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RED MEAT & CATTLE
PARTNERSHIP


Australian Government


BKPM
BADAN KOORDINASI PENANAMAN MODAL

CATTLE BUSINESS DEVELOPMENT BRAHMAN CROSS

KOPERASI PRODUKSI TERNAK MAJU SEJAHTERA

IACCB
Indonesia-Australia Commercial Cattle Breeding Program

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CHAPTER 1. INTRODUCTION/ BACKGROUND

Koperasi Produksi Ternak Maju Sejahtera (KPT-MS) is a smallholder farmer cooperative aiming to own and collectively breed cattle in cut-and-carry breedlots. A contract for collaboration with Indonesia Australia Commercial Cattle Breeding (IACCB) Program was signed in April 2017 to manage a 100-heifer¹ Brahman Cross (BX) herd and 6 bulls².

The initial 3-year pre-commercial Pilot phase was especially interested in assessing:

- (1) The ability of small-holder groups to collectively raise and commercially breed a significant number of BX cattle,
- (2) The potential of BX cattle to achieve excellent reproduction rates over several years³, and
- (3) Whether production costs in a cut-and-carry system are below the cost of imported Australian feeders.

1 Three of the heifers were delivered with calves and the remaining heifers delivered were pregnant

2 Six bulls were provided i.e. five in April 2017 and one in 2018

3 To counter the belief in Indonesia that Australian BX cows have very low fertility after the first calf

Between April 2017 and March 2020, herd productivity and financial data were routinely gathered and analysed and were the basis for recommendations for on-going improvements. The consolidated data were used to provide financial projections of the breeding business and to determine the potential commercial sustainability of the business. The financial projections form the basis of this document, which assesses the potential of KPT-MS to viably scale up its operations.

KPT-MS has succeeded in showing the Government of Indonesia (GoI), as well as other industry stakeholders, that well-established small-holder groups experienced in cattle breeding have the potential to be part of the supply-chain in the red meat business. KPT-MS possessed enough financial flexibility to meet the cash flow requirements of establishing a 100-cow BX herd. The experience also showed that the size of the communal herd that can be maintained depends on the cohesiveness of the group, effective leadership, and transparent management of the enterprise.



Success in BX-cattle breeding has not gone unnoticed and GoI, financial institutions and the feedlot industry are increasingly collaborating with the cooperative. Recently the BX-breeding unit in KPT-MS signed an agreement with the feedlot Juang Jaya Abdi Alam (JJAA) to add 20 pregnant heifers to their cattle herd in a partnership that is mutually beneficial⁴.

Through the BX-cattle breeding KPT-MS has seen the opportunity to create additional local employment with several people involved in the supply of green fodder (elephant grass) to the cattle breeding units. Local women are developing small industries based on beef meat, including producing '*abon sapi*' or meat floss and meatball for the local market.

Although Lampung province has a big number of BX cattle (primarily in commercial feedlots), one *Kecamatan* within the KPT-MS group has been nominated by government as a breeding area for pure PO-cattle. This regulation limits the potential of KPT-MS to expand the BX cattle breeding to members within the restricted area.

This document provides several alternative business model projections to inform KPT-MS members of options for scaling up. The projections were calculated using the IACCB developed CALFIN tool to calculate project cashflow and economic indicators.

⁴ Feedlots are bound by Permentan 41/2019 to import a 5% breeder/feeder composition. When partnering with smallholders (i.e. feedlots providing breeders to farmers) this means that farmers get access to BX-cattle without spending their limited financial resources.



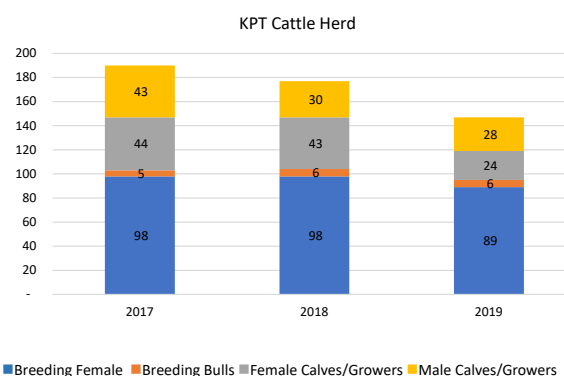
CHAPTER 2. HERD STATUS

Between the arrival of cattle in April 2017 and December 2019 the total number of the productive cattle has slightly decreased as some less productive breeders were culled due to long calving interval, birthing difficulties or poor mothering ability (Graph 1). Culled breeders have recently been replaced with 20 pregnant BX heifers (May 2020), restoring breeder numbers to over 100.

The communal system poses limitations on the efficiency of breeder production, particularly for members wanting to utilize their own labour and feed resources to greater effect. As a result, KPT-MS decided to split up the herd and breed the cattle in 5 sub-units of 15-20 head at the start of the third year. A further two units were established to raise the growers sold by the breeding units. The strategy to produce growers has seen good

results, with 87, 73 and 52 growers sold in Years 1, 2 and 3 via open or limited tender. Financial returns have been high. Income from the sale of 169 growers (progeny year 1 and year 2) resulted in 1.7B rupiah (AUD \$170,000). KPT-MS is also collaborating with local investors, using a share profit base to produce feeders.

