final report

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Indonesian Cattle Breeding Demonstration – Way Laga

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Abstract

The Indonesian government's policy objective to become self-sufficient in beef production could become a reality if a vast untapped resource of pruned palm fronds from palm oil plantations can be fully utilised to support an additional 4.5 million breeder cattle, which could all potentially be sourced from northern Australia. However, while palm fronds are palatable, they are of low nutrient value and the additional nutritional inputs to achieve acceptable breeding results still need to be determined.

An MLA funded project studying the reproductive performance of 50 Brahman heifers on a palm frond basal diet produced conception rates of 100%; calving to conception intervals of 13.1 weeks; and calf losses of only 4%. While the exercise was not cost effective in the 50 head project feedlot (loss of $458/head, but breeders were fed to excess with tapioca waste), it was hypothesized that a 300 head model, with retention of weaners until slaughter, could produce a return on investment of 3.7% after 7 years; the real profits are achieved in the grow-out phase.

This project has generated considerable interest and support with approximately 100 government officials and plantation owners attending a symposium on the concept. Additionally, the manure produced as a by-product provides additional incentive to create sustainable farming ecosystems. More research is required to develop better rations at a reduced cost and to explore the social, environmental and political opportunities of this breeding model. This project has, however, unequivocally demonstrated that Australian Brahman breeders can perform at the highest level of reproductive efficiency expected in a well-managed breeder operation in an Indonesian palm oil plantation.

Executive summary

Many factors have driven the investigation of alternative beef cattle breeding systems in Indonesia, such as, the changes in the flow of beef in south east Asia towards southern China, Indonesian government initiatives to become self-sufficient in beef production, and a requirement for existing lot feeders in Indonesia to support local beef breeding in order to maintain import quotas for feeder steers from Australia. The current palm plantations in Indonesia could conservatively support a beef breeding herd of 4.5 million head of cattle if a cost effective system can be developed to harness this source of cattle feed which is currently not being utilised.

With the support of the Live Export Program, a model for breeding beef cattle has been developed by the management of Juang Jaya Abdi Alam (JJAA) feedlot (PT Agro Giri Perkasa, PT AGP). The key elements of this model have been drawn from a mixture of Indonesian and Australian expertise and involve a low cost diet consisting of approximately 50% palm leaves.

The average nutrient value of palm leaves sampled and submitted to Dairy One in the US was quite variable with Dry Matter = 46% (39% - 55%), Crude Protein = 6.96% (5.1% – 12.4%), and Metabolisable Energy 7.57 MJ/kg (4.94 MJ/kg – 10.16 MJ/kg). These values reflect the stage of maturity of the frond but as the bulk of the supply for cattle production will be obtained from routine collection of pruned mature fronds, it is envisaged that the nutrient value of the product available will reflect the lower end of the range portrayed above.

An MLA funded project has helped develop a 50 head feedlot on the island of Sumatra into which 50 pregnant Brahman heifers (ex north Australia) were introduced to see how they would perform on a palm frond based diet. The diet had previously been trialled at the JJAA feedlot.

After several setbacks including a delayed start, 10 abortions in the initial group of heifers, and loss of weight on the initial diet, a full reproductive cycle was able to be captured with the Australian Brahman heifers which were used in the project. The reproductive performance of the animals was excellent with 100% conceptions being achieved and an average Calving to Conception Interval (CCI) of 13.1 weeks (range 4.4 – 21.4 weeks) being recorded. Although the herd was relatively small, calf losses of only 4% established a new benchmark for breeder cattle in Indonesian feedlots and mortality rates in the breeders was restricted to 4% as well. Despite exhaustive efforts to investigate the abortions in the initial group of heifers, no cause was able to be established. There is a potential threat to the economic performance of high input breeder operations if calf output cannot be assured.

There have been lingering concerns about the perceived fertility of Australian Brahman breeders in Indonesian farming systems. This project has unequivocally demonstrated that Australian Brahman breeders can perform at the highest level of reproductive efficiency expected in a well-managed breeder operation in Indonesia.

The low number of animals involved, the narrow range of condition scores (mean 2.93, range 2-4) recorded in the breeders, and the addition of extra energy to the ration during pregnancy and

lactation, all contributed to the fact that no relationship could be established between body condition score (BCS) at calving and CCI. Calf birth weights only averaged 20.6 kgs (range 16 – 31 kgs). This may have been a breed effect but also a low protein diet effect. The growth rates in the calves was only 619 gms per day, and again, this is probably due to the low protein content in the diet affecting the milk production of the dams despite the fact that the cows were all in good body condition. The Total Mixed Ration (TMR) for lactation had an energy content of 12.3MJ/kg DM and crude protein of 6.0% while the TMR during pregnancy was 11.9 MJs/kg DM and crude protein of 7.3%.

The actual financials for Way Laga indicate a loss of around $22,000 per annum for a 50 head breeder operation when weaners are sold for $5.56/kg at 90 kg. If the loss is spread over the 48 weaners “sold” then the individual loss is $458 per weaner. This implies that if the 50 head model for selling weaners was to break even, then a price of $10.60 per kg live weight at 90 kg would be required. Manure production was estimated at 3000 kg per week for the economic assessment of the 50 head feedlot. At 1 cent/kg, this represents a minimum return from the faeces of AUD $30 per week. Other estimates of the value of manure to the plantation are also discussed in the report.

Although the 50 head operation was not profitable, predictive modelling has indicated that a 300 head feedlot could provide positive financial outcomes if the unit were increased to a realistic commercial scale and if ownership of the weaners was retained until slaughter. The figures for performance of the weaners from weaning to slaughter were based on actual costs and growth rates in the AGP feedlot on an AGP ration (not palm fronds) as no data was available for weaner growth in a palm plantation feedlot at this time. A return on investment of 3.7% after 7 years was predicted.

A field day and symposium was held on Wednesday 13 March 2013. Approximately 100 people attended from a range of backgrounds. The Ministry of State Owned Enterprises, which is responsible for the PTP government owned palm plantations, sent representatives from eight PTP regions: 1, 3, 4, 5, 6, 7, 8 and 13. The larger private plantation companies who sent representatives included Sampoerna, Astra, Citra Borneo, Inda Gunilang Perkasa, BIO Nusantara Tecknologi, Paeco Agung, and Aman Jaya Group. These plantations represent more than 1 million hectares of palm oil trees, or more than 10% of national production capacity. Some of the feedback included (1) concerns surrounding the complexity of taking on an additional enterprise within the plantation; (2) the potential for internal and external corruption, which would be difficult to control; (3) the profit margins do not justify the effort and new management that would be required; (4) the opportunities for corruption and theft include, but are not limited to stealing cattle feed; secret commissions on the rations; stealing cattle/calves; and stealing funds from the proceeds; and (5) the level of profit margin does not make the extra effort to control this potential leakage justifiable.

Extension and promotional material has been prepared. Social media outlets such as Facebook and YouTube have been utilised to capture a wider and more engaging audience. (http://www.facebook.com/pages/Way-Laga-Cattle-Palm-Integration-

Project/351227811662621?fref=ts). Presentations and videos have been produced in Bahasa Indonesian language and English from the seminar, which are publicly available on Facebook and Youtube. Further analysis and promotion will occur post this project as momentum grows and interest in the concept develops.

Recommendations

Recommendations for future development and support of the breeder cow initiatives in Indonesia include

1. Refining ration to (a) ascertain the reproductive performance at higher levels of palm frond content and lower levels of energy supplements to reduce overall ration costs; (b) examine the impact of higher protein content of ration to improve calf birth weight and calf growth rates; (c) investigate rations for weaner steers in palm oil plantations and establish most cost effective options from weaning to slaughter; (d) explore silage options for palm frond collection and investigate the variation in quality of palm fronds with time of harvest and (e) explore alternate sources for protein in breeder feedlots for example Mucuna sp., Leucaena, chicken manure, etc.

2. More economic assessment and modelling including a full economic analysis of the palm plantation/beef production farming system incorporating palm frond pruning in palm plantation with collection of frond for rations; examination of the feedlot waste systems and full benefits of using feedlot waste as an organic source of fertiliser; exploring the social economic impacts of using plantation staff in multi skilled work force; and examination of the various business models ranging from full plantation ownership of the feedlot to contracting out the lot feeding operations to small farm holders.

3. Build capacity in ration management and health investigations. In conjunction with Indonesian veterinary health officials and pathology laboratories in Australia, investigate pre- and post-natal calf losses in Indonesian feedlots and examine the herd health options and vaccination programs for Indonesian breeder feedlots.

4. Examine the impact of genetic improvement in breeder feedlots.

ACKNOWLEDGEMENTS

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Contents

1 Background

Indonesia is Australia's largest and most important live cattle export market. The Indonesian Government has been concerned about the decline in local cattle production for some time and has a goal to be self-sufficient in beef supply by 2014. In an attempt to politically and publically demonstrate their commitment to beef self-sufficiency targets, in early June 2010, the Indonesian Government began implementing a series of measures to restrict the supply of imported live feeder cattle. These restrictions have caused considerable market disruption and industry concern. Import permits were issued for 283,000 head in 2013 at the start of the year which was well down on the record level of 690,000 head in 2009.

In addition to the reduction in import permits, local lot feeders have been required by the government to become involved in a range of other beef cattle enterprises in order to achieve their maximum possible share of the total import permit quota. These measures include growing breeder cattle and producing calves for further breeding and fattening; establishing local branded meat labels; purchasing local cattle for further fattening; establishing abattoirs of a high standard; and carrying out supportive projects with local beef cattle farmers. While it can be argued that supporting a move to self-sufficiency for our largest importer of live cattle is detrimental to the live export trade in Australia, the involvement of the Indonesian lot feeders in this program ensures they can continue to import feeder cattle from Australia. Secondly, and more importantly, should a successful breeder operation be established, it will create opportunities for producers in northern Australia to be able to supply a demand for young breeder stock into Indonesia.

The Indonesian government is looking to Australia to invest in Indonesian agriculture to help with breeding programs to increase local productivity. Traditionally, producing beef calves under lot feeding conditions is a very expensive exercise and is not competitive with pasture based breeder operations as the value of the calf equates to the cost of maintaining a breeder cow unit for a full 12 months in a feedlot. If the cow aborts or the calf dies then the costs increase proportionally to the extent of the calf loss. Additional energy losses occur along the calf growth pathway as feed is converted to milk which in turn is converted back to live weight gain in the form of a weaner calf. It is more energy efficient to feed the ruminant calf (> 6 weeks of age) directly. Indonesia is a very populous nation and does not have access to large tracts of cheap open grazing country, but it does have extensive well-established palm plantations where edible palm fronds are a by-product of the oil extraction industry.

With the support of the Live Export Program, a model for breeding beef cattle was developed by the management of Juang Jaya Abdi Alam feedlot (PT AGP). The key elements of this model were drawn from a mixture of Indonesian and Australian expertise and involve a low cost diet consisting of approximately 50% palm leaves (Dahlan 2001; Abu Hasan et al 1995), local agricultural waste products, and conventional feed additives delivered in large traditional-style feeding pens located in palm plantations with easy access to leaf material.

Palm fronds are free as they are cut from the tree as a normal part of plantation management. The only labour cost is in removing the leaves from the stalks and delivering them to the feed yard.

The cost shown for rice straw and napier grass in the Table 1 below are current commercial prices. The cost of AUD 4 cents per kg for palm fronds is an estimate of labour and freight charges, which is presented later in this document.

