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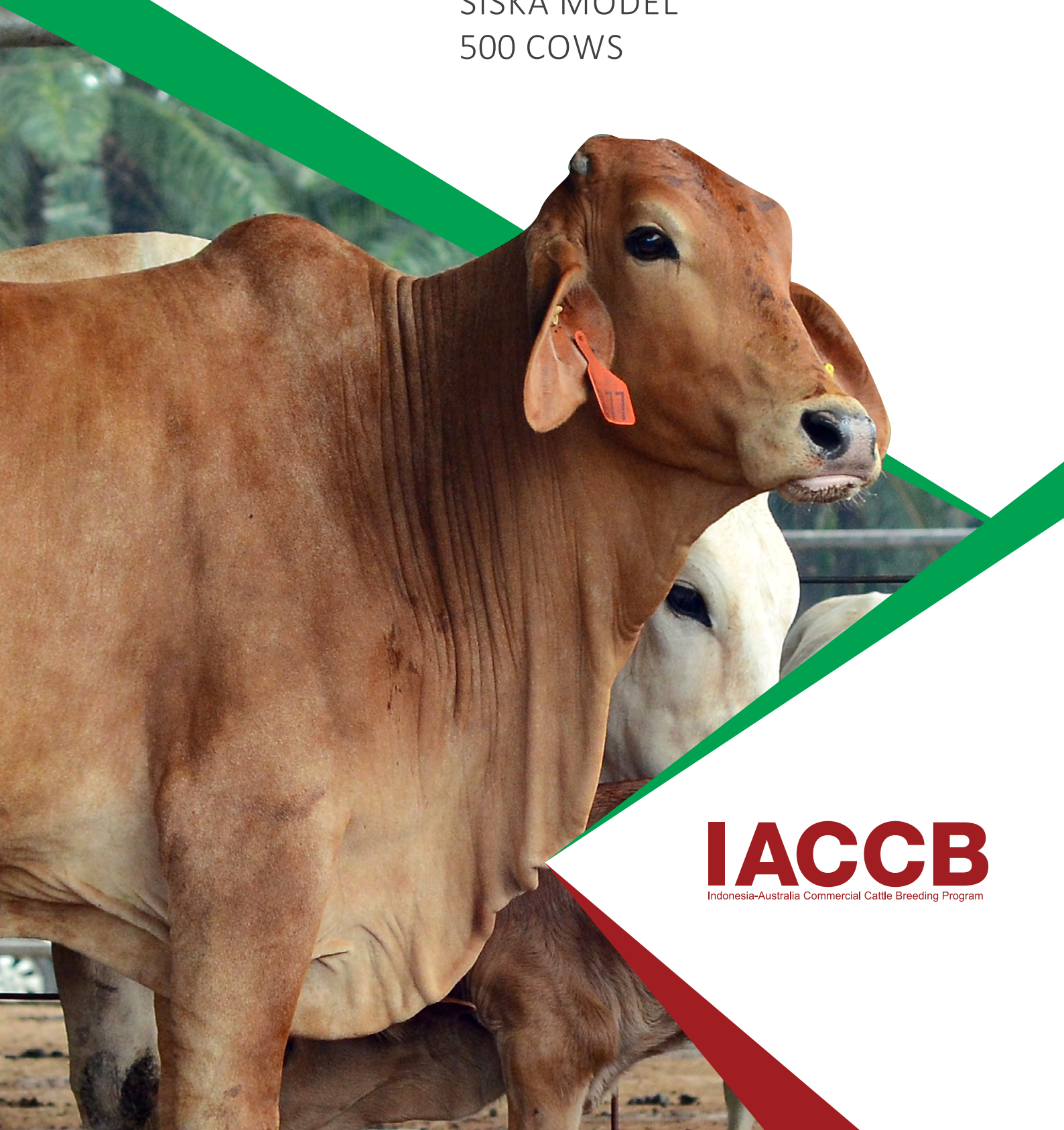
PROSPECTUS

BRAHMAN CROSS (BX) CATTLE BREEDING BUSINESS SISKA MODEL 500 COWS



IACCB
Indonesia-Australia Commercial Cattle Breeding Program

PROSPECTUS

BRAHMAN CROSS (BX) CATTLE BREEDING BUSINESS SISKA MODEL 500 COWS

Disclaimer

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BRAHMAN CROSS (BX) CATTLE BREEDING BUSINESS SISKA MODEL 500 COWS

To start a Brahman Cross (BX) cattle breeding business using SISKA (Sistem Integrasi Sapi-Sawit – Palm Oil-Cattle Integration System) model with a herd of 500 cows and 25 bulls will require an initial investment of AUD 1.085 million and estimated grazing area of 2,500 ha. The business is projected to be cash flow positive in the fourth year. During the first four years of operation, the business will require additional operational expenditure of AUD 1.015 million and additional capital expenditure of AUD 16.6 thousand. Total capital needed before achieving cash-flow positive condition amounts to AUD 1.494 million. Considering the terminal value of herd closing stock, the Internal Rate of Return (IRR) is projected to be 11.86% in year 10 with a cumulative cash surplus of AUD 1.880 million and Net Present Value (NPV) AUD 168 thousand.