Graph 1. KPT Cattle Stock 2017-2019





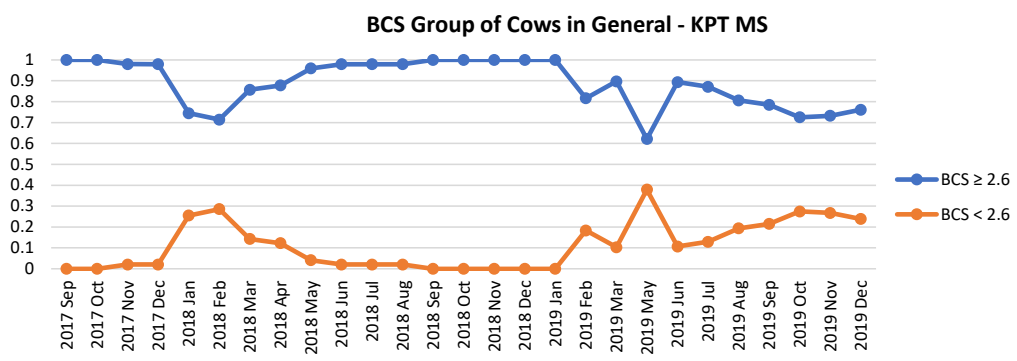
CHAPTER 3. HERD KEY PERFORMANCE INDICATORS

Body Condition Score:

KPT-MS was able to maintain the Body Condition Score (BCS) of most of the herd by feeding a cut-and-carry diet of elephant and other grasses, supplemented with local rations consisting of palm kernel cake (PKC), wet cassava waste, rice bran, milled corn cobs and husk and an additional mineral mix. Some fluctuation in the BCS condition occurred when large numbers of cows were

lactating and during the dry season, when good quality green fodder is often limited in supply. The drop in BCS in the middle of 2019 was due to the splitting up of the herd and the inconsistency of feed availability in the different breeding sub-units. The 2019 dry season was also particularly severe, further challenging feed supplies from July through to November.

Graph 2. Average BCS of Productive Cows





Key Performance indicators:

Key performance indicators i.e. Conception rate, calving rate, calf mortality rate, weaning rate and grower mortality rate for the herd are shown in Table 1.

Table 1. Key Performance Indicators⁵

Parameter	Tahun-1	Tahun-2	Tahun-3 ⁶	Avg. Yr2 & Yr3	Benchmark ⁷
Conception Rate	100.0%	94.9%	66.3%	80.6%	>90%
Calving Rate	91.0%	93.9%	64.2%	79.1%	>85%
Calf Mortality Rate ⁸	4.4%	10.9%	7.1%	7.5% ⁹	<3%
Weaning Rate	87.0%	66.3%	41.1%	53.7%	>80%
Grower Mortality Rate	0.0%	0.0%	0.0%	0.0% ¹⁰	0%

The achievement against the KPIs shows strong performance in conception and calving rates, which also shows in the calving interval (see over page). While grower mortality has been kept to 0 mortalities, the calf mortality has been a recurring problem. The lack of experience to handle calving and new-born calves, including handling bad mothering behavior and ensuring supply of colostrum were main causes of mortality with the first calves. The split in the sub-units, resulted in different quality of infrastructure and management cattle by people with different skills and knowledge, which also influences

performance indicators including calf mortality.

Calving Interval (CI):

The calving interval calculations are presented in 2 different ways i.e. for the project duration (three-year) period and for the 2nd and 3rd year. The first figures are influenced by the fact that KPT-MS received pregnant cattle, which ensured high calving rates in Year 1. It also ensures that all heifers purchased are reproductively sound.

- 5 For that specific 12-month period starting year 1 when cattle arrived
- 6 Year 3 data are incomplete as only 9 months of the year have passed and 2 of the sub-units do not possess a cattle crush to ensure effective pregnancy tests.
- 7 The benchmarks provided are best practice estimates. Benchmarks can be raised every few years as overall industry performance improves.
- 8 Calf mortality rate is the % of calves born that died before weaning
- 9 18 calves died out of 239 calves born
- 10 0 weaners out of 198 died

$$\text{Estimate of CI} = \frac{\text{Project period (month)} \times \text{number of initial cows stock at the intended period}}{\text{Total calves born up to the intended project period}}$$

The calving interval for the 33 months up to December 2019 averaged 13 months, which is an excellent result.

$$\text{KPT's Calving Interval} = \frac{33 \text{ months} \times 98}{239} = 13 \text{ months}$$

The calving interval for the 21 months up to December 2019 averaged 14 months, which is still a good result.

$$\text{KPT's Calving Interval} = \frac{21 \text{ months} \times 97}{148} = 14 \text{ months}$$

There are risks associated with purchasing pregnant heifers, as abortion, calf loss and cow mortality can be high if cattle are poorly managed.

However, with reasonable management, very rapid results can be achieved. This is worthy of consideration by government or private sector planning to implement cattle breeding programs with smallholders.

The calving interval for the 33 months up to December 2019 averaged 13 months, which is an excellent result.

The calving interval calculated for the last 21 months until December 2019, and excluding the fact that cattle arrived pregnant, averaged 14 months which is still a good result.



CHAPTER 4. ECONOMIC VIABILITY UP TO DECEMBER 2019

In order to analyse the economic viability of the enterprise we examined daily costs, including feed and operational costs, cost-of-gain and production cost for respectively calves, weaners and feeders.

Table 2. Average Daily Costs/head for Cows

Parameter	Year 1 ¹¹	Year 2	Year 3	Avg. Yr2 & Yr3
Feed cost	IDR 10,596	IDR 10,304	IDR 11,763	IDR 11,034
Operational cost ¹²	IDR 2,205	IDR 1,830	IDR 2,640	IDR 2,235
Total costs	IDR 12,801	IDR 12,133	IDR 14,403	IDR 13,268

Daily feed costs have been hovering around the IDR 10,000. The rise in costs in the third year occurred due to a change in management of the herd.

¹¹ The calculation of average costs at Yr1 is from April 2017 to March 2018, Yr2 is from April 2018 – March 2019 and Yr3 is from April-December 2019.

¹² Operational costs include labor, utilities, maintenance and other overhead costs. The formula for average operational costs is total operational costs divided by total number of cows and growers.

Initially (first and second year), KPT opted for a centralized system with the breeding stock being located at one breedlot site. The communal system was a burden on the members as it did not allow individuals to use their own labour and forages to reduce their financial inputs. In May 2019, at the start of the third year, KPT decentralized its breeding management operation. The herd was split into 6 satellite breedlots, each housing between 10 and 20 productive heifers and being managed by different farmer groups. The decentralized system impacted on the feed costs¹³, which slightly increased to IDR 11,763 and also resulted in increased operational costs.

¹³ Initially feed was single sourced for the whole herd keeping prices lower compared to individual sourcing.