Table 1 – Roughage comparison with other available feed sources in Indonesia

Ingredient	AUD per kg as fed	%DM	AUD per kg DM	CP	CF	Fat	NDF
Rice Straw	0.025	85	0.03	4	30	2	80
Palm Fronds	0.04	40	0.10	8	36	2.5	65
Young Napier Grass	0.06	20	0.30	12	24	2.5	63
Old Napier Grass	0.05	20	0.25	9	36	2.5	75

Note: AUD = Australian dollars;

Breeding cattle have only recently been managed in Indonesian feedlots in larger numbers as a result of government policies to tie the Import Permit allocations for feeder cattle to the number of breeders managed by a feedlot company. This has led to the introduction of approximately 25,000 breeding cattle into feedlots specifically designed for feeder cattle. Despite the fact that these breeders were provided with lower densities than feeder cattle, the space per cow/calf unit was still generally high, around 5 square metres per unit. Breeder pen cleaning practices tended to be similar to feeders which were not adequate to maintain a clean environment suitable for breeding. Performance (both production and economic) has generally been poor as the relatively high stocking densities and high levels of contamination created an environment for calf diseases to flourish. Furthermore, feedlotters had little experience in managing breeders in this intensive environment. Mortality rates of calves have been reported as unsatisfactory. (*Dicky Adiwoso pers comm*).

The purpose of The Way Laga Cattle and Palm Integration Project is to demonstrate to both palm oil plantation owners and the Indonesian government that large scale beef production and breeding systems using Australian Brahman cattle and a low cost oil palm-based diet are sustainable and economically viable. If successful, an entirely new market could be developed for northern Australian breeding cattle. The potential stocking density using palm leaves allows one adult cow to be permanently fed on the fronds harvested from approximately 2 hectares of palm trees. Indonesia has 9 million hectares of palm trees suggesting that the potential market for sales of breeding cattle is extremely large – up to 4.5 million head - depending on the adoption rate, the economics of the model, and the ease of implementation.

Additionally, cattle faeces collected from the feedlot can be used as a fertilizer for the plantation, replacing more expensive imported fertilizer. Young cattle produced in this system can be either utilized as additional breeding stock or as feeder cattle for further fattening.

Over the past few years, there have been large changes in the international beef trade for both live and processed beef. The most critical change for the live cattle trade in SE Asia has been the 180 degree shift in the direction of live cattle flows. For the last 50 years or more the directional flow of live cattle in SE Asia was essentially moving from Myanmar (Burma) and Cambodia into Thailand where some of these cattle were consumed while some were sent further south down the Malay Peninsula to supply Malaysia and Singapore. Cattle and buffalo from China were also exported south into Vietnam. Since 2010, the direction has changed so that almost all cattle now move in a northerly direction from Myanmar, Thailand and Laos into southern China. Large numbers of cattle from Cambodia and Vietnam also move into southern China, where rapid economic growth and urbanization is driving strong increases in demand for beef (as well as a wide range of other food products).

Figure 1 South East Asian cattle movements 1970s to 2010

Figure 2 South East Asian cattle movements – from 2010

This new and strong flow of cattle into southern China has caused reductions in national herds in continental Southeast Asia and increased prices (*P. Barnard, MLA pers comm*) Thailand and Cambodia are now negotiating with the Australian government to import feeder cattle from Australia for the first time. Vietnam has been a small importer with capacity for further increases to support local consumption as well as producing product for export to China. The effect of these new and emerging markets is likely to result in strong competition for cattle that have traditionally been imported by Indonesia. If Indonesia does not establish a more substantial domestic herd, then it could very likely remain highly dependent on imported sources of beef and live cattle. This project offers Indonesia a model which may provide an economically viable and sustainable production system to buffer Indonesian beef requirements against changes in the global beef trade.

2 Project objectives

By June 2013:

I. Demonstrate that a large scale (up to 50 head) beef production system, using Australian Brahman cattle and a low cost oil palm based diet, is sustainable and economically viable.

2. Host at least one field day/producer symposium to be attended by at least 20 other palm oil plantation owners and relevant government officials from the Department of Agriculture in Indonesia.

3. Produce extension and promotional material that illustrates the production system involved, and outlines the cost benefits and rate of returns available through establishing the new breeding systems on Indonesian palm oil plantations.

3 Methodology

3.1 Establish facility

A Memorandum of Understanding was developed to clearly define the areas of responsibility of three main parties involved in the project: Australasian Livestock Services Pty Ltd. (ALS) (Oversight of the project), PT Agro Giri Perkasa (AGP) (supply of cattle and operational support) and PT Aman Jaya Group (AJP) (supply of land, water and palm leaves) prior to commencing the project. See Appendix 1. On 7 April 2011 the site for the construction of the cattle yard and shed was selected. The site is on a small 30 hectare palm plantation owned by the Aman Jaya Group. The location of the plantation is within 10 kilometres of the city of Bandar Lampung in Lampung province, and approximately 40 km from the AGP feedlot located to the East of Bandar Lampung. This location was selected to allow easy access from the city of Bandar Lampung, the AGP feedlot, and visitors arriving to the Bandar Lampung airport.

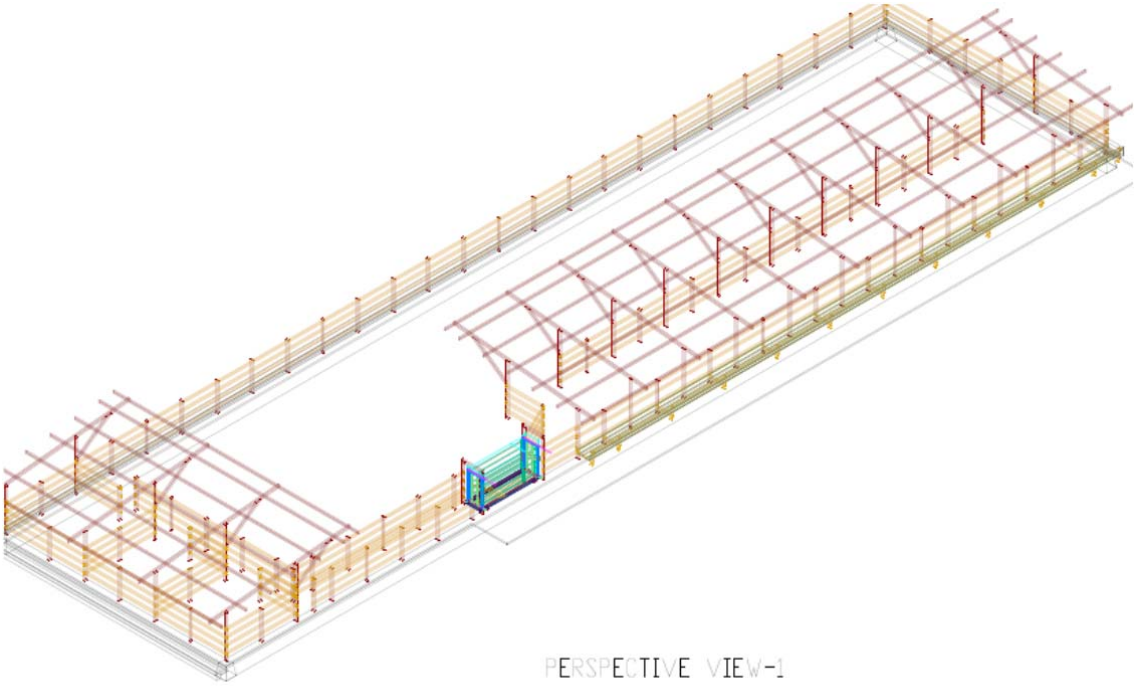
The location was a compromise which allowed relatively easy access but meant that the plantation was not large or old enough to supply enough palm leaves for all of the daily needs of the cattle. The Aman Jaya Group kindly agreed to purchase the additional leaf requirements from plantations further to the north in the Lampung region and have it delivered to the cattle yard in a regular and timely manner.

Construction commenced in May 2011 but was disrupted when the live cattle trade ban was declared by the Australian government in early June. The ban and the subsequent rush by importers to establish Export Supply Chain Assurance System (ESCAS) approved abattoirs meant that the Way Laga construction was substantially delayed as engineering assets were moved to more urgent tasks.

The feedlot was constructed using locally available products. The design aimed to provide adult cattle with a gross area of approximately 12.5 square meters per head. This area included the forcing pen, crush, race and isolation pens. Calves were provided with a creep area, which excluded cows further reducing the actual area available to the adult cattle.

The design allowed any individual cattle that need to be captured for treatment, or other reasons, to be moved to the crush with minimum stress. The design also allowed for segregation of at least two major groups of adult cattle (i.e. the pregnant and lactating groups) to allow for different feed rations to be provided to each group. This subdivision was achieved using portable panels to allow the areas for each segregated group to expand or contract as numbers changed. See engineering drawings for the yards attached in Appendix 2. Construction was completed in the second week of November 2011.

Figure 3: Design of 50 head feedlot facility



3.1.1 Introduction of stock

50 pregnant Australian Brahman heifers approximately 3 years of age were introduced to the yard on 12 November 2011. All animals were pregnancy tested in-calf and weighed at the AGP feedlot prior to delivery. Cattle were also weighed and Body Condition Scored (BCS) at intervals during the year. Weights were straight off feed as animals were retained in the feeding yard after their morning feed in order to facilitate easy access to the crush.

Two sets of blood samples were collected with the first collection on 15 December 2011 and the second collection on 26 April 2012. These collections included 3 bulls and 10 replacement heifers on 3 March to replace 10 heifers which aborted between the time of arrival at the project feedlot on 12 November and 3 March. Three Limousin Cross locally bred bulls were introduced on 18 May 2012 at the same time as the first weaning.

Pregnancy testing was conducted when animals were weighed and BCS was recorded. Frequent pregnancy testing assisted to reduce the annual cost of the ration as cows identified as pregnant were removed to a separate section of the pen where the ration was significantly cheaper than the lactating/conceiving ration.

3.1.2 Health monitoring and laboratory support

Serum was drawn off from blood samples the day after collection and frozen. The frozen serum samples were delivered to Australia under permit from the Australian Quarantine Inspection Service (AQIS) on 19 December 2012. Samples were hand carried and given to AQIS staff at the Darwin airport along with the permit.

The serum was then delivered from AQIS at the airport to the Berrimah Veterinary Laboratory in Darwin where they were stored and subsequently dispatched to the Steritech laboratory in Brisbane. This laboratory conducted the irradiation treatments prescribed in the AQIS permit. The treated samples were then returned to the Berrimah Laboratory where testing was carried out for Brucellosis (Compliment Fixation Test) and Bovine Virus Diarrhoea (Agar Gel Immunodiffusion Test). Leptospirosis testing (Microscopic Agglutination Test) was carried out by the WHO/FAO/OIE Collaborating Centre for Reference and Research on Leptospirosis – Australia and Western Pacific Region, Brisbane, Queensland.

3.1.3 Ration preparation and monitoring

The ration consisted of palm leaves followed by a mixture of concentrate fed approximately 30 minutes after the leaves. Deliveries of concentrate were coordinated through AGP feedlot and after a brief period of supply from AGP were sourced directly from commodity traders in the Lampung area. Mixing of the ration was completed entirely by hand. Samples of the ration were sent to Dairy One, a commercial feed analysis company in the USA. See summary in Table 7 in the section on the ration with details in Appendix 3. The total daily ration was split into two equal parts and fed at approximately 0830 in the morning and 1400 in the afternoon. The composition of the ration was modified a number of times during the trial according to body weight response and lactation status. The initial ration consisted of 6 kg of palm leaves (2.8kg DM), 3 kg of Palm Kernel Cake (PKC) (2.7 kg DM), 0.1 kg of salt, 0.1 kg of calcium, 0.1 kg of urea and 0.25 kg of molasses (0.20 kg DM). This mix was based on the successful performance of a smaller scale trial ran at AGP feedlot the previous year. See Table 2.

