores, and 1 in Sumba). CV Putri Wahda, the biggest trader in Flores, owns and operates its own ships and has close relationships with slaughterhouses at the end market in South Sulawesi. However, most traders use the services of shipping companies where cattle make up only a small cargo component for these companies. As a result, cattle are typically shipped on general cargo ships and not on purpose-built cattle ships.

Despite losses in cattle weight at quarantine, holding facilities, and sea, importers and exporters do not see shipping infrastructure as a major constraint. Cattle weight loss (which is approximately 10%) can be associated with long waiting periods in holding yards. This occurs due to the time for traders to aggregate a line for export, delays and uncertainty caused by weather or ship schedules, and bureaucratic processes. In Kupang, there is no loading and unloading ramp, which increases the risk of injury for cattle.

3.2.5 Supporting rules and regulations (enabling environment)

The beef industry is heavily impacted by an array of national sector policies, regulations, and programs, as well as bilateral partnerships to promote the industry. In order to achieve goals of national beef self-sufficiency, the previous government had rolled out a third beef self-sufficiency program (PSDSK) and had targets to increase the annual average growth rate of Indonesia's beef cattle herd by 12.4% and increase beef production by 10.4%. A budget of IDR 10.65 trillion was allocated for the 5-year program which ended in 2014. The Indonesia-Australia Partnership on Food Security in the Red Meat and Cattle Sector, which was approved by the Australian government in 2014, provides AUD 60 million over 10 years to develop the Indonesian cattle sector and improve prospects for long term investment and trade in red meat and cattle in Indonesia. This includes supporting investments in three priority areas – breeding, processing, and logistics.

The new president, Joko Widodo, is also prioritising the development of the agriculture sector in Indonesia, including the beef sector under the Swasembada Pangan program. His vision for the Indonesian beef sector includes the establishment of village-level breeding cooperatives in every cattle producing village and the provision of technologies and information to improve cattle feed and rearing management. This includes an AI program for 2 million cattle, with a target of 1 million new calves in the first year.

In line with national objectives, the government of NTT also has ambitious cattle expansion plans, and it prioritises livestock development in its Anggurmerah program. Since 2010, the provincial government has declared NTT a 'livestock province' with a 'one citizen, one cattle' program. The intent is to return NTT to being one of Indonesia's main suppliers of livestock, with a goal of 4 million cattle within the next 5-10 years. Through the Provinsi Ternak (Cattle Province) program, the government intends to increase the cattle population by improving local breeding. This year the NTT government has allocated IDR 3.3 billion to procure vaccines and medicines for all types of livestock, as well as minerals and concentrate feed specifically for cattle. The NTT provincial government has also signed a Memorandum of Understanding with the DKI Jakarta government to supply cattle or beef to fulfil demand in Jakarta. DKI Jakarta requires approximately 1,500 head of cattle per day. The recent partnership between PT Segarau Bahari in Kupang and PT Dharma Jaya in Jakarta is a step in this direction. NTT provincial government also has plans to expand cattle development on the 3 main islands (Timor, Flores, and Sumba) through the development of government ranches.

Other programs that have supported the sector in the past include SMD (Sarjana Membangun Desa – Graduates Building the Village), which was established in 2008 by the Director General of Livestock and Animal Health. Under this program, which formally ended in 2013, university graduates were assigned to villages or farmer groups to assist with technical, management, and financial aspects of livestock business development. SMD is now an independent social enterprise which engages in contract farming with an approximate network of 4,000 cattle farmers.