Average Daily Costs/hd - Growers

To grow the weaners KPT selected satellite sites based on the availability of feed and the capability of the owners. The number of satellite sites fluctuated, with up to 9 *kandang*s in total and three of them specifically dedicated to weaner and growers. Feed costs for individual *kandang*s varied, with a total average of IDR 9,619 in the third year.

Table 3. Average Daily Costs/head for Growers

Parameter	Year 1 ¹⁴	Year 2	Year 3	Avg. Yr2 & Yr3
Feed cost	IDR 7,188	IDR 6,883	IDR 9,619	IDR 8,251
Operational cost	IDR 2,205	IDR 1,830	IDR 2,640	IDR 2,235
Total costs	IDR 9,393	IDR 8,713	IDR 12,259	IDR 10,486

Cost of Gain (COG) and Feeder Liveweight Production Cost.

Calculation of cost-of-gain for KPT-MS is based on the ADG and the daily cost (feed and operational). This provides information for the calculation of the production cost of 1kg of liveweight, which we can compare to the market price and the cost of imported feeders. KPT-MS growers (between 4-24 months) had an average ADG of 0.38/kg/head/day with a total production cost (feed plus operational) of IDR 10,486. As detailed in the calculator below projected production cost of 320kg feeders equals IDR. 40,007 /kg which is equal to the low-end import cost of Australian feeders.

Our Calculator considers the parameters of calving and weaning rate, daily costs and targeted liveweight of a feeder to calculate the projected production cost of 320kg feeders.

¹⁴ The calculation of average costs at Yr1 is from November 2017 to March 2018, Yr2 is from May 2018 -April 2019 and Yr3 is from May-December 2019.

Calculator: KPT calf, weaner and feeder production costs

Cow-Calf-Weaner	Feed costs (hd/day) – Cows	IDR 11,034
	Operational costs (hd/day)	IDR 2,235
	Sub-total (hd/day)	IDR 13,269
	Calving Rate	79.1%
	Daily Costs	IDR 16,785
	Costs/calf born (A)	IDR 6,126,505
	Calf mortalities	9.0%
	Cost of calf mortalities (B)	IDR 604,809
	Weaner Cost /hd (A+B)	IDR 6,731,314
Weaner-Grower	Calf age at weaning (months)	4 mths
	Calf weight at weaning (kgs/hd)	100 kg
	Grower weight gain (kgs/hd/day)	0.38 kg
	Target weight at sale	320 kg
	Months required (Weaning to sale)	19 mths
	Feed costs (/hd/day) – Growers	IDR 8,251
	Operational (/hd/day) - Cows + Growers	IDR 2,235
	Sub-total costs to weaning (/hd/day)	IDR 10,486
	Grower mortalities	0.0%
	Cost of Grower mortalities /hd (C)	IDR -
Grower Costs /hd (D)	IDR 6,070,842	
Total costs/hd/feeder (A+B+D)	IDR 12,802,156	
Local Production Cost /kg	IDR 40,007	

The calculator also shows:

- the indicative production cost of a weaned calf at KPT is IDR 6.7 million
- the production cost of a 320 kg liveweight feeder is about IDR 12.8 million
- a liveweight of 320kg can be reached 19 months after weaning (with the assumption weaning at 4 months results in calves of 100kg) at an age of less than 2 years.



CHAPTER 5. SCALE-UP OPTIONS

KPT has limited scope to expand the business given its land area constraints and the special status of one of the sub-districts where BX cattle cannot be bred to keep the PO cattle as pure breeding stock.

More cattle could be raised in the same area by making the system more intensive - focusing on increased productivity and shorter calving intervals. The fastest way to get more production from the breeders is to sell cows that do not get pregnant within a set time¹⁵ or perhaps shortly post weaning.

KPT's location in Lampung has the advantage of being close to the largest collection of feedlots in Indonesia. This provides opportunities of either buying modest numbers of pregnant heifers all year round or engaging in partnerships with the feedlots who often have pregnant heifers amongst the breeders imported from Australia.

¹⁵ Given the high average BCS, fertility of the cattle should be high too (which has been proven over the years).

To benefit from the first opportunity KPT needs to aggressively cull empty cows and replace them with pregnant heifers. With good management, this should result in a calving rate of close to 100% every year and with a calving interval down to less than 12 months.

The second opportunity has already been initiated through a partnership agreement with Juang Jaya Abdi Alam. JJAA provides pregnant heifers to KPT members, who take care of them and the progeny, return cows back to JJAA and split the profit (after valuing the weaner) between JJAA and the participating farmer.

Another potential production strategy involves selling weaners and repurchasing as growers in partnership with investors. Since 2018, KPT members have been selling their weaners (heifers and bulls) to other farmers or interested parties through open or limited tender process. After an appropriate growing period, KPT repurchases selected productive

breeding females/bulls valued at IDR 14 million/head which they offer to investors for breeding¹⁶.

Based on KPTs strategy and plan, IACCB and KPT developed three business development options i.e.:

- (1) organic growth, with a total repurchase of 241 breeding females¹⁷ over the next 6 years but without an additional partnership with a feedlot;
- (2) organic growth + feedlot partnership: repurchase 241 breeding females and establish partnership with feedlot to breed 20 breeding heifers annually;
- (3) stable growth: only repurchase 61 breeding females (in 2020) and partner with a feedlot to breed 20 breeding heifers annually.

Table 4. Option Comparison

	Option 1 Organic growth	Option 2 Organic plus feedlot partnership	Option 3 Stable plus feedlot partnership
Breeder herd 2019	89 breeders		
Repurchase in 2020	61 heifers 30 bulls	61 heifers 30 bulls	61 heifers 30 bulls
Annual repurchase from 2021 on	30 heifers	30 heifers	None
Annual feedlot partnership	None	20 pregnant heifers	20 pregnant heifers
No. breeders in 2026	257 breeders	257 breeders	102 breeders

As per December 2019, KPT has a total herd of 147 head, including 89 productive cows. Investment so far is IDR 2.9B capital expenditure and IDR 1.7B operational costs.