Table 2 Original ration from November 2011

Ingredient	AUD/kg	DM%	AUD/kg DM	kg fed	kg DM fed	ration %
WAY LAGA DIET (as of 5 Feb 2012)						
Salt	0.1150	100	0.1150	0.1	0.1	1.7
limestone	0.0445	100	0.0445	0.1	0.1	1.7
PKC	0.1150	89.5	0.1285	3	2.7	44.5
molasses	0.1025	81	0.1265	0.25	0.2	3.4
Urea	0.4555	100	0.4555	0.1	0.1	1.6
Tapioca waste	0.1350	85.8	0.1573			
Palm fronds	0.0400	47.4	0.0844	6	2.8	47.1
	Feed Intake			9.55	6.0	100
	Ration cost/kg			0.0704	0.1114	
	Daily feed cost			0.6721		

3.1.4 Staff and operational procedures

At most times there were four permanent staff working at the feedlot with up to two more additional workers during the busy calving period when night shifts were essential to ensure assistance during calving and that baby calves obtained their colostrum within the appropriate time. The staff members at Way Laga were all provided with prior training at the small palm leaf trial pen at AGP feedlot. As required, other support staff, such as veterinarians, repairs and maintenance, administration, and general management, were supplied through the AGP feedlot.

Cows with new born calves were initially separated into the isolation pens. Calves were weighed and ear tagged as soon as they could be safely accessed. This was usually on their first day of life. After 3-5 days cows and calves were released to join the main group of lactating and weaned cows (which included the bulls).

The mixture of manure and bedding on the floor of the cattle yard was cleaned out about once per week. The time between these cleaning events was influenced primarily by weather. The cleaning process was completed by hand using shovels and wheelbarrows. Once the waste material was dumped at the rear of the cattle yard it became the property of the plantation management who removed it at irregular intervals to fertilise their trees. The material was usually left for about one month to compost prior to being used for fertilizer. A sample of this product was

also sent to Dairy One for analysis on 16 April 2013. See summary of results in the section below on Manure with detail in Appendix 4.

Dr Neny Santy Jelita Lumbantoruan, senior veterinarian for PT AGP – on site manager of the project.

4 Results and discussion

4.1 Abortions

Of the 50 pregnant Brahman cross females that were delivered to Way Laga on 11 November 2011, 10 heifers aborted from arrival to 3 March 2012.

Table 3 Abortions within 4 months of induction

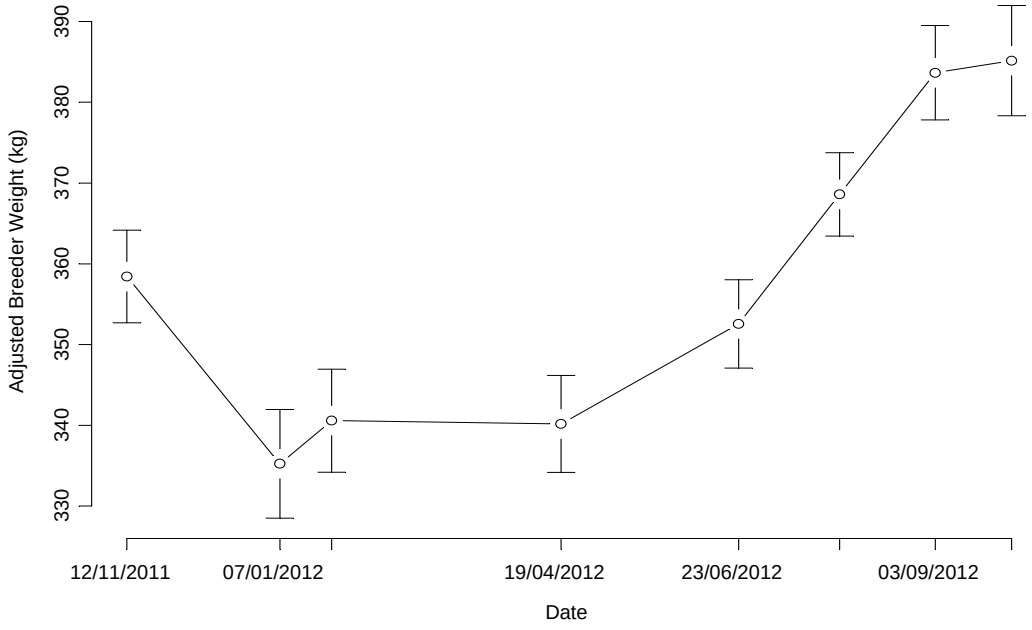
No	RFID	Ear Tag number	Remarks	Abortus Date
1	982 000162485431	1	Aborted	Before 15 Dec 2011
2	982 000149113160	5	Aborted	3-Mar-12
3	982 000090423797	24	Aborted	7-Jan-12
4	982 000123619381	27	Aborted	12-Nov-11
5	982 000184002746	32	Aborted	14-Nov-11
6	982 000123595067	33	Aborted	3-Jan-12
7	982 000123458138	34	Aborted	Before 15 Dec 2011
8	982 000184002091	36	Aborted	14-Nov-11
9	982 000163132456	40	Aborted	Before 15 Dec 2011
10	982 000138474057	46	Aborted	16-Nov-11

Four head aborted between 12 and 16 November, two head aborted on 3 and 7 January, one head on 3 March and records are incomplete for three head which aborted before 15 December. See Table 3 above and Appendix 5. These animals were removed and replaced with another 10 head of pregnant heifers from JJAA feedlot on 26 April 2012. The delay in replacing these heifers that aborted was due to the ESCAS requirements implemented at the AGP feedlot in August 2011. The original 50 heifers were initially moved outside ESCAS rules as they were originally imported as feeders and were therefore only permitted to leave the feedlot to go for slaughter. It took considerable time to have the rules for pregnant feeders clarified and then implemented. Way Laga was audited by PT Sucofindo, Department of Agriculture, Forestry, and Fisheries (DAFF), approved ESCAS Auditors in March/April 2012. The replacement heifers were then certified as pregnant by PT Sucofindo and AGP Veterinary staff in early April and subsequently allowed by DAFF to leave AGP supply chain to go to Way Laga. The 10 heifers whose calves aborted were returned to AGP to re-join the supply chain.

4.2 Live weights and body conditions scores (BCS) during pregnancy

Individual cow live weights on each of the weighing dates prior to calving were adjusted for pregnancy by back-calculating the stage of pregnancy on that date from the known date of calving. Weights were adjusted using the formula in O'Rourke et al (1991). Appendix 6. Figure 4 shows Mean Live Weights (+/- Standard Error) for Breeders on each weigh date. Weights are adjusted for stage of pregnancy determined by first calf birth date or pregnancy diagnosis (prior to second calf) using O'Rourke et.al (1991).

Figure 4 - Mean breeder cow live weights adjusted for pregnancy over time



It usually takes 2-4 weeks for stock to regain their induction weight after entry to a feedlot. However, it was apparent that after 2 months on the original palm frond ration, breeders were actually losing weight and therefore 2 ration adjustments were implemented to reverse this trend in weight change. The first ration change was implemented on 6th February 2012 and the second occurred approximately 1 month later.

4.3 Births

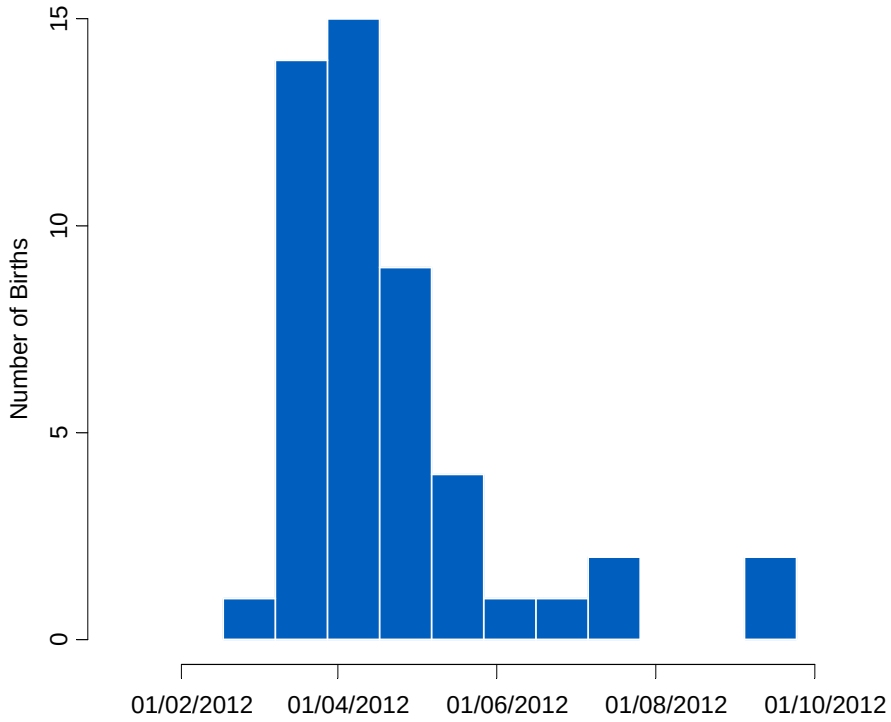
The first normal healthy calf was born on 19 March 2012 and the last of the calves was born on 21 September 2012.

One cow, Ear Tag 47, died on 10 May, 10 days after giving birth to a live calf that survived the loss of its mother. The cause of death was septicaemia as a result of a uterine infection.

(See post mortem details below.) This cow was replaced with a new cow which subsequently calved normally. A further cow, Ear Tag 17, was sold to slaughter after an extended illness. Her calf also survived but the cow was not replaced. The result of the two cow deaths is that there were 51 calves born at Way Laga during 2012 while the final number of cows remaining was only 49.

The spread of calf births was a function of the main group of pregnancies from the largest property source (Rockhampton Downs, Brand "RNT", Northern Territory) plus a small number of other cows selected at random from the AGP feedlot followed by 10 pregnant heifers selected only on pregnancy status 5 months later as abortion replacements. See Figure 5 below.

Figure 5 - Distribution of births over time at 1st calving in intervals of 3 week.



4.4 Bull management

Three Limousin-cross locally bred bulls were introduced on 18 May at the same time as the first weaning. The age of the bulls was from 2 to 3 years-old. After developing a range of back and hind leg injuries as a result of their mating activities, all three Limousin bulls were replaced on 19 June with Brahman bulls from the AGP feedlot. The bulls form the feedlot had been run together

and had developed their own social order. Moreover, they were accustomed to working on concrete floors. Locally bred bulls are tied up by a nose rope for their entire lives. As a result they are never able to complete the action of mounting. Once they are let off the rope in the yard with cows they mate normally but as a result of their lack of appropriate exercise they quickly develop back and back-leg muscle injuries to the point where they all become extremely lame. At this point they are no longer able to serve a cow and must be replaced.
It was intended that each bull would be fertility tested by the local Artificial Insemination (AI) centre. When approached to test the bulls, they would only complete the testing if we left them at the facility for several months. As this was not possible an extra bull was included as a contingency if one of the bulls was not fertile. Each bull was given a physical examination of the testicles to ensure that there were no palpable abnormalities and that their scrotal circumference was a minimum of 36 cm.

One of the Brahman bulls was observed to be dominant over the other two and at the same time it was noticed that this bull could not complete the act of copulation with the cow. This bull was removed as soon as this was reported on 10 July and was not replaced.

4.5 Breeder herd health and stock losses.

4.5.1 Cow mortality

Two cows died during the year of 2012. Cow Ear Tag 47 died on 10 May 2012 from septicaemia which resulted from a uterine infection following birth of a normal calf on 1 May. The cow was noted to be sick on Sunday 6 May. The animal was examined on 8 May when it was noted to be depressed, showed a temperature of 39.9 C, and had a purple coloured udder and vulva. Treatments of antibiotics and anti-inflammatories were administered. A post-mortem was conducted and photographed following the death of this cow. In summary, the post mortem showed a severe metritis and septicaemia. Full details and photos in Appendix 7.

Sick cow with metritis unfortunately did not respond to therapy

A second cow, Ear Tag 17, was sold for slaughter on 19 June 2012 following a series of infections beginning in the jaw and extending to many parts of the body. The cow lost considerable weight when the infection spread to several joints causing difficulty in moving around the pen (sick pen isolation). It was considered that the welfare of the cow was best served by emergency slaughter.