To maintain the cattle population, the provincial government has issued regulations and decrees that restrict the amount of inter-regional exports of large livestock from NTT. However, these quotas are not binding and are often increased during the year. Provincial Regulation No. 10/2003 on Certification of Breeding Stock and Permits for Export of Large Livestock is supported by an annual governor decree which sets the yearly quota for cattle exports to other provinces. The quota does not take into account potential demand from Jakarta and other provinces. It is based, instead, on a percentage of projected births of male cattle in NTT. Although the exact formula for calculating the quota is not provided in the decree or provincial regulation, the export quotas from 2009-2013 equated to approximately 9% of the total cattle population. The export quota for 2014 was 55,000 head of cattle, which was lower than the quotas for 2012 and 2013 (74,000 and 69,000 cattle respectively). In previous years, actual export numbers have exceeded the initial allocation and the government tends to amend the quota during the year. As a result, the quota is not particularly restrictive for the growth of the cattle industry in NTT. Alongside quotas on cattle export, the governor decree also specifies that only

male cattle weighing over 275kg (Bali type) or 300kg (Sumba Ongole type) are allowed to be exported, but this minimum weight requirement is not being enforced.

Related to the export of cattle are the export permits which are issued by the district government based on a letter of recommendation by Dinas Livestock. There is high competition among traders to receive export permits, and these permits reinforce the oligopolistic nature of the regional cattle trade industry.

Other relevant rules and regulations include local regulations in Sumba to protect the Ongole breed, regulations banning the slaughter of productive females, and the national beef standards (SNI 3932:2008). In Sumba, farmers are only allowed to breed Ongole cattle, which is considered to be a symbol of the Sumbanese culture and identity. In terms of the slaughter of productive females, this is banned under a series of national, provincial, and sometimes district and city regulations. Finally, the national beef standards specify language and measurements used to define quality of cattle (age, breed, sex), beef (cuts, muscle and fat colour, marbling), processes (freezing), certification and labelling (Halal), and microbiological standards. These standards are not widely recognised, accepted, or used. They are used as a reference only and do not form the basis of trade.

4 Analysis

4.1 Problems and underlying causes

The problems and underlying causes are specific to the poor target groups that AIP-PRISMA seeks to support through interventions in the beef market system in NTT. These problems have been identified through the Sector Dynamics section above and are also presented in the Intervention Logic Analysis Framework (ILAF) table. The two key problems can be summarised as:

- Farmers are unable to increase production of calves because of long inter-calving intervals and high rates of calf mortality
- Farmers experience low productivity because of slow weight gain in cattle

Farmers are unable to increase production of calves because of long inter-calving intervals and high rates of calf mortality. Farmers lack access to nutritious feed, water, and good rearing practices that are necessary to reduce mortality among calves. Farmers also have low awareness of the benefits of quality feed and water. This is particularly important given the high calf mortality rates of over 30% in NTT. Trials in TTU have shown that calf mortality rates can be brought down to under 5% through supplementary feed. However, in NTT, feed tends to be scarce in the dry season, and even when it is available, it does not have the proper nutrients. Sufficient intake of drinking water is also a critical input for reducing mortality rates.

At the same time, farmers also lack access to services and information on proper breeding (including on the management and selection of prime bulls and female breeders). In-breeding is

prevalent in NTT, and less superior bulls are often allowed to mate with female cows. This leads to low quality offspring, with a higher risk of calf mortality. It also affects the genetics of future breeding stock, with lower quality breeding stock linked to longer inter-calving intervals.

Farmers experience low productivity because of slow weight gain in cattle. Good nutrition and sufficient water intake is also important for improving growth rates of cattle. This leads to shorter growth periods, which can reduce the amount of time that capital is tied up in cattle and improve economic returns for farmers. Unfortunately, most feeder cattle are being fattened with low quality feed and are not getting the required daily intake of water. Feed is also insufficient during the dry season. Smallholder farmers are only achieving an ADG of <0.2kg during cattle fattening, which leads to prolonged fattening periods of up to 24 months. Better feed for fattening purposes and increased water intake can result in higher ADGs of 0.4-0.5kg, reducing fattening periods to 6 months. Despite these benefits, farmers have low awareness of the benefits of quality feed and sufficient water intake. They also lack access to nutritious feed, water, and good practices to accelerate weight gain.