¹⁶ Internally developed and managed by KPT, offering the local community to invest with profit sharing scheme

¹⁷ In 2020 acquiring 61 heifers and 31 bulls – all year 1 progeny - from surrounding farmers and additionally re-purchase 30 heifers per year up to 2026 to offer as an investment to investors.

General assumptions¹⁸

Based on the productivity/financial data trends, general assumptions are detailed in Table 5.

Table 5. General Assumptions for KPIs to inform economic calculations

Key Parameter	Assumptions	Comments
Simulation period	Up to 2026	10 th year after project start
Calving rate	80%	Previous 2-year average 79.1%
Calf mortality	7%	Previous 2-year average 9%
Feed cost Cows/hd/d	IDR 10,000 - annual 3% increase	In December 2019, KPT started standardizing the feed sources ¹⁹
Feed cost Growers /hd/d	IDR 9,000 – annual 3% increase	
Cull cows	5%	Unproductive cows are culled after 2 failed pregnancy tests
ADG Grower	0.4 kg	Sold at 234 kg
Growers sales	Grower heifers/bulls are sold at 15 months old	

Option 1. Organic Growth, No Partnership

In 2020, KPT repurchases 61 cows and 30 bulls from their neighborhood community. The breeding females are then placed in the selected satellite *kandang*²⁰. From 2021 onwards, KPT repurchases 30 cows every year. Total repurchase from 2020 to 2026 is 241 cows. From the 89 breeders end of 2019, the projection shows that by end of 2026 the number of cows increases to 257 head and the total herd number increases from 147 head end of 2019 to 476 head. (see Annex 2. Herd Growth Projection – Option 1)

¹⁸ Percentages for KPIs are detailed in Annex 1 and Annex 5 under title: Cattle Sales and Retaining Parameters.

¹⁹ Applying best practice of one of their members, planting king grass instead of buying (Detailed calculations provided in Annex 9).

²⁰ KPT uses their own criteria to select the satellite *kandang* but focuses on availability of adequate infrastructure and farmer knowledge and experience in cattle breeding.

The investment required for this option is mainly for repurchasing the cattle and reconditioning the satellite *kandang* to be suitable for BX cattle. A positive cashflow can be achieved from 2021 onwards. In 2026, the resulting IRR will be 13.19% with a positive NPV at IDR 813,371,949 (see Annex 3. Cash Flow Projection – Option 1).

Option 2. Organic Growth, With Partnership

Option 2 consists of combining the Option 1 strategy with a partnership with a feedlot to provide KPT with 20 pregnant heifers annually²¹. From 2020 to 2026, KPT repurchases a total of 241 heifers and along with that strategy, starting in 2021 KPT manages 20 pregnant BX²² cattle per annum through a partnership contract with the feedlot²³. Assumptions related to the Partnership are provided in Table 6.

Table 6. Assumptions for the Partnership agreement²⁴

Key Points	Description
Acquiring cattle	Feedlot provides pregnant cows (approx. 6 months pregnant) to the farmer groups
Raising cattle	The farmer group cares for the cow from arrival until return to the feedlot which is after the calf is weaned and BCS of cow has recovered
Feedlot feed support to farmers	Over a 10-month period the feedlot provides an amount of concentrate to the farmer group. Amounts per month vary depending on the condition of the cows - approx. 3 months pre-calving + approx. 4 months until calf is weaned + up to 3 months for reconditioning the cow before returning to feedlot ²⁵ . In addition to the concentrate farmers provide green fodder
Feed for growers	Solely the responsibility of farmer groups
Grower sales	KPT plans to sell at 15 months old

The number of cattle in this option grows from 147 head at the start of 2020 to 494 head in 2026 due to additional calves originating from the Partnership (see Annex 4. Herd Growth Projection – Option 2). Due to additional income from selling the partnership’s growers, the IRR in 2026 increases to 13.73% with a positive NPV of IDR 962,258,873. The cash flow becomes positive from 2022 onwards (see Annex 5. Cash Flow Projection – Option 2).

- 21 The feedlot selects the farmers it collaborates with based on their proven skills and experience and other criteria. It provides some technical support and some feed to the farmers over an average 10-month period.
- 22 Assumed that number of managed breeding females is not many, because (1) KPT still needs to ensure the area which can be used for BX breeding operation and (2) highly depends on the number of pregnant cows which can be provided by feedlot regularly
- 23 In the contract, KPT is provided with some concentrate to feed the breeding females. In return, the profit share from the grower sales is 60%/40% for KPT/feedlot. Feedlot also has its own requirement when selecting partners
- 24 Summarized from the current contract between JAA and one of KPT’s members
- 25 There is an option that the farmer retains the cow, but experience shows that it is more beneficial to return the cow to feedlot for new conception. Farmers have the option, if previous cycle was deemed beneficial for both feedlot and farmer, to go into another agreement immediately receiving another pregnant heifer.



Option 3. Stable Growth, With Partnership

Assumptions in this option are: (1) KPT repurchases 61 cows and 30 bulls in 2020 and does not repurchase any more from 2021 onwards²⁶ and (2) KPT will establish a partnership with a feedlot and manages 20 cows annually²⁷.

The projection shows that by end of 2026 KPT will have 102 cows and the total herd will rise to 209 head (see Annex 7. Herd Growth Projection – Option 3).

With Option 3, in 2026 the IRR is projected to be 8.05% and the NPV is negative at IDR -356,586,687. Meanwhile, positive cashflow can be attained from 2021 onwards (see Annex 8. Cashflow Projection – Option 3).

Table 7. Herd closing stock numbers for the three options²⁸

Cattle category	Opt 1: Organic Growth (No Partnership)	Opt. 2: Organic Growth (Incl Partnership)	Opt. 3: Stable Growth (Incl Partnership)
Breeding Females	257	257	102
Breeding Bulls	19	19	9
Grower Heifers 12- mths	100	109	49
Grower Bulls 12- mths	100	109	49
Grower Heifers 12+ mths	-	-	-
Grower Bulls 12+ mths	-	-	-
Total Closing Stock	476	494	209

²⁶ Anticipating no cows available in the community or investors losing interest in the business scheme.