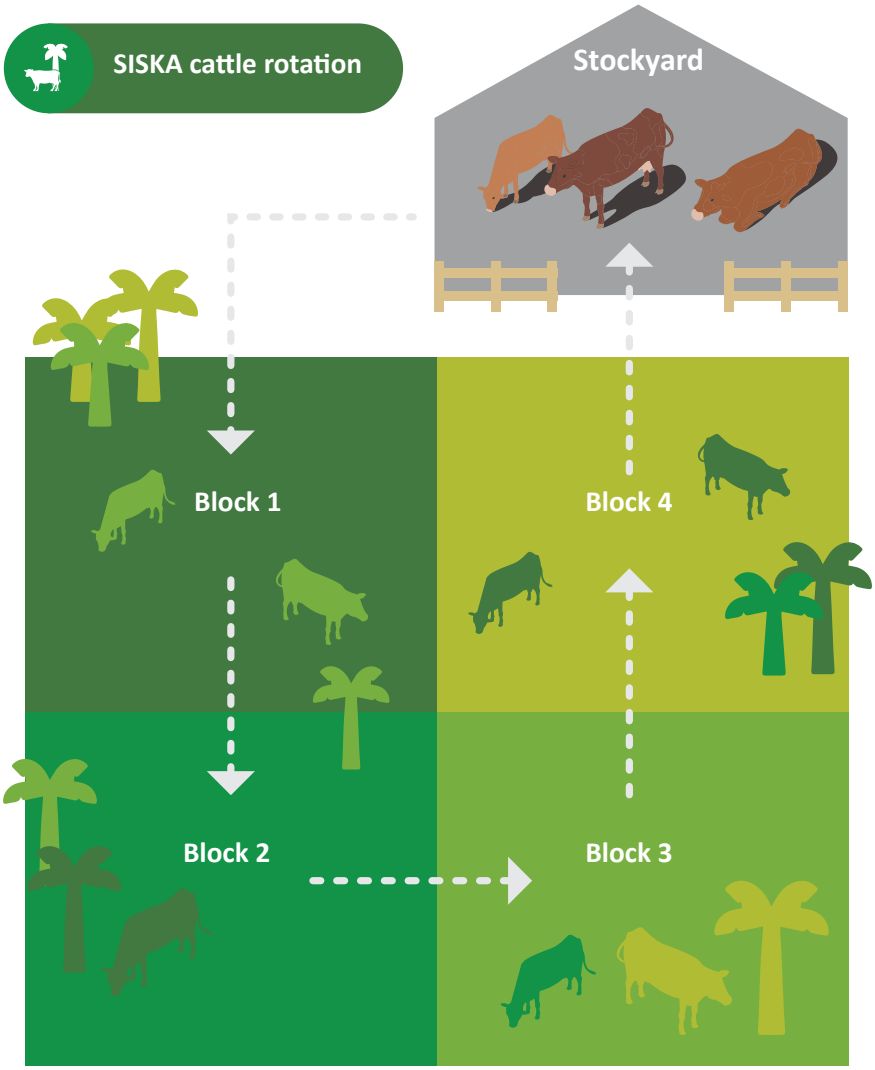
1. Summary of Investment

Business Development	Economic Calculation
Duration of operation 10 (ten) years Herd size • 500 (five hundred) cows • 25 (twenty five) bulls SISKA (Sistem Integrasi Sapi-Sawit – Palm Oil-Cattle Integration System) model with natural mating system Required grazing area at initial phase is 2,500 ha and gradually increase to 4,000 ha in year 10 Potentially selling 1,549 head of progeny At the end of year 10, number of cows increase to 548 head with the total herd of 1,248 head	Initial capital investment required AUD 1.085 million Positive cash flow in year 4 Maximum investment before cash flow positive amounts to AUD 1.494 million (includes investment and operational costs) Cumulative surplus cash flow in year 10 AUD 1.880 million Including the terminal value of herd closing stock, NPV (Net Present Value) in year 10 AUD 168 thousand and IRR (Internal Rate of Return) reaches 11.86%

This prospectus provides a financial summary for the integration of commercial cattle breeding into an oil palm operation in Kalimantan or Sumatera. It assumes that cattle will be managed professionally and with a commercial approach to production. It is not relevant to smallholder cattle production systems. Costings and assumptions are based on applied research conducted by the Indonesia-Australia Commercial Cattle Breeding Program from 2016 to 2020. Additional information on commercial cattle breeding in Indonesia is available on www.iaccbp.org and on www.redmeatcattlepartnership.org

Please scan QR Code to download the spreadsheet's calculation

2. 2. Cattle Breeding Business Operations in the Palm Oil Plantation[1]