4.2 **Services, enabling environment and weaknesses analysis**

There are a number of services and enabling environment factors which affect the underlying causes of the problems highlighted above. In order to strengthen the market system, it is crucial that identified weaknesses in these services and enabling environment factors are the target of interventions. The key services weaknesses are detailed in the ILAF table and include:

- No feed providers because of difficulties sourcing raw materials for feed production in NTT
- Limited outreach of public water services and no private water services for cattle farming because of unclear business viability
- No prime bull rental services because of easy availability of group bulls
- Government is the main source of information but its outreach is limited

No feed providers because of difficulties sourcing raw materials for feed production in NTT

Access to feed and good feed practices is important for fattening, as well as for reducing mortality and improving the growth of calves. The long dry season in NTT limits the quantity and quality of feed and affects the availability of raw materials for the production of processed feed or supplements. There are limited to no feed producers and traders in NTT, and feed products (such as silage, fermented feed, concentrates, or more nutritious tree forages) are not available to smallholder farmers in NTT. In short, farmers have few alternative feed options outside of native grasses. This is exacerbated by limited knowledge of feed requirements and sources by cattle farmers.

Limited outreach of public water services and no private water services for cattle farming because of unclear commercial viability

Access to water is also necessary for reducing calf mortality and improving the growth of calves and cattle. Traditionally, water services are seen as being the responsibility of the government. But despite government programs to build mini dams, reservoirs, wells, and irrigation systems, water continues to be insufficient for cattle farming, agriculture, and household needs. Lack of proper management and maintenance has meant that much of the water infrastructure is no longer functional. Government involvement in the provision of such services creates disincentives for private sector companies to invest in these areas. Furthermore, private actors are often deterred by the high investment required for water infrastructure and by the challenges of identifying groundwater sources when digging wells or drilling bore wells. Although the government has a map of underground water sources, the information is not necessarily accurate or updated. This contributes to the unclear commercial viability around new investments in water infrastructure.

No prime bull rental services because of easy availability of group bulls

Access to breeding services, such as prime bull rental services, can lead to genetic improvements in calves and future breeding stock. These services can reduce the risk of in-breeding and ensure that calves are not bred from inferior bulls. These services have not yet developed in NTT since farmers are accustomed to getting free access to group bulls and are unaware of the consequences of using group bulls (in terms of in-breeding, reduced genetic quality, lower calf production, higher risk of calf mortality, etc.)

Government is the main source of information but its outreach is limited

Government is the main source of information about animal husbandry, including information on better breeding management, good feeding and water intake practices, and how to monitor the health and growth of cattle. Government extension is not able to effectively satisfy the need for technical information, especially since it has relatively few extension agents and most of them are not sufficiently trained in animal health and rearing. At the same time, while a few private companies, social enterprises, and NGOs have extension staff for cattle farming, these information services are only accessible to farmers participating in contract farming schemes with these organisations.

5 Strategy for change

The strategy is designed to strengthen the weaknesses in the current service provision and enabling environment in the market system. This takes the form of (1) identifying the market potential, through calculations to show the potential of the sector; (2) a vision of change, to envisage how the value chain or market system would operate if identified problems are resolved; and (3) a set of interventions which can be targeted at specific market actors or groups of market actors which can be engaged to drive change in the system.

5.1 Market potential

There is a clear market opportunity to expand NTT's potential to fulfil national beef demand through increased inter-regional exports. Demand for beef is expected to continue increasing as Indonesian income and middle class population grow. Despite the growth in national production, Indonesia is still reliant on imports to sustain its demand for beef. There is significant potential for import substitution as 17% of total consumption comes from beef imports (an estimated 100,000 tonnes in 2014). While it is unclear what the breakdown is between imported feeder cattle for feedlots and imported slaughter cattle (which jointly contribute to 13% of total consumption), there is also potential for substituting imported slaughter cattle. NTT, which has a cattle sector that is already being driven by inter-regional exports, has the opportunity to expand its domestic export potential.