Purulent discharge vaginal discharge from uterine infection

Bluish discolouration of teats in downer cow with septicaemia.

With the emergency slaughter included as a death, the cow mortality rate for 2012 was 4%. According to personal communication with other breeding establishments in the Lampung province, this rate is within the normal range of annual deaths.

4.5.2 Cow morbidity

Other conditions that resulted in successful treatments or natural resolution included myiasis of the vulva, lameness, various skin lacerations/infections, tail infections, retained foetal membranes, metabolic disturbances (two head with convulsions some weeks after calf birth), and weight loss for new mothers. The small number of lactating cows that were observed to be losing an unacceptable amount of weight while feeding their new calves were placed in the isolation pens and provided with additional leaf and concentrate. When seasonally available, *Mucuna bracteata*, the legume which grows under the palm trees, was added to the feed to encourage weight gain. These cases all recovered without further treatment and re-joined the main breeder group.

4.5.3 Calf mortality

Two of the 51 calves born in 2012 died.

The first death, Calf Ear Tag Number 9259, died on 9 July 2012 as a result of being crushed by a bull when it slipped over during the act of serving a cow. The second, Calf Ear Tag Number 2242, died as a result of bloody diarrhoea and dehydration on 9 August 2012. Treatments of antibiotics and anti-inflammatories were instituted with little effect. Post mortems were carried out on both calves. See photos in Appendix 8. Two calf deaths from 51 births equates to a mortality rate of 4%.

Based on personal communication with larger feedlots in Lampung, the annual calf mortality rate is usually more than 10%. Our figure of 4% is considerably lower than the regional average.

Calf management at Way Laga was similar to that at AGP where the calf mortality is consistently more than double this figure. The low death rate at Way Laga may have been due to the fact that this is a new site with no previous contamination from calf pathogens and/or that the relatively low number of calves means that they were subject to much more individual scrutiny and care. It is also possible that the personal attention of the small number of calves ensured that colostrum was delivered at such an early stage that it provided a superior level of protection.

4.5.4 Calf morbidity

Calf illness at Way Laga in 2012 consisted of a small number of cases of diarrhoea, pneumonia, and myiasis. All but one calf responded to treatment and recovered fully. The morbidity observed was also much lower than is seen at AGP. Morbidity at AGP can average 30+% of all calves born during the rainy season (October to April) while morbidity at Way Laga was closer to 10% or less. 80% of Way Laga calves were born during the final months of the wet season February, March and April. No cases of omphalitis (navel ill) were observed at Way Laga. Both these observations are also likely to be a result of a relatively new and clean environment as well as a small number of animals to care for ensuring effective colostrum intake.

4.6 Calf and Weaner data

4.6.1 Birth weight

The average birth weight of the calves at first calving (N = 49) was only 20.6 kgs (*+/- 0.81 kg). The heifers in the project all conceived in the pens under natural mating after their initial calving. At the time of compiling this report, 36 of the breeders had calved for the second time. The average weight at the second calving was only marginally greater at 22.2 kgs.(++/- 1.03 kg) It is likely that there is a strong genetic influence here combined with an expectation of smaller calves in lot feeding situations. Small birth weights can certainly be advantageous when it comes to dystocia related problems especially in maiden heifers.

	No	Mean	Median	Range
Calf weights at 1st calving	49	20.6 kgs	21.0 kgs	16 – 31 kgs
Calf weights at 2nd calving	36	22.2 kgs	22.0 kgs	17 – 29 kgs.

(* The +/- here is a 95% confidence limit half-width which is essentially the variance in the birth weights expressed as a confidence in the estimate dependent on sample size.)

Figure 6 - Distribution of calf birth weights at first calving

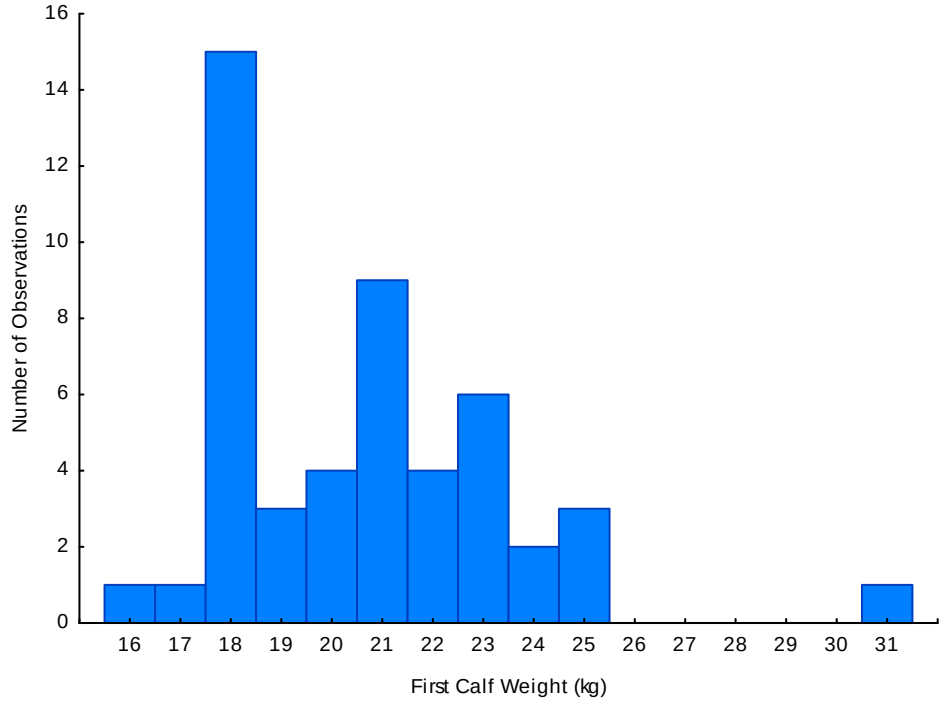
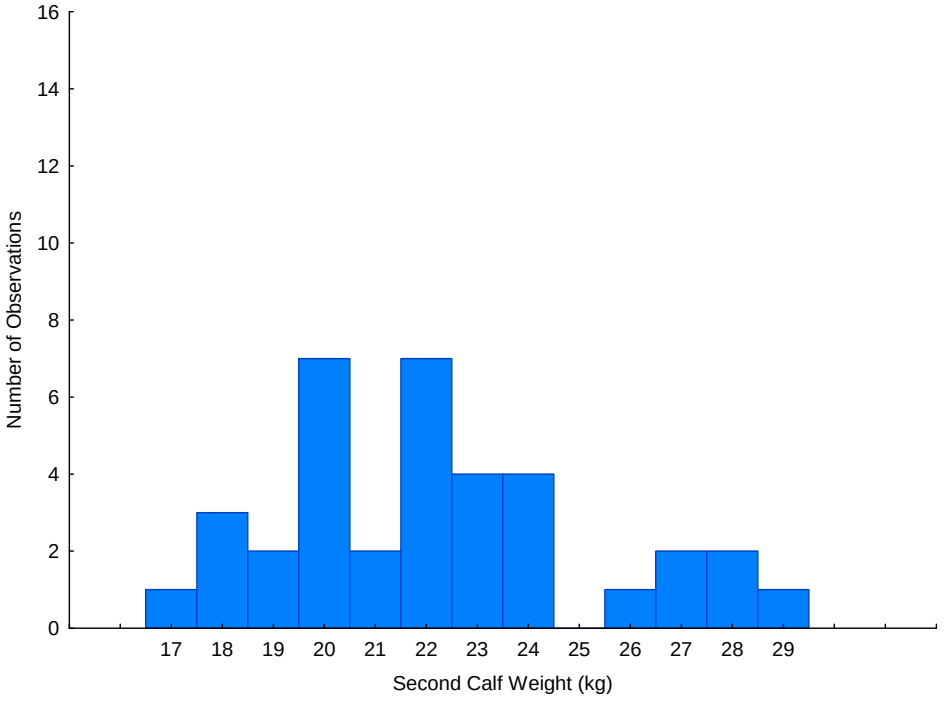


Figure 7 Distribution of calf birth weights at second calving



The first 11 weaners from the first calving were removed on 18 May with subsequent weanings on 23 July (24 head), 4 September (eight head) and 3 October (six head). The first group included some very small calves as a result of a communication failure with the staff at Way Laga. The instruction to them was to wean any calves that were: 55 to 60 kg live weight; two months old; or which had been seen chewing their cud for at least three weeks. The staff included some quite young calves that had been seen chewing their cud but without any reference for how long. All calves survived.

Table 4 – Details of first calves born at Way Laga 2012.

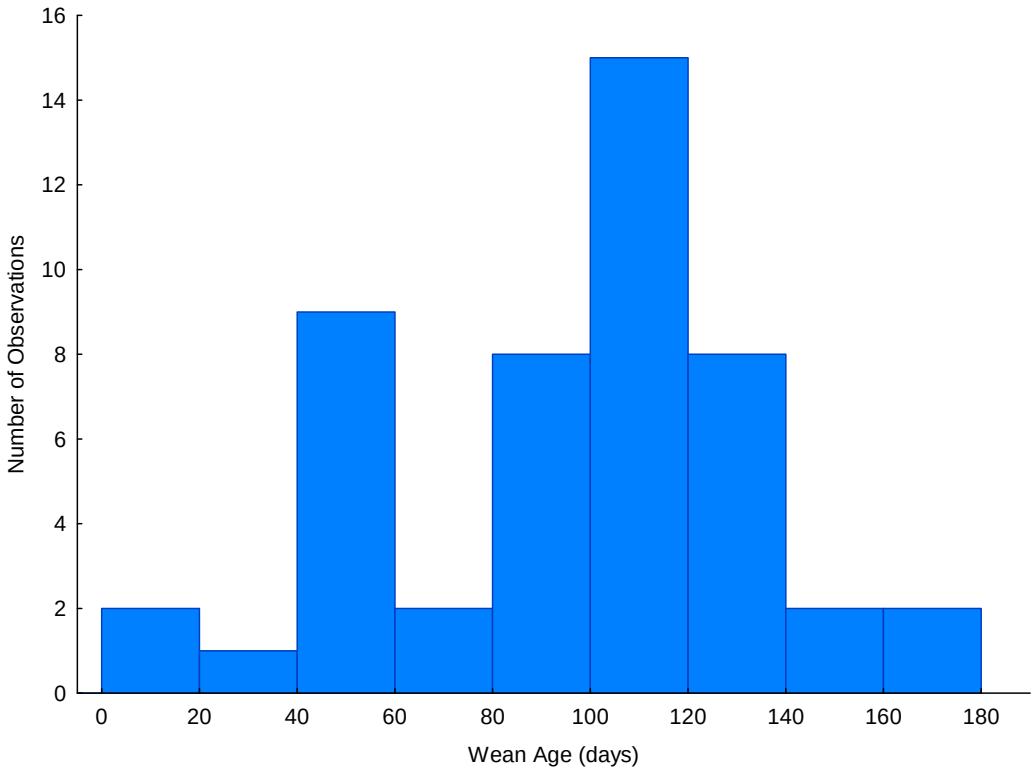
No.	Ear Tag	Birth Date	Sex	Birth weight	Wean Date	Wean Weight	Wean Age (days)
1	2	25-Apr-12	Male	23	23-Jul-12	82	89
2	4	30-Apr-12	Female	25	4-Sep-12	124	127
3	6	26-Mar-12	Male	23	18-May-12	46	53
4	7	2-Apr-12	Male	18	23-Jul-12	64	112
5	8	1-Apr-12	Male	18	23-Jul-12	94	113
6	9	1-Apr-12	Female	18	4-Sep-12	114	156
7	10	4-Apr-12	Female	22	23-Jul-12	88	110
8	11	10-Apr-12	Female	31	23-Jul-12	88	104
9	12	3-Apr-12	Male	18	23-Jul-12	82	111
10	13	28-Mar-12	Male	18	23-Jul-12	86	117
11	14	10-Apr-12	Female	18	23-Jul-12	70	104
12	15	19-Mar-12	Male	20	18-May-12	64	60
13	16	27-Mar-12	Male	17	4-Sep-12	100	161
14	17	15-Mar-12	Male	23.5	18-May-12	60	64
15	18	20-Mar-12	Male	24	18-May-12	54	59
16	19	5-Apr-12	Female	21	23-Jul-12	90	109
17	20	24-Mar-12	Female	23	18-May-12	56	55
18	21	24-Apr-12	Male	20	23-Jul-12	64	90
19	22	20-Mar-12	Female	22	18-May-12	44	59
20	23	23-Mar-12	Male	21	18-May-12	64	56
21	25	3-Apr-12	Male	22	23-Jul-12	98	111
22	26	21-Mar-12	Female	21	23-Jul-12	100	124
23	28	4-Apr-12	Female	23	23-Jul-12	92	110