Cattle in the stockyard every 3 months

- A certain number of cattle herd (a colony) is rotationally grazed in the plantation's blocks (rotational grazing) using a cell system rounded with electric fencing set. One full cycle of rotational grazing is approximately 90 days.
- Every 3 months the cattle is returned to the cattle yard/ pen for pregnant test, weighing, weaning, progeny selection, cattle selection for sale etc. For certain case, cattle is brought back to cattle yard/pen for special treatment such as isolation or quarantine.
- The estimated values of hectares required for grazing in year 1 is 2,500 ha and gradually increase to 4,000 ha in year 10. This assumption is calculated annually, based on the projected number of adult cattle and multiplied by the estimated required grazing area per head.[2]

1 See more details in IACCB Commercial Cattle Breeding Manual. Free download in www.iaccbp.org and www.redmeatcattlepartnership.org

2 See more details Annex 4. The estimated values of hectares required for grazing

3. Initial Capital Investment Required

No	Category	Qty	Unit	Price/unit	Total
1	**Cattle Purchase**				
	Breeding Females (Cows)	500	head	AUD 1,850.00	AUD 925,000.00
	Breeding Bulls	25	head	AUD 2,500.00	AUD 62,500.00
2	**Breeding Center**				
	Cattle Yard	1,000	m2	AUD 20.00	AUD 20,000.00
	Pen	300	m2	AUD 20.00	AUD 6,000.00
3	**Ranch and Office Equipment**				
	Electring fencing	1	set	AUD 30,000.00	AUD 30,000.00
	Cattle crush, digital weighing scale etc	1	set	AUD 13,000.00	AUD 13,000.00
	Water/electricity Installation	1	set	AUD 1,000.00	AUD 1,000.00
	Other ranch equipment and tools	1	set	AUD 1,000.00	AUD 1,000.00
	Office equipment	1	set	AUD 1,000.00	AUD 1,000.00
	Mini truck	1	unit	AUD 18,000.00	AUD 18,000.00
4	**Pasture Preparation**				
	Ploughing, cuttings purchase, fertilizing, sowing etc	8	ha	AUD 960.00	AUD 7,680.00
				TOTAL	**AUD 1,085,180.00**

The initial capital investment[3] required is AUD 1.085 million with the following details:

- 500 (five hundred) cows with weight around 380-400 kg
- 25 (twenty five) 450-500 kg bulls
- Cost for cattle yard 1,000 m2 (include cattle race/gang way and loading/ unloading ramp) and pen 300 m2 (include handling/calving pen).
- Buying 1 (one) set of import brand electric fencing for *rotational grazing*[4]
- Buying 1 (one) set of equipment and supplies include import made cattle crush, digital scale, feed throughs and other equipment as well as electricity/water installations
- Buying 1 (one) unit of used mini truck for transporting feed/ water, electric fencing, cattle and other purposes
- Pasture preparation for additional forage in the area of 8 ha, the costs include ploughing, seeds/cuttings purchasing, fertilizing and sowing[5]

3 The initial investment value may vary depending on cattle purchasing price, type of infrastructure materials or quality of equipment.

4 Usually the electric fencing set consist of reel geared, tester faultfinder, energizer, solar panel with mounting kit, lead connector single, earth rod and clamp, reel stand, treadin steel dan battery. Number of items, its specification and price may vary, depend on the brand and supplier. The quantity of electric fencing set can also be added or lessed, based on the geographic condition of the plantation and number of herd colonies

5. The additional area required for forage plantation is explained is section 6. Daily Operational Cost. The detailed calculation can be seen in Annex 3. The estimation of required additional area for producing forage

4. Monthly Operational Costs

No	Category	Qty	Unit	Price/unit	Total
1	Labour (person/month)				
	Manager	1	person	AUD 1,500.00	AUD 1,500.00
	Paramedic	1	person	AUD 600.00	AUD 600.00
	Stockmen	10	person	AUD 500.00	AUD 5,000.00
	Administration staff	1	person	AUD 500.00	AUD 500.00
2	Utilities (water/electricity) etc	1	month	AUD 100.00	AUD 100.00
3	Pen/Cattle yard repair and maintenanace	1	month	AUD 250.00	AUD 250.00
4	Vehicle repair and maintenance	1	month	AUD 250.00	AUD 250.00
5	Transportation and fuel	1	month	AUD 300.00	AUD 300.00
6	Others	1	month	AUD 100.00	AUD 100.00
TOTAL					**AUD 8,600.00**

- Estimated monthly operational costs[6] during the first year is AUD 8,600 with an assumption of 3% yearly increase
- Monthly operational costs comprised of:
  - Labour cost of 13 workers. In year 1, the workers are 1 Ranch Manager, 1 Paramedic, 1 Admistration staff and 10 Stockmen[7] who manage herd in 2 (two) colonies, those include feed/water providers and caretaker of feed warehose.[8]
  - Overhead cost for pens repair/maintenance, pen utilities, vehicle operations and other costs

5. Other Annual Operational Costs

No	Category	Qty	Unit	Price/unit	Total
1	Animal health services (medicine, vitamines etc)	545	head	AUD 2.50	AUD 1,361.25
TOTAL					**AUD 1,361.25**

Beside the above monthly operational costs, there is an annual animal health related costs include medicines, vitamines and other health services.