Based on our calculations, there is potential to unlock at least an additional AUD 14.6M in the beef sector in NTT.

Table 1: Business potential in target area

Description/Years	Total Business in the target area (s)
Existing Production (Head)	64,557
Potential New Production in Existing Areas (Head)	20,852
Total Potential Production (Head)	85,409
Average Selling Price Cattle per kg (IDR)	28,000
Current Value of Production (IDR in millions)	432,207
Current Value of Production (AUD)	39,291,550
Total value of potential production (IDR in millions)	592,764
Total value of potential production (AUD)	53,887,638
Total potential value of increased production (million IDR)	160,557
Total potential value of increased production (AUD)	14,596,088

5.2 Vision of change

Focusing on achieving the potential outlined above for the beef sector in NTT, a vision of change can be outlined for both the sector and service levels. The vision of change at the **sector level** is to: increase and maximise smallholder cattle production and productivity. At the **service level**, it is envisaged that farmers will have improved access to: (1) feed, (2) water, (3) breeding information and prime bull rental services, and (4) information services.

We envision that feed services, including information on better feed practices, will be delivered through feed companies or fattening companies. Breeding information and prime bull rental services can also be provided by fattening companies. Finally, water services, along with better water practices, can either be provided by individual private companies (such as fattening companies or companies involved in the water sector) or in collaboration with the Dinas Public Works.

5.3 Intervention areas

It is crucial that interventions are designed which are ‘systemic’ so that outcomes are not dependent upon the project or development partner for sustainability. This means that AIP-PRISMA should not seek to provide services (or at least only temporarily) but rather enter the market system in a catalytic manner to tackle the service weaknesses in existing market actors. Based on our analysis, three key interventions areas will be necessary to transform the beef sector in NTT. The following table shows the key intervention areas along with approved, on-going, or completed interventions and intervention concepts:

Intervention Areas	Approved, on-going, or completed interventions and intervention concepts
<p>Intervention Area 1: Introduce affordable nutritious feed for calves and cattle</p>	<ul style="list-style-type: none"> • Introduce nutritious year-round feed options with locally available raw materials (YMTM in TTU) • Introduce nutritious year-round feed options with locally available raw materials (PUSKUD in Kupang) • Introduce production of new raw materials for nutritious year-round feed options and conservation feed technologies (Sumba Stock Feed in East Sumba)
<p>Intervention Area 2: Promote sustainable water services for cattle farming</p>	-
<p>Intervention Area 3: Introduce prime bull rental and breeding information services</p>	-

Intervention Area 1: Introduce affordable nutritious feed for calves and cattle

The ultimate goal is to ensure the availability of feed, especially in the dry season, for both calves and cattle. Proper feed is of prime importance for securing better economic returns from cattle farming. It can reduce mortality in calves while shortening the fattening period for cattle. This intervention area will involve (1) developing nutritious feed formulas with locally available raw materials (or through the production of new raw materials) that can be available year round or (2) developing technologies to conserve feed for dry season feeding. This may include support to identify and produce better feed combinations and to increase awareness among farmers of the benefits of more nutritious feed formulas. It will be important to ensure that exposure to the benefits of new feed options are accessible to women and tailored to their needs. Measures to reduce the amount of time required to source and collect feed can be important for reducing the labour burden of women.

AIP-PRISMA will be starting with three feed-related interventions. With PUSKUD in Kupang and YMTM in TTU, the idea is to supplement Lamtoro with other locally available raw materials that are available during the dry season (such as cassava) in order to accelerate the weight gain of cattle. There is potential to scale-up this model to Flores, where Lamtoro is widely available. With

SSF in East Sumba, the intervention will involve introducing smallholder farmers to Tagasaste production and methods for producing silage from Tagasaste. Farmers can utilise parts of the tree for silage and can also sell the top leaves to SSF. SSF uses the leaves to produce its premium feed product for feedlots and is interested in procuring as much fodder as can be produced. As a result, this model can be scaled up to other parts of Sumba and to Flores, which is another location where Tagasaste can be grown.