²⁷ Notes for Partnership in Option 3 is similar with Option 2

²⁸ Growers are sold around 12 months old, so none remain at the facility.



CHAPTER 6.

SUMMARY

6.1. Improve Cattle Performance

Table 8 provides information on the current vs the targeted achievement for KPT. Some of the targets have already been achieved and need to be maintained or improved. For instance,

the average calving interval of 13 months can probably be shortened if non-productive cows can be culled as soon as possible and replaced with pregnant heifers from a feedlot.

Table 8. Productivity achievements vs planned

Nr	Issue	Current KPI achievement	KPT Target
1	Calving Interval	13 months	13 months
2	BCS (Body Condition Score)	2.6 – 4.0	≥ 3.0
3	BCS Lactating cows	2.6 – 4.0	≥ 3.0
4	Calving Rate	79.1%	80%
5	Weaner Weight (4 months)	100 kg	100 kg
6	ADG (Average Day Gain)	0.38 kg	0.40 kg
7	Feed composition	70% King Grass and 30% concentrate	80% King Grass and 20% concentrate
8	Calf mortality	9%	7%

6.2. Scaling-up

Following Table 8 provides a summary comparison between three options. KPT is

studying to decide on the optimal strategy to develop their cattle breeding business.

Table 8. Projected Key Economic and Financial Figures

	Organic Growth (No Partnership)	Organic Growth (Incl Partnership)	Stable Growth (Incl Partnership)
Key plan (s)	Invest in a total of 241 breeding females up to 2026	Invest in 241 breeding females up to 2026 Feedlot Partnership in 2021 to acquire and manage 20 head (annually)	Invest 61 breeding females in 2020 Feedlot Partnership in 2021 and acquire and manage 20 head (annually)
Required Investment (2020-2026)	<ul style="list-style-type: none"> IDR 4.0 (CAPEX) IDR 9.7B (Op.Costs) 	<ul style="list-style-type: none"> IDR 4.05B (CAPEX) IDR 10.2B (Op. Costs) 	<ul style="list-style-type: none"> IDR 1.35B (CAPEX) IDR 7.1B (Op. Costs)
Herd Size	<ul style="list-style-type: none"> 257 cows 476 head total herd 	<ul style="list-style-type: none"> 257 cows 494 head total herd 	<ul style="list-style-type: none"> 102 cows 209 head total herd
Cashflow positive	2021 onwards	2022 onwards	2021 onwards
IRR	13.19%	13.73%	8.05%
NPV	IDR 813.4M	IDR 962.3M	IDR -356.5M

KPT will get the best result if they combine the option of repurchasing 241 heifer (spread over 7 years) and establish partnership with feedlot from 2020 onwards (Option 2). This will result in a projected IRR of 13.73% in 2026 and a positive NPV of IDR 962.3M.

Option 1, organic growth without a feedlot partnership, offers only slightly lower IRR and NPV but has the advantage of becoming cash flow positive one year earlier than Option 2. Both Options 1 and 2 require significant capital investment, approximately three times that of Option 3. Operational costs are also around 30% higher for Options 1 and 2 compared with Option 3.

Option 3 is the lowest risk as it requires less capital and cash flow management, involves fewer breeders, and is less reliant on external smallholder farmers as a critical part of the business process. However, Option 3 also returns a negative NPV, whereas options 1 and 2 are strongly positive. This means that if farmers can achieve the discount rate used in the NPV calculation through alternative investment, they would be better simple investing the money they would otherwise be spending on cattle production.

All options will require significant cash flow management, especially prior to achieving a positive cash flow.

ANNEX 1.

CATTLE SALES AND RETAINING PARAMETERS – ORGANIC GROWTH (OPTION 1)

	2020	2021	2022	2023	2024	2025	2026
Calving Rate	80%	80%	80%	80%	80%	80%	80%
Cull							
Breeding Females	5%	5%	5%	5%	5%	5%	5%
Breeding Bulls	0%	10%	10%	10%	10%	10%	10%
Retained Heifers	0%	0%	0%	0%	0%	0%	0%
Growers Sales							
Heifers at 12-mths							
15-mths	100%	100%	100%	100%	100%	100%	100%
18-mths							
Bulls at 12-mths							
15-mths	100%	100%	100%	100%	100%	100%	100%
18+mths							

ANNEX 2. HERD GROWTH PROJECTION – ORGANIC GROWTH (OPTION 1)

	2019	2020	2021	2022	2023	2024	2025	2026
Opening Stock								
Breeding Females	89 hd	145 hd	167 hd	187 hd	206 hd	224 hd	241 hd	241 hd
Breeding Bulls	6 hd	36 hd	32 hd	29 hd	26 hd	23 hd	21 hd	19 hd
Grower Heifers	24 hd	56 hd	65 hd	73 hd	81 hd	87 hd	87 hd	95 hd
Grower Bulls	28 hd	56 hd	65 hd	73 hd	81 hd	87 hd	87 hd	95 hd
Total Opening Stock	147 hd	293 hd	329 hd	362 hd	394 hd	421 hd	421 hd	452 hd
Purchases								
Breeding Females	61 hd	30 hd	30 hd	30 hd	30 hd	30 hd	30 hd	30 hd
Breeding Bulls	30 hd	0 hd	0 hd	0 hd	0 hd	0 hd	0 hd	0 hd
Total Purchases	91 hd	30 hd	30 hd	30 hd	30 hd	30 hd	30 hd	30 hd
Births								
	120 hd	140 hd	158 hd	174 hd	188 hd	204 hd	216 hd	216 hd
Cattle Sales								
Grower Heifers	24 hd	55 hd	64 hd	72 hd	80 hd	86 hd	86 hd	94 hd
Grower Bulls	28 hd	55 hd	64 hd	72 hd	80 hd	86 hd	86 hd	94 hd
Cull Breeding Females	4 hd	7 hd	8 hd	9 hd	10 hd	11 hd	11 hd	12 hd
Cull Breeding Bulls	0 hd	4 hd	3 hd	3 hd	3 hd	3 hd	2 hd	2 hd
Total Cattle Sales	56 hd	121 hd	139 hd	156 hd	173 hd	185 hd	185 hd	202 hd
Closing Stock								
Breeding Females	89 hd	145 hd	167 hd	187 hd	206 hd	224 hd	241 hd	257 hd
Breeding Bulls	6 hd	36 hd	32 hd	29 hd	26 hd	23 hd	21 hd	19 hd
Grower Heifers	24 hd	56 hd	65 hd	73 hd	81 hd	87 hd	87 hd	95 hd
Grower Bulls	28 hd	56 hd	65 hd	73 hd	81 hd	87 hd	87 hd	95 hd
Total Closing Stock	147 hd	293 hd	329 hd	362 hd	394 hd	421 hd	452 hd	476 hd