The animal health cost is assumed AUD 2.50/hd/year and increase 3% yearly. This is categorized as a variable cost and calculated based on the average number of the herd stock in the respective year.

6 The estimated operational cost may vary depending on animal health costs, number of workers during the initial stage, workers' wages and overhead costs components

7 From year 2 onwards, the number of stockmen is automatically calculated with a ratio of 1:100 (one stockman can manage 100 head of cattle). Number of workers and the ratio could be adjusted based on the company's need and ability

8 A colony is a number of cattle which are grazed is one location. For this simulation, 1 (one) colony in year 1 is similar with 250 head.

6. Daily Operational Cost

No	Category	Cost/hd/day	
1	Feed Intake Cows		
	Grazing	AUD	0.60
	Pen	AUD	0.80
2	Feed Intake Growers		
	Grazing	AUD	0.50
	Pen	AUD	0.70

Daily operational costs include feed cost[9] for cows and growers, which consists of forage, concentrate and mineral supplementation.[10]

See the details below:

- The average feed intake costs for cows (concentrate supplement) that are grazed in the plantation is AUD 0,60/ head/day, and for cows that are in the pen (during specific treatment) is AUD 0.80/head/day.[11]
- The average feed intake costs for growers (concentrate supplement) that are grazed in the plantation is AUD 0,50/ head/day and for growers that are in the pen (during specific treatment) is AUD 0.70/head/day.[12]
- 95% of total herd is assumed grazed in the plantation, and 5% is in the pen for specific treatment
- To fulfill the required quantity for forage that consumed by the cattle that are treated in the pen, it requires additional 8 ha of an empty area for producing the forage.[13]
- It is assumed that feed cots will increase by 0.5% every year.

9 Feed cost may vary depending on the feed composition, percentage of feed material required, percentage of dry matter in the commodities used, and feed materials price

10 Mineral supplementation comprised of DCP (Dicalcium Phosphate or dicalcium phosphate), ZA (zwavelzure ammoniac or ammonium sulphur) and salt

11 See more details Annex 1. Feed Composition Daily Concentrate Supplement of Cows. Feed commodities composition and its price may vary, depends on the availability in each region. Changes in feed composition will affect cows body weight. Occasionally additional forage are also provided to the cattle in the grazing area

12 See more details Annex 2. Feed Composition Daily Concentrate Supplement of Growers. Feed commodities composition and its price may vary, depend on the availability in each region. Variation in feed composition will affect growers body weight. The intake volume is an average and adjusted based on the weight of growers. Occasionally additional forage are also provided to the growers in the grazing area

13 See more details Annex 3. The estimation of required additional area for producing forage

7. The Assumption of Breeding Business Simulation and Cattle Stock Projection

	Year 1	Year 2	Year 3	Year 4	Year 5
Opening Stock					
Cows	500 hd	495 hd	441 hd	404 hd	436 hd
Bulls	25 hd	25 hd	24 hd	23 hd	25 hd
Female progeny	0 hd	22 hd	178 hd	293 hd	269 hd
Male progeny	0 hd	22 hd	178 hd	293 hd	269 hd
Total Opening Stock	**525 hd**	**564 hd**	**821 hd**	**1.013 hd**	**999 hd**
Female and Male Calves Born	**50 hd**	**346 hd**	**308 hd**	**282 hd**	**306 hd**
Mortality					
Female and Male progeny	6 hd	34 hd	34 hd	26 hd	26 hd
Cows	5 hd	5 hd	4 hd	4 hd	4 hd
Bulls	0 hd	0 hd	0 hd	0 hd	0 hd
Total Mortality	**11 hd**	**39 hd**	**38 hd**	**30 hd**	**30 hd**
Replacement					
Cows	0 hd	0 hd	0 hd	0 hd	0 hd
Bulls	0 hd	0 hd	0 hd	3 hd	0 hd
Total Replacement	**0 hd**	**0 hd**	**0 hd**	**3 hd**	**0 hd**
Cattle Sales					
Female progeny	0 hd	0 hd	11 hd	76 hd	69 hd
Male progeny	0 hd	0 hd	22 hd	152 hd	137 hd
Cull cows	0 hd	49 hd	44 hd	40 hd	43 hd
Cull bulls	0 hd	1 hd	1 hd	1 hd	1 hd
Total Cattle Sales	**0 hd**	**50 hd**	**78 hd**	**269 hd**	**250 hd**
Closing Stock					
Cows	495 hd	441 hd	404 hd	436 hd	457 hd
Bulls	25 hd	24 hd	23 hd	25 hd	24 hd
Female progeny	22 hd	178 hd	293 hd	269 hd	272 hd
Male progeny	22 hd	178 hd	293 hd	269 hd	272 hd
Total Closing stock	**564 hd**	**821 hd**	**1,013 hd**	**999 hd**	**1,025 hd**
Bulls : Cows Ratio	**5%**	**5%**	**6%**	**6%**	**5%**