No.	Ear Tag	Birth Date	Sex	Birth weight	Wean Date	Wean Weight	Wean Age (days)
24	29	21-Apr-12	Male	21	23-Jul-12	90	93
25	30	24-Mar-12	Male	19	23-Jul-12	74	121
26	35	3-Apr-12	Male	20	18-May-12	52	45
27	37	19-Mar-12	Female	21	18-May-12	48	60
28	38	13-Apr-12	Female	18	4-Sep-12	102	144
29	39	3-Apr-12	Male	18	23-Jul-12	106	111
30	41	24-Mar-12	Male	19	23-Jul-12	98	121
31	42	21-Apr-12	Female	18	23-Jul-12	90	93
32	43	23-Mar-12	Female	25	23-Jul-12	78	122
33	44	8-Apr-12	Female	18	23-Jul-12	76	106
34	45	18-Apr-12	Male	21	4-Sep-12	78	139
35	47	3-May-12	Female	23	18-May-12	30	15
36	48	29-Feb-12	Male	23.5	18-May-12	72	79
37	49	27-May-12	Female	18	4-Sep-12	112	100
38	50	23-Apr-12	Male	25	23-Jul-12	70	91
39	51	10-Apr-12	Female	23	23-Jul-12	90	104
40	52	10-Mar-12	Female	18	23-Jul-12	100	135
41	2155	6-Sep-12	Female	22	3-Oct-12	60	27
42	2163	2-Jul-12	Male	20	3-Oct-12	104	93
43	2173	21-Sep-12	Male	18	3-Oct-12	48	12
44	2242	6-Jun-12	Female	18	dead		
45	2270	22-Jul-12	Female	21	4-Sep-12	62	44
46	2353	7-Jul-12	Male	21	3-Oct-12	84	88
47	4035	24-May-12	Male	20	4-Sep-12	102	103
48	8154	24-May-12	Female	18	3-Oct-12	90	132
49	8277	29-Mar-12	Female	23	23-Jul-12	80	116
50	8288	23-Apr-12	Female	18	3-Oct-12	116	163
51	9259	21-Apr-12	Female	16	dead		

The mean weaning weight for the group was 80.3 kgs +/- 5.15 kgs (Range 30 – 116 kgs) and the average age at weaning was 96.1 days +/- 10.29 days (Range 12 – 163 days). This equates to an average growth rate of calves of 619 grams/day for the calves born in the first lactation at Way Laga.

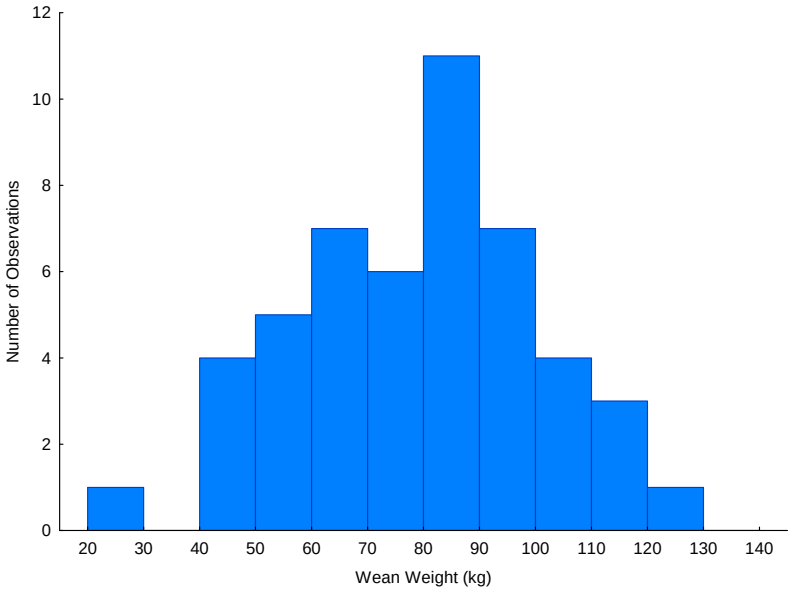
Weaners were sent directly to AGP where they joined the main weaner groups from their breeding project. Data collection on these weaners for the purposes of this project stopped when they went to AGP. The weaning times became quite spread out due to the logistical challenges of taking the weaners back to AGP. It was neither convenient nor economically sensible to take one or two weaners when the only transportation option was a 40 km truck trip. Because of this, the weaners were transported at a wide range of weights and ages, with the shipment load being contingent to what was available at the time.

Figure 8 - Distribution of weaner ages at weaning.



Experience from other breeding projects in Indonesia suggests that weaning can be safely practiced at 60 kg live weight / 2-3 months of age as long as calves have been well prepared with creep feeding and appropriate weaner feed rations.

Figure 9: Distribution of weaner weights at weaning.



4.7 Pregnancy post calving

Besides the ability to achieve high calf survival rates, the other critical factor necessary for the success of a breeder operation in a lot feeding system is a high pregnancy rate combined with a low Calving to Conception Interval (CCI). Pregnancy testing was carried out at irregular intervals linked to 2-3 month periods after weaning events and at other times when staff happened to be at the facility.

Calves were weighed and ear tagged as soon as they could be safely accessed. After 3-5 days cows and calves were released to join the main group of lactating and weaned cow group (which included the bulls).

100% of the 49 cows at Way Laga reconceived with an average CCI of 13.1 weeks (+/- 1.31 weeks). The range for this interval was from 4.4 weeks to 21.14 weeks. For the 49 first calvers. If weaning had been practiced more effectively then it may well have reduced the average CCI further.

Weaner calves ready to be transferred to JGA Feedlot.

Cows were allowed to stay in the project despite an extended period between calving and conception in order to measure this outcome for the purposes of this research project. In a commercial situation there would be a cut-off point after which cows that failed to conceive would be sold and replaced. The cut-off time would be determined using a number of factors including the daily cost of feed, the value of the calf, the slaughter value of the empty mother, and the cost and availability of pregnant replacements. This commercial approach of early culling of cows that fail to get in calf by a certain time has the potential to push the average CCI below the 13.1 weeks figure achieved here.

4.7.1 Relationship between body condition and weight with time to reconception

In beef breeding systems based on native pastures, the condition score of the breeder at calving is the most important factor for getting a cow back in calf. Furthermore, the assessment of body condition is an inexpensive powerful tool which can be readily taught. The BCS can then be implemented as a practical key performance indicator to ensure optimum success of the enterprise. The body condition of a breeder at calving indicates the amount of fat coverage and consequently the reserves of energy required to maintain healthy ovarian activity. In the feedlot however, the lack of body reserves can be overcome by adjusting feed/energy intake post calving and therefore BCS is probably not as critical as in a pasture based production system. Nevertheless, if relationships could be demonstrated between BCS and CCI, then understanding

the significance of body condition would be a useful management tool to include in any best practice management manual for local producers. Cow weights were adjusted for pregnancy status using a technique modified from Silvey and Haydock (1978) which adjusts the weight of a gravid uterus for calf birth weight. Cow weights at calving and reconception are interpolated using average daily gains (kg/day) from adjusted live-weight records recorded before and after calving/reconception dates.

Body Condition Scores (BCS) at calving and reconception dates were taken from the nearest date to calving and reconception dates. The reconception date was calculated as 285 days prior to the date second calf was born. Where the second calf has not been recorded, the reconception date was calculated from pregnancy diagnosis while in second calf.

Models used for relationships between Time to Reconception and measures for Cow BCS at first/second calf, Cow Weights at first/second calf, Cow BCS and Cow Weight at Reconception are linear regressions (see lines plotted in each figure). The following plots are the relationships between Time to Reconception (weeks) and the following measures: Cow BCS at first calf, Cow Weight at first calf, Cow BCS at Reconception, and Cow Weight at second calf. Analysis of Variance of Regression tests was used to determine if any of the relationships between the two variables used were significant (eg can cow BCS at first calf be used to predict time taken to reconceive). All tests indicate that Time to Reconception cannot be predicted by any of the variables measured.

Figure 10. Cow BCS versus Time to Reconception at first calving (R^2 = 0.053, SE = 4.344)

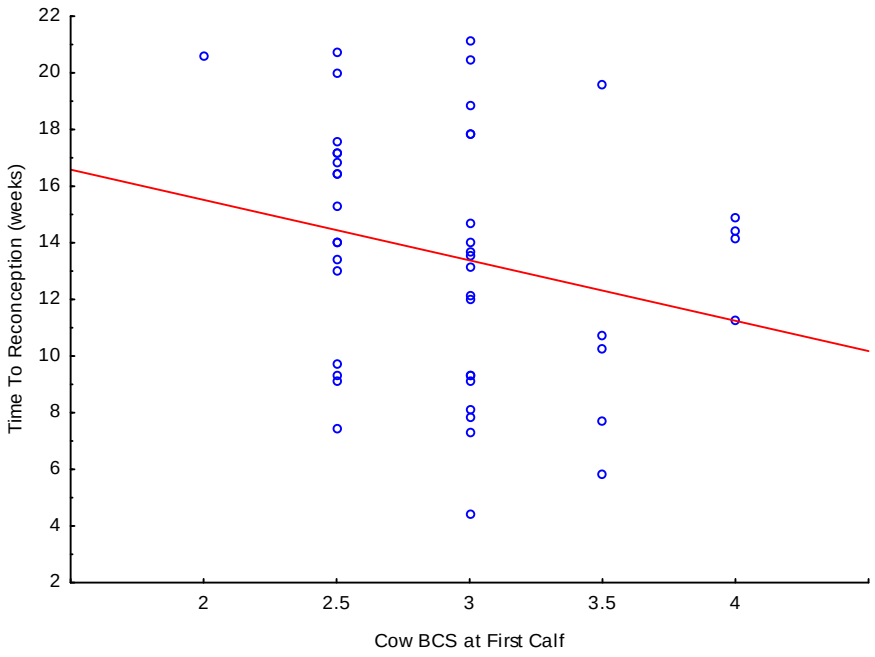
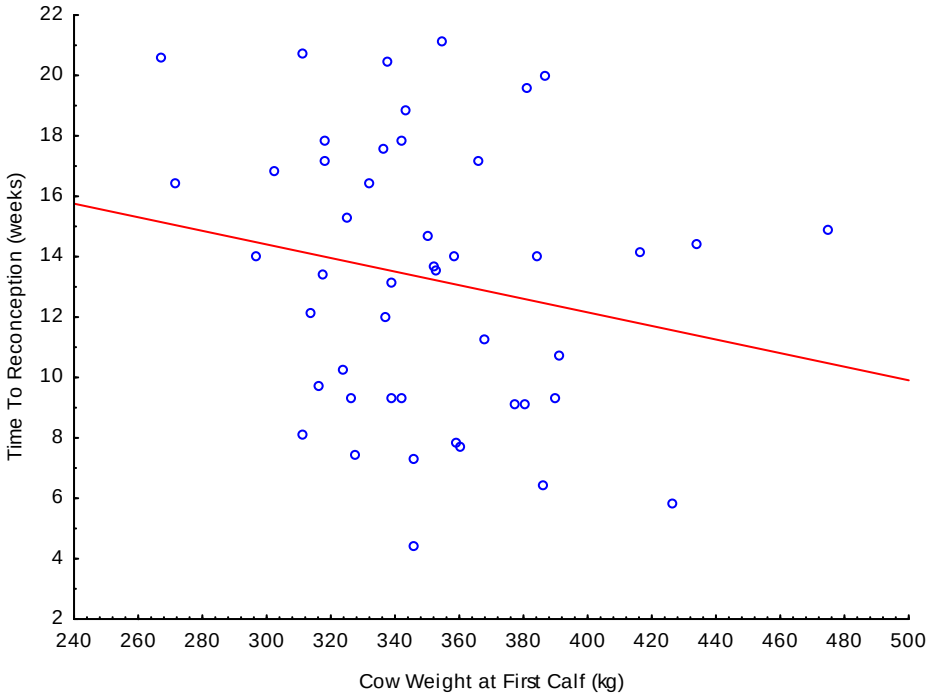