ANNEX 3. CASH FLOW PROJECTION – ORGANIC GROWTH (OPTION 1) IN THOUSAND RUPIAH (000)

	2019	2020	2021	2022	2023	2024	2025	2026
Cash In								
Cattle Sales	IDR 1,805,091	IDR 769,200	IDR 1,704,777	IDR 1,984,067	IDR 2,263,850	IDR 2,552,028	IDR 2,768,550	IDR 3,072,080
Terminal Value	IDR 0	IDR 0	IDR 0	IDR 0	IDR 0	IDR 0	IDR 0	IDR 7,900,470
Sub Total Cash In	IDR 1,805,091	IDR 769,200	IDR 1,704,777	IDR 1,984,067	IDR 2,263,850	IDR 2,552,028	IDR 2,768,550	IDR 10,972,550
Cash Out								
Investment Costs	IDR 2,957,267	IDR 1,334,000	IDR 450,000	IDR 450,000	IDR 450,000	IDR 450,000	IDR 450,000	IDR 450,000
Operational Costs	IDR 1,712,121	IDR 726,357	IDR 1,075,098	IDR 1,246,399	IDR 1,414,579	IDR 1,587,746	IDR 1,751,349	IDR 1,933,405
Taxes	IDR 0	IDR 7,711	IDR 152,920	IDR 178,417	IDR 204,818	IDR 232,071	IDR 246,800	IDR 277,169
Sub Total Cash Out	IDR 4,669,388	IDR 2,068,068	IDR 1,678,018	IDR 1,874,816	IDR 2,069,397	IDR 2,269,816	IDR 2,448,149	IDR 2,660,574
Cash Surplus (Deficit)	IDR -2,864,298	IDR -1,298,868	IDR 26,759	IDR 109,251	IDR 194,453	IDR 282,212	IDR 320,401	IDR 8,311,976
Cumulative Cashflow	IDR -2,864,298	IDR -4,163,165	IDR -4,136,406	IDR -4,027,155	IDR -3,832,702	IDR -3,550,490	IDR -3,230,089	IDR 5,081,887
Discount Factor	1.00	0.91	0.83	0.75	0.68	0.62	0.56	0.51
Present Value	IDR -2,864,298	IDR -1,180,789	IDR 22,115	IDR 82,082	IDR 132,814	IDR 175,231	IDR 180,858	IDR 4,265,358
Cumulative Present Value	IDR -2,864,298	IDR -4,045,087	IDR -4,022,971	IDR -3,940,889	IDR -3,808,075	IDR -3,632,844	IDR -3,451,986	IDR 813,372

ANNEX 4. HERD GROWTH PROJECTION – ORGANIC GROWTH (INCL PARTNERSHIP) - OPTION 2

	2019	2020	2021	2022	2023	2024	2025	2026
Opening Stock								
Breeding Females	89 hd	145 hd	167 hd	187 hd	206 hd	224 hd	241 hd	241 hd
Breeding Bulls	6 hd	36 hd	32 hd	29 hd	26 hd	23 hd	21 hd	19 hd
Grower Heifers	24 hd	56 hd	74 hd	82 hd	90 hd	96 hd	104 hd	104 hd
Grower Bulls	28 hd	56 hd	74 hd	82 hd	90 hd	96 hd	104 hd	104 hd
Total Opening Stock	147 hd	293 hd	347 hd	380 hd	412 hd	439 hd	470 hd	470 hd
Purchases								
Breeding Females	61 hd	50 hd	50 hd	50 hd	50 hd	50 hd	50 hd	50 hd
Breeding Bulls	30 hd	0 hd	0 hd	0 hd	0 hd	0 hd	0 hd	0 hd
Total Purchases	91 hd	50 hd	50 hd	50 hd	50 hd	50 hd	50 hd	50 hd
Returned Breeding Females		20 hd	20 hd	20 hd	20 hd	20 hd	20 hd	20 hd
Births	120 hd	158 hd	176 hd	192 hd	206 hd	222 hd	234 hd	234 hd
Cattle Sales								
Grower Heifers	24 hd	55 hd	73 hd	81 hd	89 hd	95 hd	103 hd	103 hd
Grower Bulls	28 hd	55 hd	73 hd	81 hd	89 hd	95 hd	103 hd	103 hd
Cull Breeding Females	4 hd	7 hd	8 hd	9 hd	10 hd	11 hd	12 hd	12 hd
Cull Breeding Bulls	0 hd	4 hd	3 hd	3 hd	3 hd	3 hd	2 hd	2 hd
Total Cattle Sales	56 hd	121 hd	157 hd	174 hd	191 hd	203 hd	220 hd	220 hd
Closing Stock								
Breeding Females	89 hd	145 hd	167 hd	187 hd	206 hd	224 hd	241 hd	257 hd
Breeding Bulls	6 hd	36 hd	32 hd	29 hd	26 hd	23 hd	21 hd	19 hd
Grower Heifers	24 hd	56 hd	74 hd	82 hd	90 hd	96 hd	104 hd	109 hd
Grower Bulls	28 hd	56 hd	74 hd	82 hd	90 hd	96 hd	104 hd	109 hd
Total Closing Stock	147 hd	293 hd	347 hd	380 hd	412 hd	439 hd	470 hd	494 hd

ANNEX 5.