	Year 6	Year 7	Year 8	Year 9	Year 10
Opening Stock					
Cows	457 hd	471 hd	489 hd	509 hd	528 hd
Bulls	24 hd	26 hd	25 hd	27 hd	26 hd
Female progeny	272 hd	290 hd	301 hd	310 hd	323 hd
Male progeny	272 hd	290 hd	301 hd	310 hd	323 hd
Total Opening Stock	**1,025 hd**	**1,077 hd**	**1,116 hd**	**1,156 hd**	**1,200 hd**
Female and Male Calves Born	**320 hd**	**330 hd**	**342 hd**	**356 hd**	**370 hd**
Mortality					
Female and Male progeny	26 hd	28 hd	30 hd	32 hd	34 hd
Cows	5 hd	5 hd	5 hd	5 hd	5 hd
Bulls	0 hd	0 hd	0 hd	0 hd	0 hd
Total Mortality	**31 hd**	**33 hd**	**35 hd**	**37 hd**	**39 hd**
Replacement					
Cows	0 hd	0 hd	0 hd	0 hd	0 hd
Bulls	3 hd	0 hd	3 hd	0 hd	3 hd
Total Replacement	**3 hd**	**0 hd**	**3 hd**	**0 hd**	**3 hd**
Cattle Sales					
Female progeny	65 hd	70 hd	74 hd	75 hd	78 hd
Male progeny	129 hd	140 hd	147 hd	149 hd	155 hd
Cull cows	45 hd	47 hd	48 hd	50 hd	52 hd
Cull bulls	**1 hd**	**1 hd**	**1 hd**	**1 hd**	**1 hd**
Total Cattle Sales	**240 hd**	**258 hd**	**270 hd**	**275 hd**	**286 hd**
Closing Stock					
Cows	471 hd	489 hd	509 hd	528 hd	548 hd
Bulls	26 hd	25 hd	27 hd	26 hd	28 hd
Female progeny	290 hd	301 hd	310 hd	323 hd	336 hd
Male progeny	**290 hd**	**301 hd**	**310 hd**	**323 hd**	**336 hd**
Total Closing stock	**1,077 hd**	**1,116 hd**	**1,156 hd**	**1,200 hd**	**1,248 hd**
Bulls : Cows Ratio	**6%**	**5%**	**5%**	**5%**	**5%**

- The initial cattle investment is 500 cows and 25 bulls
- The estimated number of calved cows in year 1 is only 10% or 50 head from total 500 head of cows. The progeny is assumed to be 50% (fifty percent) male and 50% (fifty percent) female. From year 2 onwards, the estimated calving rate is 70% per year.
- The assumption of calves mortality rate is 10%
- Starting year 2, every year the unproductive cows which are 10% of total cows will be sold
- The unproductive bull will also be sold starting year 2 (1 head/year). To keep the bulls ratio of 5% (1 bull : 20 cows), 3 new productive bulls will be purchased every 2 years starting year 4.

- The half of female progeny will be sold at age 18 months (50%) and the other half will be retained, grown up as cows. The sales of female progeny is started in year 3.
- All male progeny is sold at age 24 months and the sales is started in year 3
- Total cattle sales within ten years will be 518 head (five hundred eighteen) of female progeny with average weight of 292 kg[14] , 1,031 (one thousand thirty one) of male progeny with average weight of 374 kg[15] , 418 (four hundred eighteen) culled cows with average weight of 450 kg and 9 (nine) culled bulls of approximately 500 kg live weight.
- Closing stock in year 10 will be 1,248 (one thousand two hundred forty eight) head.

14 Estimated ADG (Average Daily Gain) of female progeny after weaning from 4-18 months old is 0.45 kg. The assumption of weight increase is by consuming forage in the plantation and consuming additional intake of concentrate supplement as can be seen in Annnex 2. Feed Composition Daily Concentrate Supplement of Growers. ADG may vary, depend on the feed quality and quantity.

15 Estimated ADG (Average Daily Gain) of male progeny after weaning from 4-24 months old is 0.45 kg. The assumption of weight increase is by consuming forage in the plantation and consuming additional intake of concentrate supplement as can be seen in Annnex 2. Feed Composition Daily Concentrate Supplement of Growers. ADG may vary, depend on the feed quality and quantity.