Figure 11. Cow body weight at calving versus Time to Reconception (R^2 = .04, SE = 4.49)



Neither the body condition score of the cow nor the weight of the cow at calving had any significant relationship with the time to reconception (p=0.122 and 0.18 respectively) with neither explaining any more than around 5% of the variation seen in times to reconception. One suspects that the fact that the cows were on a rising plane of nutrition may have impacted this finding, but more importantly, it should also be noted that there was only one animal in BCS of 2 or below at calving. While this animal took over 20 weeks to reconceive, there were 5 other breeders in BCS 3 or better which also took approximately 20 weeks to reconceive. There were insufficent numbers of animals in the lower body condition range (as illustarted in Figure 10) to obtain a trend. The analysis of body weight on time to reconception followed a similar trend. Again, the small number breeders weighing less than 300 kgs (Figure 11) should be noted; the 3 animals which were <300 kgs had CCI's greater than 14 weeks.

Figure 12. Distribution of cow BCS at first calving

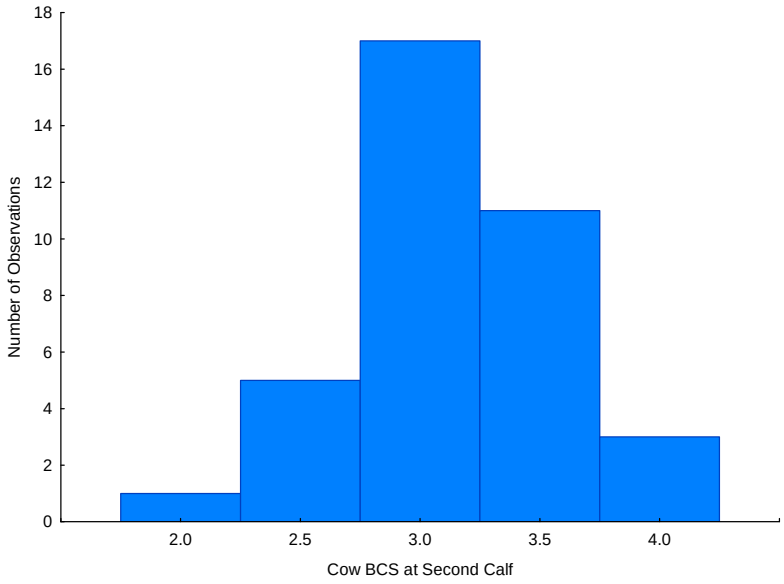
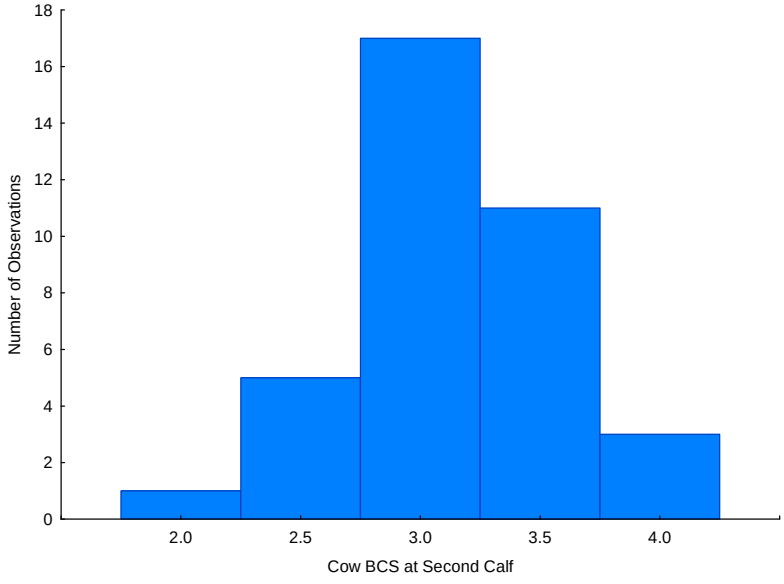


Figure 13. Distribution of cow BCS at second calving



The impact of body condition on CCI from calving 2 was unable to be tested as pregnancy data and was not available at the time of writing this report. Figure 13 shows that the overall body condition of the breeder cows had improved between calving 1 and calving 2. This would suggest that a less expensive ration may still achieve the same results as found at calving 1.

Figure 14. Distribution of cow weight at first calf

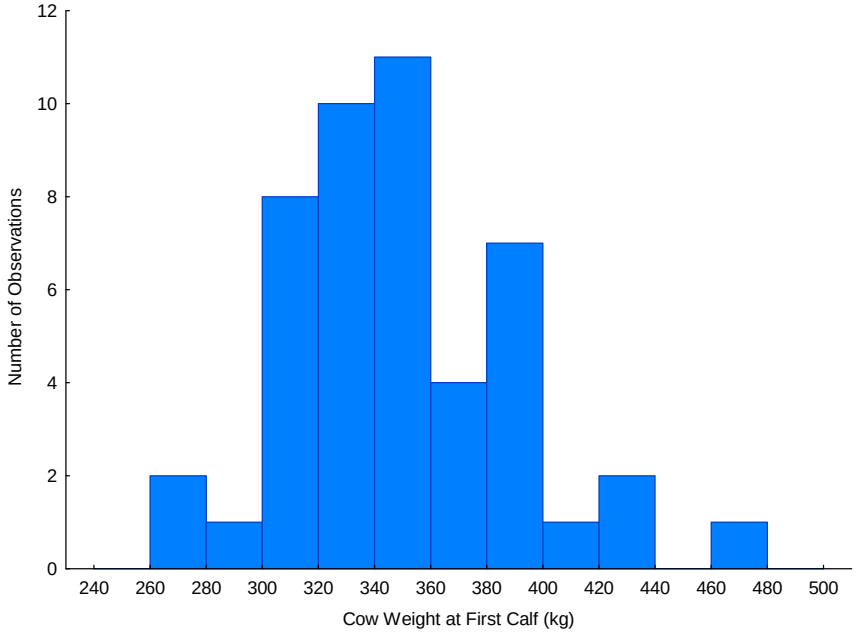
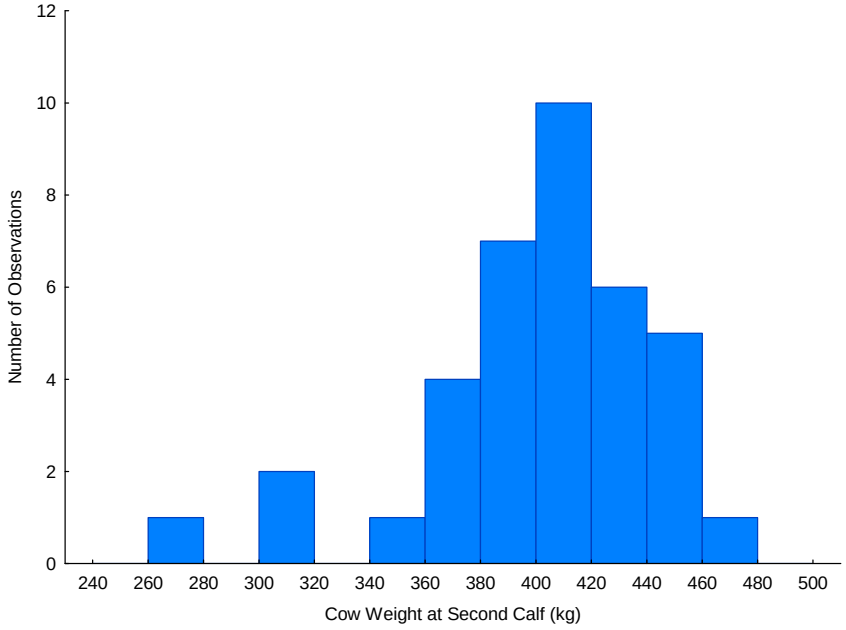


Figure 15. Distribution of cow weight at second calf



4.7.2 Body condition and weight at time of reconception.

Neither cow body weight nor BCS at reconception were significantly related to Time to reconception (p=0.846 and 0.585 respectively). Both measures explained less than 1% of the variation seen in reconception times.

Further analysis was done on the data to see if there was any association with either body condition or body weight at time of reconception on the actual CCI. Again, the low numbers of animals in lower ranges of body condition (= or <2) and body weight (<300 kgs) probably explains the very poor relationships found. Figure 16 and Figure 17 clearly demonstrate both the poor correlations and the scarcity of numbers in the lower ranges where the greatest responses would be expected to be observed.

Figure 16. The relationship between Body Condition Score at Reconception and CCI

(R^2 = .006, SE = 4.58)