Intervention Area 2: Promote sustainable water services for cattle farming

The goal is to improve access to water for cattle farming and ensure sufficient water intake by cattle and calves. This will influence the growth of calves and cattle and also reduce cattle mortality. As with the feed intervention area, it will be important to ensure that water services and information on better water practices are accessible to women. Measures to reduce the amount of time required to source and collect water can be important for reducing the labour burden of women.

There is potential to collaborate with the public works department in order to gain access to existing water infrastructure that has been damaged through the lack of proper management or maintenance. In particular, PUSKUD is interested in rehabilitating a broken water pump facility that is close to its area of operations. An assessment would be required to determine the groundwater level, the feasibility and cost of repairing the facility, and the economic viability of developing paid water services from this facility. PT Djuang Jaya, which already provides credit to PUSKUD cattle farmers, is willing to provide more credit to farmers if they use the resulting water services. There are also opportunities for developing pipelines and water storage facilities for villages that have access to spring water. PT Aqua, one of the largest producers of bottled water in Indonesia, already has a CSR program which develops water pipelines in NTT to supply water for human consumption, and there may be opportunities to extend this to cattle farming.

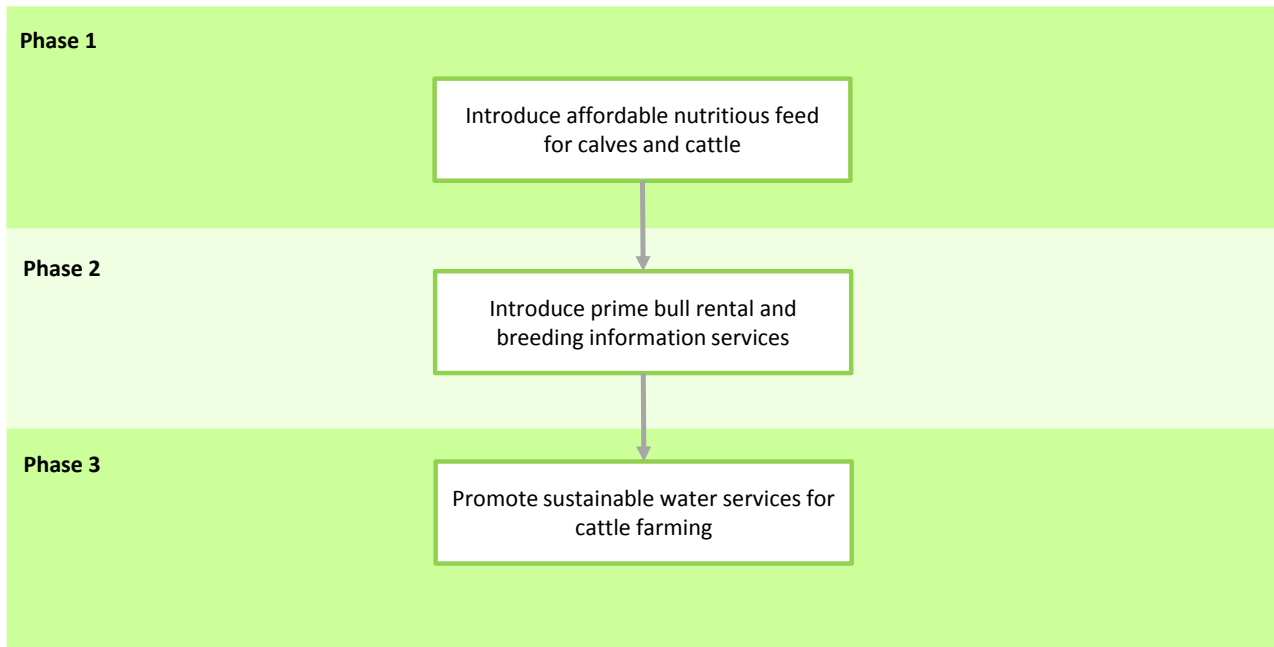
Intervention Area 3: Introduce prime bull rental and breeding information services