CASH FLOW PROJECTION – ORGANIC GROWTH (INCL PARTNERSHIP) - OPTION 2 IN THOUSAND RUPIAH (000)

	2019	2020	2021	2022	2023	2024	2025	2026
Cash In								
Cattle Sales	IDR 1,805,091	IDR 769,200	IDR 1,704,777	IDR 2,133,721	IDR 2,412,590	IDR 2,704,848	IDR 2,925,451	IDR 3,233,061
Terminal Value	IDR 0	IDR 0	IDR 0	IDR 0	IDR 0	IDR 0	IDR 0	IDR 7,985,790
Sub Total Cash In	IDR 1,805,091	IDR 769,200	IDR 1,704,777	IDR 2,133,721	IDR 2,412,590	IDR 2,704,848	IDR 2,925,451	IDR 11,218,851
Cash Out								
Investment Costs	IDR 2,957,267	IDR 1,350,000	IDR 450,000	IDR 450,000	IDR 450,000	IDR 450,000	IDR 450,000	IDR 450,000
Operational Costs	IDR 1,712,121	IDR 726,357	IDR 1,130,347	IDR 1,327,044	IDR 1,497,293	IDR 1,672,589	IDR 1,838,383	IDR 2,022,691
Taxes	IDR 0	IDR 7,711	IDR 135,107	IDR 195,669	IDR 221,324	IDR 249,065	IDR 264,267	IDR 316,422
Sub Total Cash Out	IDR 4,669,388	IDR 2,084,068	IDR 1,715,455	IDR 1,972,714	IDR 2,168,617	IDR 2,371,654	IDR 2,552,650	IDR 2,789,113
Cash Surplus (Deficit)	IDR -2,864,298	IDR -1,314,868	IDR -10,678	IDR 161,007	IDR 243,973	IDR 333,194	IDR 372,801	IDR 8,429,737
Cumulative Cashflow	IDR -2,864,298	IDR -4,179,165	IDR -4,189,843	IDR -4,028,836	IDR -3,784,863	IDR -3,451,669	IDR -3,078,869	IDR 5,350,869
Discount Factor	1.00	0.91	0.83	0.75	0.68	0.62	0.56	0.51
Present Value	IDR -2,864,298	IDR -1,195,334	IDR -8,825	IDR 120,967	IDR 166,637	IDR 206,887	IDR 210,436	IDR 4,325,788
Cumulative Present Value	IDR -2,864,298	IDR -4,059,632	IDR -4,068,457	IDR -3,947,489	IDR -3,780,853	IDR -3,573,965	IDR -3,363,529	IDR 962,259

ANNEX 6.

CATTLE SALES AND RETAINING PARAMETERS – STABLE GROWTH INCL PARTNERSHIP (OPTION 3)

	2020	2021	2022	2023	2024	2025	2026
Calving Rate	80%	80%	80%	80%	80%	80%	80%
Cull							
Breeding Females	5%	5%	5%	5%	5%	5%	5%
Breeding Bulls	0%	20%	20%	20%	20%	20%	20%
Retained Heifers	0%	0%	0%	0%	0%	0%	0%
Growers Sales							
Heifers at 12-mths							
15-mths	100%	100%	100%	100%	100%	100%	100%
18-mths							
Bulls at 12-mths							
15-mths	100%	100%	100%	100%	100%	100%	100%
18-mths							

ANNEX 7. HERD GROWTH PROJECTION – STABLE GROWTH INCL PARTNERSHIP (OPTION 3)

	2019	2020	2021	2022	2023	2024	2025	2026
<u>Opening Stock</u>								
Breeding Females	89 hd	145 hd	137 hd	129 hd	122 hd	115 hd	108 hd	108 hd
Breeding Bulls	6 hd	36 hd	29 hd	23 hd	18 hd	14 hd	11 hd	9 hd
Grower Heifers	24 hd	65 hd	63 hd	60 hd	57 hd	55 hd	55 hd	49 hd
Grower Bulls	28 hd	56 hd	63 hd	60 hd	57 hd	55 hd	52 hd	49 hd
Total Opening Stock	147 hd	302 hd	292 hd	272 hd	254 hd	239 hd	214 hd	
<u>Purchases</u>								
Breeding Females	61 hd	20 hd	20 hd	20 hd	20 hd	20 hd	20 hd	20 hd
Breeding Bulls	30 hd	0 hd	0 hd	0 hd	0 hd	0 hd	0 hd	0 hd
Total Purchases	91 hd	20 hd	20 hd	20 hd	20 hd	20 hd	20 hd	20 hd
Returned Breeding Females		20 hd	20 hd	20 hd	20 hd	20 hd	20 hd	20 hd
Births	120 hd	134 hd	128 hd	122 hd	116 hd	110 hd	104 hd	
<u>Cattle Sales</u>								
Grower Heifers	24 hd	55 hd	62 hd	59 hd	57 hd	55 hd	52 hd	52 hd
Grower Bulls	28 hd	55 hd	62 hd	59 hd	57 hd	55 hd	52 hd	52 hd
Cull Breeding Females	4 hd	7 hd	7 hd	6 hd	6 hd	6 hd	6 hd	5 hd
Cull Breeding Bulls	0 hd	7 hd	6 hd	5 hd	4 hd	3 hd	2 hd	
Total Cattle Sales	56 hd	124 hd	137 hd	129 hd	124 hd	119 hd	111 hd	
<u>Closing Stock</u>								
Breeding Females	89 hd	145 hd	137 hd	129 hd	122 hd	115 hd	108 hd	102 hd
Breeding Bulls	6 hd	36 hd	29 hd	23 hd	18 hd	14 hd	11 hd	9 hd
Grower Heifers	24 hd	56 hd	63 hd	60 hd	57 hd	55 hd	52 hd	49 hd
Grower Bulls	28 hd	56 hd	63 hd	60 hd	57 hd	55 hd	52 hd	49 hd
Total Closing Stock	147 hd	293 hd	292 hd	272 hd	254 hd	239 hd	223 hd	209 hd

ANNEX 8.