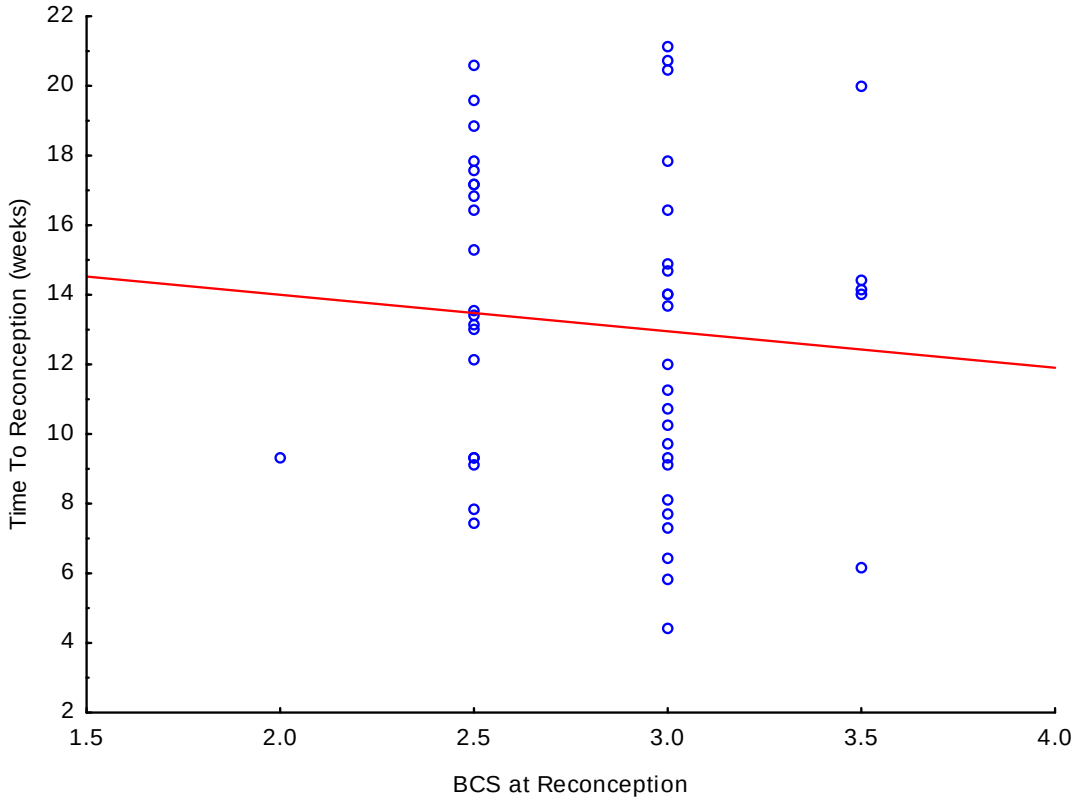
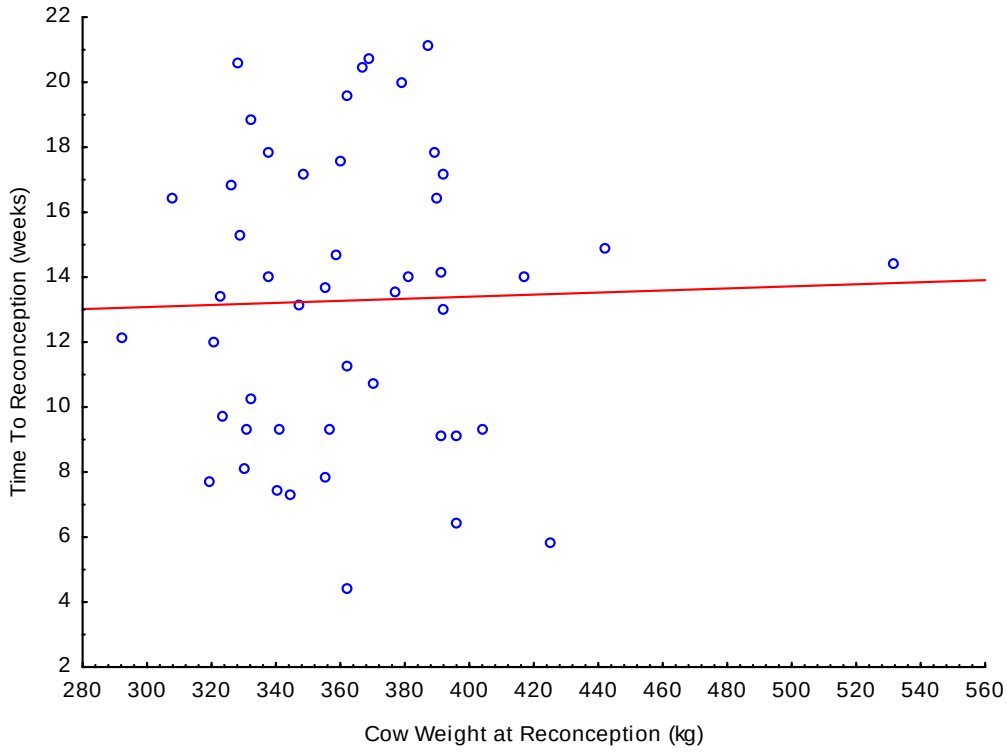


Figure 17. Body weight at reconception versus CCI (R^2 = .0008, SE = 4.53)



4.8 The palm frond based ration

4.8.1 Rations fed during the project

The initial ration fed to the cows (See Table 2) was based on the same experimental ration fed to a small group of heifers at the AGP feedlot for the previous 18 months. The 7 head trial group at the AGP feedlot either maintained their weight or had a very small weight loss on this ration.

Weight at induction was measured at AGP after a short fasting period which included movement from their pen to the loading facility. On arrival at the Way Laga feedlot, pregnant heifers were fed the normal induction ration, which was approximately 70% green chopped king grass and 30% concentrate, with no exposure to palm leaves for the first day or so. No gradual steps were taken to address ration change as experience from feeding cattle on palm leaves previously at AGP indicated that cattle found oil palm leaves extremely palatable and intakes were good.

Cattle were weighed after feeding as the yard is designed to attract the animals into the feeding area which can then be locked off, with the entry to the race, crush and scales as the only exit. While the experimental ration was successful at the trial at AGP, at Way Laga the experimental palm frond ration resulted in consistent and significant weight loss over the first 33 days following the introduction of the 50 cows on 11 November (See Figure 4).

A number of changes were made including more leaves and more PKC. While this arrested the weight loss, it did not result in the weight gain that was needed to provide a suitable BCS for

calving. The ruminant nutritionist who created the original ration was consulted and, following his recommendations, the ration was modified by replacing 1 kg of PKC with 1 kg of tapioca waste (as fed). Leaves were fed at between 6 and 8 kg per head per day depending on appetite. This ration was introduced on 6 February and proved successful in reversing the weight loss. About 1 month later a further 1 kg of PKC was replaced by tapioca waste and this ration became the standard issue for pregnant cows for the remainder of their first pregnancy. As seen above in Figure 4, this ration resulted in a modest and consistent weight gain. However, the ration with 2 kg tapioca waste was only for those pregnant cows waiting to have their first calf. Once cows were confirmed pregnant for the second time later in 2012 they were placed on the pregnancy diet as presented below (Table 5). Because they were in very good condition after conception, the low cost 'pregnant cow' diet below provided for a slow and steady weight loss to take them back down to about BCS 3.5 for their second calf.

Table 5 Final Way Laga Rations for pregnant cows – end 2012

Ingredient	AUD/kg	DM%	AUD/kgDM	kg fed	kg DM fed	ration % (dry matter basis)
PREGNANT DIET						
Salt	0.10	100	0.10	0.1	0.1	1.65
Limestone	0.045	100	.045	0.1	0.1	1.65
PKC	0.145	89.5	0.16	1	0.9	14.8
molasses	0.1325	81	0.17	0.25	0.2	3.35
Urea	0.51	100	0.51	0.1	0.1	1.65
Tapioca waste	0.12	85.8	0.14	1	0.9	14.19
Palm fronds	0.04	47.4	0.08	8	3.8	62.7
			Feed Intake	10.55	6.1	100
			Ration cost/kg	0.0648	0.113	
			Daily feed cost	$0.68		

Once cows calved, they were isolated from the pregnant group and the ration was modified again

by adding 4 more kg of tapioca waste making a total of 6 kgs (Table 6). This resulted in the cost of the ration rising from 68 cents per head per day to $1.26 per head per day.

Table 6 - Ration for lactating and conceiving cows – late 2012

	AUD/kg	DM%	AUD/kgDM	kg fed	kg DM fed	(Dry matter basis)
LACTATING/WEANED DIET						**Ration %**
Salt	0.10	100	0.10	0.1	0.1	*1*
Limestone	0.045	100	0.045	0.1	0.1	*1*
PKC	0.145	89.5	0.16	1	0.9	*9*
Molasses	0.13	81	0.16	0.25	0.2	*2*
Urea	0.51	100	0.51	0.1	0.1	*1*
Tapioca waste	0.12	85.8	0.14	6	5.1	*51*
Palm fronds	0.04	47.4	0.08	7.5	3.6	*35*
	Feed Intake			15.05	10.1	*100*
	Ration cost/kg			0.0840	.1251	
	Daily feed cost			1.2636		

A ration analysis were conducted by Dairy One (US). the Ration details for the pregnant and lactating rations are listed in Table 7. More details are available in Appendix 3

Table 7 – Comparison of Lactating and Pregnancy rations.

Date	Origin	DM%	CP%	Mcal/kg	Mj/kg
Lactating Ration					
6/4/2012	WL TMR	73.8	12.4	No report	
12/9/2013	WL Concentrate	73.8	16.8	No report	
10/12/2012	WL Lactating TMR	73.3	6.0	2.94	12.30
16/4/2013	WL Lact. Concentrate	78.3	8.2	2.91	12.17
Preg ration					
10/12/2012	WL Pregnant TMR	78.9	7.3	2.85	11.92
16/4/2013	WL Preg. Concentrate	83.1	13.1	2.96	12.38
16/9/2012	Palm fronds	52.9%	12.4%		

(WL = Way Laga, TMR =Total Mixed Rations (TMR) and concentrate as Fed)

The main difference between the Pregnancy Ration (Table 5) and the Lactation Ration (Table 6)

is the proportion of tapioca waste to palm fronds. Both rations contained the same amount of PKC, molasses, and salt. While the palm fronds contained relatively moderate amounts of protein, the energy content is low and therefore was unable to sustain positive growth rates when included in the ration at high proportions. The addition of tapioca waste supplied surplus energy as it is rich in starch, however, it is very low in protein. This is reflected further in the calf growth rates prior to weaning. It appears that the cows were not producing much milk as calf growth rates of 619 grams a day are well short of the 900 grams/day expected in calves suckling Brahman cows on good pastures (Ridley, 2005).

The protein content of the lactation/mating ration was only 8.2%. Low protein during gestation affects the birth weight of the calf (Perry, 2009). The issue of calf growth rates needs further research. If weaning weights at 3 months of age can be increased by an estimated 30 kgs without impacting CCI, there is potential to increase returns on calves by $166.80. Smaller birth weights require less veterinary inputs and possibly help account for the low calf mortalities achieved; this all needs to be validated and tested in further research. While some cows lost weight during lactation, they all gained weight again after weaning with BCS rising to around 4. Once cows were diagnosed as pregnant, they were separated to a new pen where the cheaper ration was provided (Table 6).

The annual cost of the ration depends on the proportion of the time the cows spend on the pregnant ration compared to the lactating/conceiving rations. As the lactating ration is more expensive, it is desirable to have the cows on this ration for the shortest possible time. The cows at WL spent 43% of their time on the pregnant ration and 57% on the lactating/conceiving ration (Appendix 6). With the respective costs of these rations being 68 cents and $1.26, this means that on average the ration cost $1.01 per head per day. This annual feed cost could be further reduced if the CCI is also reduced by the following measures identified during this trial:

- Commercial culling of cows with extended CCI.
- Improved bull management to ensure that all bulls were suitably fertile and capable of normal serving behaviour before joining the cows.
- Weaning at the appropriate time rather than waiting until suitable truck lots of weaners were ready.
- Early pregnancy diagnosis to make sure cows are moved to the pregnant ration group.

On 2 March 2012 a small trial was commenced at AGP feedlot with 5 empty heifers with the aim of trying to find a lower cost ration that contained more palm leaf and less concentrate. Ad libitum palm fronds were supplemented with :

500g	tapioca waste
200g	molasses
150g	salt
100g	limestone
50g	urea

1 kg of this supplement was fed over 2 - 3 feeds per day with ad libitum palm fronds or any other forage starting with 10 kg per head per day of palm leaves. The supplement cost less than 15 cents per kg. The results of the trial are listed in Table 8 and demonstrate that weight gains were able to be maintained on this supplement regime.

Table 8. Live Weight (kg) Results of High Leaf / Low cost trial diet with supplement

2 March	17 Mar	3 Apr	9 Apr	24 Apr	2 May	9 May	18 May	26 May	3 Jun
343	335	331	335	332	338	345	346	342	343

After losing weight for the first two weeks, the leaf was increased from 10 kg per head per day to as much as the heifers could eat which rose to 14.8 kg per head per day on 26 May 2012. At this time the heifers had managed to regain their original weight after about 11 weeks of feeding on a diet with a cost of around 15 cents per day for concentrate and 60 cents worth of palm leaves. This was slightly more than the $0.68 / head/day cost of the pregnancy ration in Table 5 and so the trial was discontinued at this time.

While this small trial demonstrates that cattle can eat quite large quantities of leaf in their diet, it also shows that if the cost of leaf is 4 cents per kg, it is just as cheap to supply less leaf and more concentrate.

4.8.2 Cost of the leaf

The calculation of the cost of the leaf is critical to the financial outcome of the project. The Way Laga plantation manager confirmed that his workers could consistently cut 250 kg of leaf per worker per day and that his daily wage costs were in the order of $5 per day. Using these figures the cut leaf costs 2 cents per kg.