The goal is to improve calf production through access to better breeding inputs and information on proper breeding practices (including management and selection of prime bulls and female breeders). This will increase the calf population via two channels: (1) increasing the number of births of better quality calves and (2) reducing post-natal mortality. Given the involvement of women in animal husbandry and management, they are an important target for any intervention involving improved breeding practices and services. Potential partners include social enterprises or cooperatives such as Koperasi Setara and PUSKUD. Since PT Dharma Jaya has received funds for cattle breeding in NTT, there may also be potential to promote a prime bull rental service through PT Dharma Jaya.

5.4 Sequencing and prioritisation of intervention areas

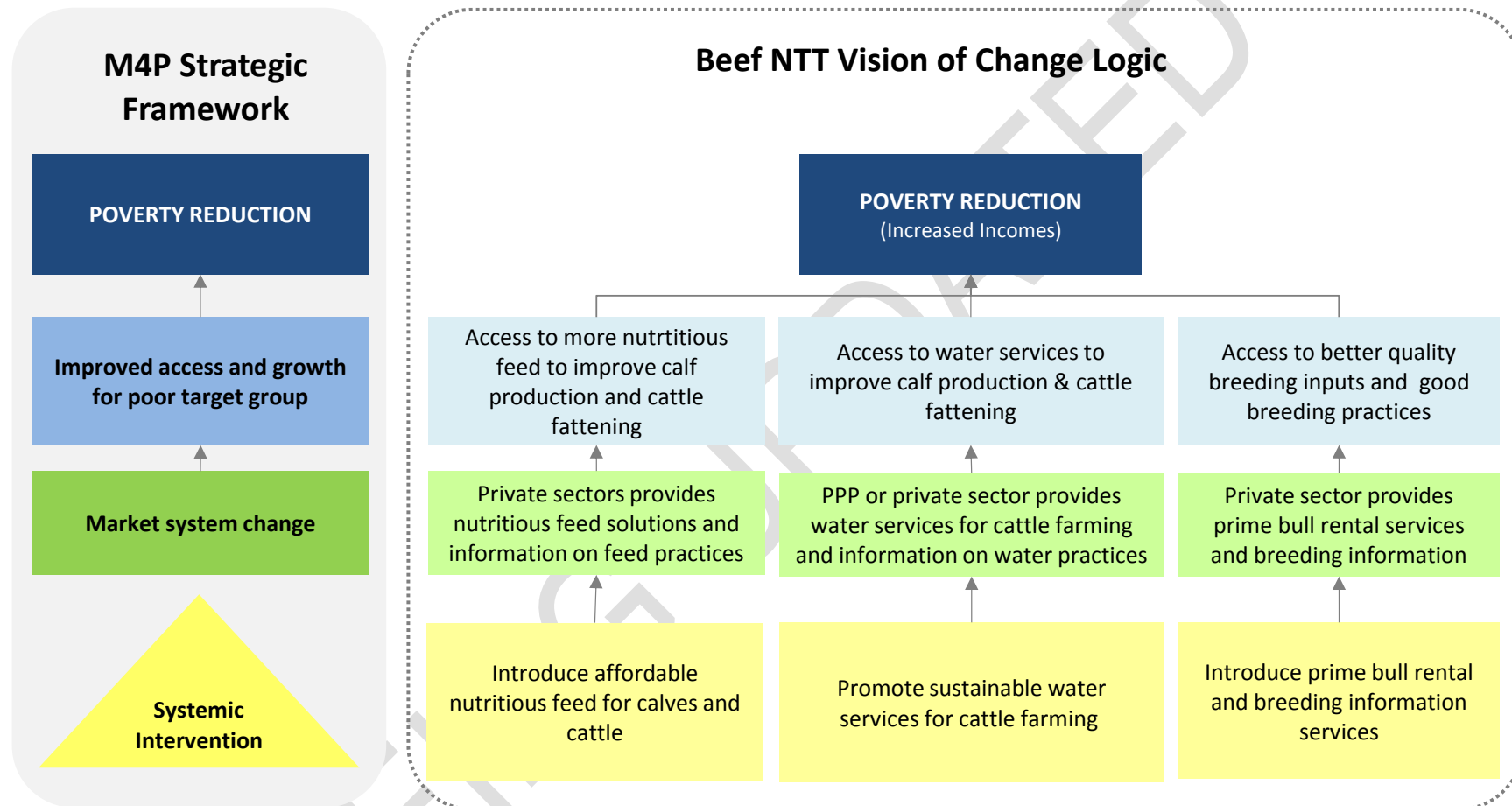
It is recommended that the intervention areas in the NTT beef sector be implemented in three phases. In the first phase, the focus will be on *introducing affordable nutritious feed for calves and cattle*. Better feed will lead to shortened fattening periods, as well as increased