8. Cash Flow Projection

	Year 1	Year 2	Year 3	Year 4	Year 5
# Cattle Sales					
Female progeny	0 hd	0 hd	11 hd	76 hd	69 hd
Male progeny	0 hd	0 hd	22 hd	152 hd	137 hd
Cull cows and bulls	0 hd	50 hd	45 hd	41 hd	44 hd
Cash In					
Cattle Sales	AUD -	AUD 88,446.00	AUD 135,737.85	AUD 460,536.09	AUD 430,857.19
Other Revenue	AUD -	AUD -	AUD 87,525.00	AUD 90,150.00	AUD 92,850.00
Cattle Terminal Value Year 10	AUD -	AUD -	AUD -	AUD -	AUD -
Sub Total Cash In	**AUD -**	**AUD 88,446.00**	**AUD 223,262.85**	**AUD 550,686.09**	**AUD 523,707.19**
deducted by					
CAPITAL EXPENDITURE					
Investment Costs	AUD 1,085,180.00	AUD 515.00	AUD 7,956.75	AUD 8,136.36	AUD -
Sub Total Capital Expenditure	**AUD 1,085,180.00**	**AUD 515.00**	**AUD 7,956.75**	**AUD 8,136.36**	**AUD -**
Cash Out					
Operational Costs	AUD 217,702.25	AUD 223,430.69	AUD 271,714.07	AUD 302,307.92	AUD 306,816.42
Sub Total Cash Out	**AUD 217,702.25**	**AUD 223,430.69**	**AUD 271,714.07**	**AUD 302,307.92**	**AUD 306,816.42**
CASH SURPLUS (DEFICIT)	**(AUD 1,302,882.25)**	**(AUD 135,499.69)**	**(AUD 56,407.97)**	**AUD 240,241.81**	**AUD 216,890.76**
Cumulative Cash Flow	**(AUD 1,302,882.25)**	**(AUD 1,438,381.94)**	**(AUD 1,494,789.91)**	**(AUD 1,254,548.10)**	**(AUD 1,037,657.34)**

	Year 6	Year 7	Year 8	Year 9	Year 10	Cumulative 10 yrs
# Cattle Sales						
Female progeny	65 hd	70 hd	74 hd	75 hd	78 hd	518 hd
Male progeny	129 hd	140 hd	147 hd	149 hd	155 hd	1,031 hd
Cull cows and bulls	46 hd	48 hd	49 hd	51 hd	53 hd	427 hd
Cash In						
Cattle Sales	AUD 416,373.46	AUD 450,313.64	AUD 473,900.46	AUD 485,786.70	AUD 508,354.11	AUD 3,450,305.49
Other Revenue	AUD 95,625.00	AUD 98,500.00	AUD 101,475.00	AUD 104,500.00	AUD 107,650.00	AUD 778,275.00
Cattle Terminal Value Year 10	AUD -	AUD -	AUD -	AUD -	AUD 1,882,969.11	AUD 1,882,969.11
Sub Total Cash In	**AUD 511,998.46**	**AUD 548,813.64**	**AUD 575,375.46**	**AUD 590,286.70**	**AUD 2,498,973.22**	**AUD 6,111,549.60**
deducted by						
CAPITAL EXPENDITURE						
Investment Costs	AUD 29,096.57	AUD -	AUD 8,324.94	AUD 9,500.78	AUD 8,422.39	AUD 1,157,132.78
Sub Total Capital Expenditure	**AUD 29,096.57**	**AUD -**	**AUD 8,324.94**	**AUD 9,500.78**	**AUD 8,422.39**	**AUD 1,157,132.78**
Cash Out						
Operational Costs	AUD 318,255.76	AUD 331,837.71	AUD 351,265.24	AUD 364,072.61	AUD 386,063.67	AUD 3,073,466.34
Sub Total Cash Out	**AUD 318,255.76**	**AUD 331,837.71**	**AUD 351,265.24**	**AUD 364,072.61**	**AUD 386,063.67**	**AUD 3,073,466.34**
CASH SURPLUS (DEFICIT)	**AUD 164,646.13**	**AUD 216,975.93**	**AUD 215,785.28**	**AUD 216,713.31**	**AUD 2,104,487.17**	**AUD 1,880,950.48**
Cumulative Cash Flow	**(AUD 873,011.21)**	**(AUD 656,035.27)**	**(AUD 440,249.99)**	**(AUD 223,536.68)**	**AUD 1,880,950.48**	

Cash flow Projection Analysis

ROI (Return on Investment)	144.37%
IRR (Internal Rate of Return)	11.86%
Cumulative Cash Flow	AUD 1,880,950.48
NPV (Net Present Value)	AUD 168,184.06
Positive Cash Flow	Year 4
PBP (Pay Back Period)	Year 10

9. Cash Flow Projection Analysis

- Source of revenue:

  (1) All female progeny sales at age 18 months old

  (2) All male progeny sales at age 24 months old

  (3) Culled cow sales

  (4) Culled bull sales.