CASH FLOW PROJECTION – STABLE GROWTH INCL PARTNERSHIP (OPTION 3) IN THOUSAND RUPIAH (000)

	2019	2020	2021	2022	2023	2024	2025	2026
Cash In								
Cattle Sales	IDR 1,805,091	IDR 769,200	IDR 1,763,277	IDR 1,869,603	IDR 1,776,149	IDR 1,730,237	IDR 1,681,451	IDR 1,580,697
Terminal Value	IDR 0	IDR 0	IDR 0	IDR 0	IDR 0	IDR 0	IDR 0	IDR 3,260,828
Sub Total Cash In	IDR 1,805,091	IDR 769,200	IDR 1,763,277	IDR 1,869,603	IDR 1,776,149	IDR 1,730,237	IDR 1,681,451	IDR 4,841,525
Cash Out								
Investment Costs	IDR 2,957,267	IDR 1,350,000	IDR 0	IDR 0	IDR 0	IDR 0	IDR 0	IDR 0
Operational Costs	IDR 1,712,121	IDR 726,357	IDR 1,073,680	IDR 1,085,619	IDR 1,067,994	IDR 1,057,258	IDR 1,044,625	IDR 1,025,298
Taxes	IDR 0	IDR 7,711	IDR 165,399	IDR 192,996	IDR 174,039	IDR 165,245	IDR 159,207	IDR 160,180
Sub Total Cash Out	IDR 4,669,388	IDR 2,084,068	IDR 1,239,079	IDR 1,278,615	IDR 1,242,033	IDR 1,222,503	IDR 1,203,831	IDR 1,185,478
Cash Surplus (Deficit)	IDR -2,864,298	IDR -1,314,868	IDR 524,198	IDR 590,988	IDR 534,117	IDR 507,734	IDR 477,620	IDR 3,656,047
Cumulative Cashflow	IDR -2,864,298	IDR -4,179,165	IDR -3,654,967	IDR -3,063,980	IDR -2,529,863	IDR -2,022,129	IDR -1,544,509	IDR 2,111,538
Discount Factor	1.00	0.91	0.83	0.75	0.68	0.62	0.56	0.51
Present Value	IDR -2,864,298	IDR -1,195,334	IDR 433,221	IDR 444,018	IDR 364,809	IDR 315,263	IDR 269,604	IDR 1,876,130
Cumulative Present Value	IDR -2,864,298	IDR -4,059,632	IDR -3,626,411	IDR -3,182,393	IDR -2,817,584	IDR -2,502,321	IDR -2,232,717	IDR -356,587

ANNEX 9.

GRASS PRODUCTION CALCULATION

9.1. GRASS PRODUCTION COST IN PARTNERSHIP SYSTEM

The breeder enterprise goes into an agreement with a landowner/farmer and is paying for the establishment and maintenance costs of the grass but not for the land lease. The enterprise guarantees offload of grass produced at IDR 100/kg fresh harvested grass.

Preparations		
Area	1	Ha
Cost		
Initial investment cost		
Land Rental	-	IDR
Land clearing	2,000,000	IDR
Labor cost	800,000	IDR
Seed cost	3,500,000	IDR
Sub Total Preparation cost	6,300,000	IDR
Annual cost		
Cost		
Maintenance cost		
Fertilizer cost	100,000	IDR
Weed control cost	380,000	IDR
Maintenance cycle	2	Unit
Harvesting cost		
Labor cost	400,000	IDR
Transport	300,000	IDR
Fuel	62,500	IDR
Harvesting cycle	5	Unit
Annual operation cost		
Maintenance cost	960,000	IDR
Harvesting cost	3,812,500	IDR
Sub Total Annual cost	5,152,500	IDR
Total Cost	11,452,500	IDR
Production		
Yield	125,000	kg
Production cost Per Kg	92	IDR
Purchasing cost (from landlord/landowner)	100	IDR
Production Cost Per Kg	192	IDR

9.2. GRASS PRODUCTION COST IN RENT SYSTEM

In this system the production is managed by the breeding enterprise who leases the land, pays for all outgoings including labour costs for harvesting.

<u>Preparations</u>		
Area	-	Ha
Cost		
Initial investment cost		
Land Rental	5,000,000	IDR
Land clearing	2,000,000	IDR
Labor cost	800,000	IDR
Seed cost	3,500,000	IDR
Sub Total Preparation cost	11,300,000	IDR
<u>Annual cost</u>		
Cost		
Maintenance cost		
Fertilizer cost	100,000	IDR
Weed control cost	380,000	IDR
Maintenance cycle	2	kali
Harvesting cost		
Labor cost	400,000	IDR
Transport	300,000	IDR
Fuel	62,500	IDR
Harvesting cycle	5	kali
Annual operation cost		
Maintenance cost	960,000	IDR
Harvesting cost	3,812,500	IDR
Sub Total Annual cost	5,152,500	IDR
Total Cost	16,452,500	IDR
Production		
Yield	125,000	kg
Production Cost Per Kg	132	IDR

9.3. GRASS PRODUCTION COST IN A RENT SYSTEM IMPLEMENTED BY STOCKMEN

In this system the breeding enterprise leases the land and pays all outgoings, but harvesting is done by the stockmen as part of their routine activity in the breedlot. Production

cost is cheaper as in system 2 but some of the labour costs are absorbed by the breeding enterprise.

Preparations

Area	1	Ha
Cost		
Initial investment cost		
Land Rental	5,000,000	IDR
Land clearing	2,000,000	IDR
Labor cost	800,000	IDR
Seed cost	3,500,000	IDR
Sub Total Preparation cost	11,300,000	IDR

Annual cost

Cost		
Maintenance cost		
Fertilizer cost	-	IDR
Weed control cost	280,000	IDR
Maintenance cycle	1	kali
Harvesting cost		
Labor cost	-	IDR
Transport	-	IDR
Fuel	62,500	IDR
Harvesting cycle	5	kali
Annual operation cost		
Maintenance cost	280,000	IDR
Harvesting cost	312,500	IDR
Sub Total Annual cost	872,500	IDR

Total Cost	12,172,500	IDR
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Production		
Yield	125,000	kg
Production cost Per Kg	97	IDR



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