demand for calves (feed steers) for fattening. As a result, the second phase will focus on responding to this increased demand for calves by *introducing prime bull rental and breeding information services*. Since the focus is on prime bull rentals and breeding information services, this can likely be achieved without heavy investments and there are already a number of potential partners. The final phase will be on *promoting sustainable water services for cattle farming*, which is a more challenging intervention area as there are few potential partners.



BEING C

5.5 Sector vision of change logic



Annex 1: Intervention Logic Analysis Framework (ILAF)

(1) Problem/ Symptom	(2) Underlying cause	(3) (4) Services and Enabling Environment	(5) Service weaknesses/ underlying causes	(6) Intervention Areas	Service Provider/Partner
Farmers are unable to increase production of calves because of long inter-calving intervals and high rates of calf mortality	Farmers lack access to feed, water, and good rearing practices to reduce mortality among calves Farmers have low awareness of the benefits of quality feed and water Farmers lack access to services and information on proper breeding (including on the management and selection of prime bulls and female breeders)	Feed services Water services Information services Breeding information & prime bull rental services	No feed providers because of difficulties sourcing raw materials for feed production Limited outreach of public water services and no private water services for cattle farming because of unclear commercial viability Government is the main source of information but its outreach is limited No prime bull rental services because of easy availability of group bulls	Intervention Area 1: Introduce affordable nutritious feed for calves and cattle	<ul style="list-style-type: none"> • PUSKUD • YMTM • UD Timor Permai • CV Triyo Bakti • STMJ • Sumba Stock Feed • PT Dharma Jaya
				Intervention Area 2: Promote sustainable water services for cattle farming	<ul style="list-style-type: none"> • Public Works Dinas (Provincial/District) • PUSKUD • PT. Aqua, PT Djuang Jaya (CSR)
				Intervention Area 3: Introduce prime bull rental and breeding information services	<ul style="list-style-type: none"> • Koperasi Setara • PUSKUD • PT Dharma Jaya
Farmers experience low productivity because of slow weight gain in cattle	Farmers lack access to nutritious feed, water, and good practices to accelerate weight gain Farmers have low awareness of the benefits of quality feed and water	Feed services Water services Information services	No feed providers because of difficulties sourcing raw materials for feed production Limited outreach of public water services and no private water services for cattle farming because of unclear commercial viability Government is the main source of information but its outreach is limited	Intervention Area 1: Introduce affordable nutritious feed for calves and cattle	See above
				Intervention Area 2: Promote sustainable water services for cattle farming	See above

Annex 2: Gender Table

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