  (5) Other revenues, include the benefits to palm oil plantation such as the savings of weeding costs and the savings of organic fertilizing costs

- It is assumed that selling price[16] of 2 years old male growers is AUD 5.00/kg live weight (app. 374 kg) and 18 months female growers is AUD 4.30/kg live weight (app. 292 kg). Meanwhile, cows selling price with an average live weight of 450 kg is approximately AUD 3.90/kg and a culled bull weighing around 500 kg is AUD 4,00/kg. The selling price is assumed to increase by 0.5% per year
- Within ten years, 1,549 progeny, 427 culled cows and culled bull are sold with total revenue AUD 3.450 million.
- Beside the cattle sales, the other revenues are coming from the savings of weeding costs and the efficiency in organic fertilizing costs which are calculated starting year 3 onwards. The estimated savings of weeding costs is AUD 8.00/ha and the efficiency from organic fertilizing is AUD 25.00/ha then those are multiplied by the initial grazing area of 2,500 ha. The other revenues are assumed 3% increase yearly. In year 10, the total of other revenues reach AUD 778 thousand.
- Final stock in year 10 will be 1,248 head and the estimated cattle terminal value will be AUD 1.882 million
- Total investments over ten years, including the cattle purchased and recondition of its infrastructure is AUD 1.157 million.
- Total estimated operational costs over ten years- including feed, health service, labour costs and other overhead costs are around AUD 3.073 million.
- Projected cumulative cash flow at the end of year 10 is surplus AUD 1.880 million.
- Based on the analysis, positive cash flow can be achieved in year 4. Pay back period will be obtained in year 10.
- Taking into account the terminal value of herd closing stock, IRR (Internal Rate of Return) in year 10 will reach 11.86% and ROI (Return on Investment) 144.37%.

16 Selling price/kg varies per region and is depending on sale time. Selling price has significant impact on the revenue

10. BX Cattle Breeding Business Risks

In order to run the business as planned, you should always pay attention to and maintain the cattle productivity performance parameters, including:

Body Condition Score: Always maintain BCS (Body Condition Score) of Cows in ideal condition ≥3. Non-ideal BCS will reduce reproductive ability of the cows.

Average Daily Gain: Maintain ADG (Average Daily Gain) of weaned calves to meet the targeted weight. Lower ADGs will impact final weight of sales cattle.

Cattle mortality rate including abortion and still birth. Abortion and still births will affect the number of calves born. Calf death rate will affect the number of growers and finished cattle for sale. Meanwhile, cow and bull deaths will reduce the calving rate and increase the cost of purchasing new cattle for replacement,

Cull unproductive cows. All cows that failed to conceive within the targeted period and not immediately culled (sold) can potentially increase feed cost. Delay in culling and replacing unproductive cows with new pregnant cows extend the calving interval and reduce the calving rate

Annex 1. Feed Composition Daily Concentrate Supplement of Cows

Commodity	Grazing			Pen		
	Volume /hd	Price /kg	Costs	Volume /hd	Price /kg	Costs
Palm Kernel Cake	2.50 kg	AUD 0.10	AUD 0.25	4.50 kg	AUD 0.10	AUD 0.45
Dedak	0.20 kg	AUD 0.42	AUD 0.08	0.20 kg	AUD 0.42	AUD 0.08
Onggok	0.20 kg	AUD 0.50	AUD 0.10	0.20 kg	AUD 0.50	AUD 0.10
Molasses	0.02 kg	AUD 0.60	AUD 0.01	0.02 kg	AUD 0.60	AUD 0.01
Mineral Mix						
DCP	0.0675 kg	AUD 0.61	AUD 0.04	0.0675 kg	AUD 0.61	AUD 0.04
Salt	0.0675 kg	AUD 0.29	AUD 0.02	0.0675 kg	AUD 0.29	AUD 0.02
ZA	0.015 kg	AUD 0.22	AUD 0.003	0.015 kg	AUD 0.22	AUD 0.003
Sub Total	3.07 kg		AUD 0.51	5.07 kg		AUD 0.71
Direct Cost of Feed Provision*			AUD 0.10			AUD 0.10
Total Costs			AUD 0.61			AUD 0.81
Rounded			**AUD 0.60**			**AUD 0.80**

*Direct cost of feed provision consist of fuel cost for feed logistic and casual labor costs. This cost is averagely calculated per head per day

Annex 2. Feed Composition Daily Concentrate Supplement of Growers

Commodity	Grazing			Pen		
	Volume /hd	Price /kg	Costs	Volume /hd	Price /kg	Costs
Palm Kernel Cake	1.00 kg	AUD 0.10	AUD 0.10	2.50 kg	AUD 0.10	AUD 0.25
Dedak	0.20 kg	AUD 0.42	AUD 0.08	0.30 kg	AUD 0.42	AUD 0.13
Onggok	0.20 kg	AUD 0.50	AUD 0.10	0.30 kg	AUD 0.50	AUD 0.15
Molasses	0.02 kg	AUD 0.60	AUD 0.01	0.02 kg	AUD 0.60	AUD 0.01
Mineral Mix						
DCP	0.0675 kg	AUD 0.61	AUD 0.04	0.0675 kg	AUD 0.61	AUD 0.04
Salt	0.0675 kg	AUD 0.29	AUD 0.02	0.0675 kg	AUD 0.29	AUD 0.02
ZA	0.015 kg	AUD 0.22	AUD 0.003	0.015 kg	AUD 0.22	AUD 0.003
Sub Total	1.57 kg		AUD 0.36	3.27 kg		AUD 0.60
Direct Cost of Feed Provision*			AUD 0.10			AUD 0.10
Total Costs			AUD 0.46			AUD 0.70
Rounded			**AUD 0.50**			**AUD 0.70**

* Direct cost of feed provision consist of fuel cost for feed logistic and casual labor costs. This cost is averagely calculated per head per day.

Annex 3. The estimation of required additional area for producing forage

	Cows	Growers
Average liveweight	450 kg	280 kg
% DM required in feed (of live weight)	2.5%	2.5%
DM/hd/day required	11.3 kg	7.0 kg
Forage		
% forage required	80%	80%
DM required from forage/head/day	9.0 kg	5.6 kg
% DM	25%	25%
Forage required /head/day (rounded)	**36 kg**	**22 kg**

DM=Dry Matter

FM= Fresh Matter

The average weight of cows is assumed 450 kg/head and the needs of Dry Matter (DM) /head/day is 2.5% of the weight or 11,3 kg/ head/day. The required DM of Forage is 80% of Total Feed or 9.0 kg. If % DM Forage is 25% then the requirement for Fresh Matter (FM) of Forage is circa 36 kg per head/day.

The average weight of growers is assumed 280 kg (average weight from weaning age to the age at sale). Using similar formula, the growers require DM Forage 5,6 kg or FM Forage 22 kg per head/ day

Forage's harvest result (DM)	
Forage's harvest result FM /ha/year	100,000 kg
% DM Forage	25%
Production of DM Forage /ha/year	25,000 kg
(% palatable)	85%
Avg. Forage's harvest result DM /ha/year	**21,250 kg**

Assumption of forage's harvest result (King Grass) per ha/year is 100 ton. With 25% of DM Forage, the production of DM Forage is 25 ton per ha/year. If only 85% is palatable, the average harvest result of DM Forage is 21.250 ton /ha/year.

	Avg./year
No. of herd in the pen (5% of avg. total herd)	
Cows and Bulls	30 hd
Growers	30 hd
DM Forage required over 1 year	
Cows and Bulls	99,191 kg
Growers	61,095 kg
Total	**160,286 kg**

Required Area for Forage Plantation	7.5 ha
Rounded Area	**8 ha**

From total herd per year, it is assumed that only 5% is in the pen for specific treatment. After a rounded calculation, in average there are circa 30 cows-and-bulls and 30 growers in the pen/year. Multiplied by 9 kg for cows and 5,6 kg for growers, it requires 160 ton DM Forage/year. If the annual requirement of 160 ton divided by the forage's harvest result of 21 ton/year, it needs additional 8 ha of an empty area (rounded) to plant additional forage to feed the 5% of the herd in the pen.

Assumption	Unit / Price
Forage plantation area	8 ha
Initial Investment (/ha)	
Cuttings purchase costs King Grass /ha	AUD 480.00
Ploughing costs /ha	AUD 250.00
Fertilizing costs /ha	AUD 130.00
Sowing costs /ha	AUD 100.00
Operational costs /cycle/ha	
Fertilizing costs /ha	AUD 130.00
Application costs /ha	AUD 20.00

The estimated value of investment for 8 ha is AUD 960 per ha, comprises of ploughing cost, purchasing cost for King Grass' cuttings, fertilizing and sowing[17] . The assumption for yearly operational costs are for fertilizing cost and application costs 2 times per year or in total AUD 150 per cycle /ha and is assumed 3% yearly increase.

17 8 ha requires +/- 32,000 King Grass' cuttings with the price of AUD 150/cutting. The assumption of planting distance for King Grass is 40 cm (in row) x 80 cm (between rows). In a 1 ha of 100 m x 100 m, there are 250 cuttings and for between rows there are 125 cuttings = 31,250 cuttings (rounded to 32,000 cuttings). The assumption of required fertilizer is 200 kg x AUD 0,65/kg. The cost, price and application varies per region and geographic condition

Annex 4. Estimated Annual Requirement of Feed and Land

	Year 1	Year 2	Year 3	Year 4	Year 5
Projected no of adult cattle /year	520 hd	509 hd	735 hd	737 hd	741 hd
Estimated required grazing area /hd	4 ha	4 ha	4 ha	4 ha	4 ha
Estimated required grazing area	2,080 ha	2,036 ha	2,940 ha	2,948 ha	2,964 ha
Estimated required grazing area (rounded)	**2,500 ha**	**2,500 ha**	**3,500 ha**	**3,500 ha**	**3,500 ha**

	Year 6	Year 7	Year 8	Year 9	Year 10
Projected no of adult cattle /year	779 hd	810 hd	838 hd	868 hd	904 hd
Estimated required grazing area /hd	4 ha	4 ha	4 ha	4 ha	4 ha
Estimated required grazing area	3,116 ha	3,240 ha	3,352 ha	3,472 ha	3,616 ha
Estimated required grazing area (rounded)	**3,500 ha**	**3,500 ha**	**4,000 ha**	**4,000 ha**	**4,000 ha**

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