It was assumed that women would be the primary labour source of leaf collection; this was the case in the Way Laga plantation. Assuming that a woman might cut a little less than a man, the daily figure of 200 kg is projected. Additionally, there are costs of transport from the plantation to the cattle yard as well as overtime for weekends and holidays. After taking these additional costs into account the figure of 4 cents per kg was adopted for use in the financial model. Some plantations may be able to obtain their leaf at a lower price.

4.8.3 Volume of leaf available in plantations

Palm plantations are laid out in standard grids where trees are spaced approximately 9 metres apart leading to an average of about 120 trees per hectare (numbers fluctuate after taking into account roads and waterways, etc). Plantation management at Way Laga advised that the standard pruning practice for mature tree management is to cut one frond from each tree every month.

The writer has cut leaves from mature fronds on a number of occasions in a number of locations and found that on average each mature frond will yield about 3 kg of leaf material. This means that each hectare has a potential production of 360 kg of leaf material each month. Plantation management advised that there is little difference in leaf production between the wet and dry seasons.

Mature cows can eat 8 kg of leaf per head per day or approximately 240 kg per month.

As most plantations have a mixture of trees of various ages, a conservative average figure for sustainable feeding of leaf to cows of 2 hectares per cow has been determined. The Indonesian government uses a national figure of 9 million hectares of palm plantations. Hypothetically, this area could support a breeding cattle herd of 4.5 million head.

4.8.4 Nutritional value of the leaf

Dairy One has been used to analyse leaf material on a number of occasions. The first analysis was in 2010 when AGP was conducting their own research on the potential of palm leaf diets. Subsequently a number of samples have been sent for analysis with similar results (See Dairy One Appendices 4.1- 4.4). This information is summarised in Table 9 below.

Table 9 Range of Measurements of nutritional value of Palm Leaf.

Date	Origin	DM%	CP%	Mcal/kg	MJ/kg
2010	AGP Lampung	47.4	5.1	1.18	4.94
16/9/2012	W.L. Lampung	52.9	12.4		
14/12/2012	W.L. Lampung	55	5.7	1.99	8.32
16/8/2012	* PTPN 6 Jambi	37.6	7.2		5.73
31/12/2012	Silage AGP Lampung	44.1	5.6	2.08	8.70
16/4/2013	Way Laga Lampung	39	5.8	2.43	10.16
Average		46	6.96	1.92	7.57

Note: * PTPN is a Semi-Government plantation located near Jambi in Sumatera.

The nutrient value of palm fronds is quite variable and is dependent on the maturation of the leaf and the season in which the leaf was collected. Dry matter measurements are affected by the handling of the material prior to delivery to the laboratory and would probably account for some of the variation noted above. The palatability, however, is good.

Palatability of palm fronds is excellent – the concentrate is also readily consumed.

4.8.5 Silage

During this trial all leaves were collected fresh. Our working definition of 'fresh' is that the leaves were a maximum of three days old. After three days, they turn brown and are less attractive to the cattle. In most cases, the leaves were collected on one day and then fed the next. The only time during the year that labour was not available to collect leaves was the major Muslim festival of Lebaran, which is normally celebrated over a period of seven days where nobody works unless it is absolutely essential. Collecting palm leaves to feed cattle during this time was not regarded as an essential service.

During the Lebaran festival in August 2012, the palm leaf component of the diet was replaced by rice straw from the feed storage at AGP. This alternative was well accepted by the cattle, which continued to consume their daily rations as though nothing had changed. No observable differences were noted in feed consumption or cattle condition during or after the 6 days of rice straw substitution.

Rice straw will generally not be available in or near a palm plantation. As a contingency, a small trial to determine if palm leaves could produce useful silage was conducted at AGP. Leaf was mixed with the standard silage inoculant used at AGP and packed tightly into air tight plastic drums (14th August 2012). Periodically, drums were opened and fed to stock at AGP to check their condition and palatability. On all occasions, the silage was found to be highly palatable to cattle – at a similar level to the fresh product – and remaining in good condition apart from a small degree of spoilage near the top of the drum. Samples were analysed by Dairy One. See

Appendix 3.1 and Table 9 above.

A small trial on palm at AGP - leaf + standard silage inoculant packed tightly into air tight plastic drums yielded excellent results.

4.8.6 Manure production

Cleaning was practiced on an as-need basis, but, on average, occurred about once per week. The volume of waste also varied depending on the time between cleaning and the moisture content based on recent rainfall. All cleaning was completed by hand. As an average figure, we have determined that it takes about 100 wheelbarrow loads to clean the entire facility and the average weight of one wheelbarrow is 30 kg. This yields approximately 3 tons of manure and bedding waste being physically removed from the cattle yard per week. This waste product is taken from the yard in the wheelbarrow and dumped in a composting pile behind the yard for the plantation management to handle. Management allows the product to naturally compost, bags it, and then spreads it under trees in the plantation.

This does not take into account the volume of urine and faeces that may be flushed from the pen during heavy rain events. Using the standard calculation that a cow will produce about 5% of body weight manure per day (Watts 1993), then the amount that might be expected from Way Laga would be in the order of 50 head x 400kg x 5% x 7 days = 7,000 kg/week. This suggests that a little over 50% of the faeces produced are washed into the plantation environment during storms. The utilization of this flushed faecal material will need some planning to maximize the value of this component. At Way Laga there is a convenient hill below the cattle yard allowing the washed material to be channelled to trees with simple drainage lines.

Dry matter analysis of the product indicates that fresh manure has a DM of around 28% while compost DM is around 37%. (Analysis completed at AGP feedlot nutrition laboratory). Dairy One analysis of the faeces is presented in Appendix 4. In summary it contains 2% Nitrogen, 1.45% Calcium, 0.22% Phosphorus, 0.34% Magnesium, 1.1% Potassium, 1,320 ppm of Iron and 603 ppm of Manganese.

Commercial sales of faeces are made on a daily basis from the AGP feedlot where demand is such that all faeces produced can be sold. The demand for faeces far outstrips supply especially with low numbers of feeders in the feedlot at the present time due to import permit restrictions. The market price for faeces from AGP is AUD 0.5 cent per kg of wet fresh faeces collected from the pen. These faeces are a mixture of manure, urine, and a substantial volume of bedding, which in the case of AGP, is waste fibre from coconut husks. The price of AUD 0.5 cent per kg wet is determined at the weighbridge which excludes the freight component to get it to the customer destination. AGP also produces quantities of compost which vary in price from AUD 1.5 cents per kg (truck lots) for faeces stored in piles for 30 days to AUD 4.5 cents for one month old compost which is further handled by fine screening and bagging.

For the purposes of the preliminary cost calculations, a figure of AUD 1 cent per kg has been used to take account of the fact that the Way Laga faeces are actually on site with no freight component (i.e. the freight component for delivery of faeces is estimated to be another AUD 0.5 cent per kg). Also, the volume used for the calculations was 3000 kg per week representing the faeces that were actually collected by hand and presented for use in the plantation. This is a significant under-estimate of the real value of the faeces to the plantation if the storm wash from the pens is captured and well utilized. 3000 kg per week at 1 cent represents a return from the faeces of AUD $30 per week. The Way Laga figure for returns on notional faeces sales may appear small, but if significant numbers of cattle are managed in plantations, the contribution from cattle fertilizer has the potential to provide a useful financial addition to the overall project.

If 50 cows produce 3000 kg per week of 28% DM faeces then over the course of a year the DM volume produced will be 52 weeks x 3000 x .28 = 65,520 kg. If the 50 cows were supplied leaf from the 2 hectares per cow as per the leaf supply estimate above then this would imply that 65,250 kg of faeces would be available to 100 hectares x 120 trees = 12,000 trees or 5.2 kg of DM faeces per tree per year. No allowance has been made for the 'mulch' value of the palm leaves had they been allowed to compost under the trees. Leaving palm fronds to rot between the rows of palm trees can help soil conservation and erosion control (Abu Hassan et al 1996). Prior to the 1990's the trunks and the leaves used to be burnt but due to environmental concerns, the practice has now been banned (Lin 2000). While the nutrient value and environmental benefits are expected to be small, there is no information available as to its real value and this is one area which needs further research. No dollar value has attempted to be assigned to the opportunity cost of leaving the palm fronds in the plantations as mulch.

Two papers were presented at the Cattle and Palm Integration seminar held at the Bogor office of ICARD on 8 June 2012 which included discussion of the value of cattle faeces in the palm plantation. An alternative means of calculating the value of the faeces is to estimate any additional production from the plantation when inorganic fertilizer is replaced with organic faecal material. There is some information available, which is largely anecdotal, that points to an increase in fresh fruit production from the palm trees when cattle faeces are used to supplement inorganic fertilizer applications. In the paper presented from one trial (Farmer Group named

"Tunas Muda", address at Kusau Makmur Village, Kabupaten Kampar-Riau: See Appendix 9) the value of net fruit production per tree was increased by AUD$543 per hectare when 1 kg of inorganic fertilizer was replaced by 0.5 kg of organic fertilizer and 2.5 kg of cattle faeces fertilizer when applied twice per year per tree. This suggests that the net value of 5.2 kg DM per tree per year as per the calculation for Way Laga faecal supplies could be in the order of AUD$1000 per hectare additional income for the plantation.

A second source suggests significantly greater value from the faeces and urine produced by cattle in the plantation (Patrianov 2009). (Appendix 10). Findings from this study that were presented included:

- Plant Productivity, fruit production increased 15 – 25 % based on fruits weight
- Fertilizer Cost efficiency, decreased 30-40 %
- Cattle Feed cost from palm by-product, equivalent to AUD $1.93/head/day (temporary data trial result of small scale Feed Mill APBN –TP 2011).

While specific details of the background to these figures are not available, analysis suggests that the value of organic fertilizer to the palm plantation is significantly positive (Mr Mathew Reed pers comm.). An alternative analysis following the provision of some additional information from a large commercial palm plantation near Palembang (central Sumatera) estimated the value for the composted manure produced per cow per year would indicate a saving of AUD$ 275 dollars per hectare per year for plantation owners for three years assuming it is combined with one application of AUD$180 of lime which lasts for 3 years. See Appendix 11 - Analysis of the cost benefits of manure to palm plantations.

4.9 Disease investigation

The only significant disease event was the abortion storm shortly after the heifers arrived at Way Laga between 12 November 2011 and 3 March 2012 – See Appendix 5. The majority of abortions were foetuses around 5 months of age similar to the one shown in the photograph over page. Serum samples were collected on 15 December 2011 and 26 April 2012 and tested in Australia (Appendix 12). All animals in the group were tested by the Brucellosis Complement Fixation Test (CFT) and were negative for both the first and second samples except for one anti-complimentary result in the first sample group. This result would suggest that Brucellosis was not the cause of the abortions.

Aborted foetus estimated to be about 5 months old.

Testing for Bovine Virus Diarrhoea (BVD) using an Agar Gel Immunodiffusion Test (AGID) was conducted only on the 10 paired samples from those animals that aborted. Nine of the 10 animals tested positive in the first test including 5 head with a titre of 2, and 4 head with a titre of 1. One animal had a negative titre. At the second test only 6 animals showed a positive titre (all with a value of 2) while 3 head were negative and 1 was indeterminate. This result would suggest that the animals had been infected with Pestivirus for an extended period prior to the abortion event. If there had been active infection shortly before the abortions then titres of 3 would be expected on the first test falling to 2 at the second. Advice from Berrimah Laboratory pathologists suggest that these results are not suggestive of an abortion storm caused by Pestivirus.

The Microscopic Agglutination Test (MAT) was conducted for *Leptospira hardjo, L. pomona, L. tarassovi* and *L. topaz*. This testing was carried out on the paired serum collected from the 10 aborted animals. *L. hardjo* test resulting in one positive titre (400) and one equivocal titre from two animals in the first test. All others from the first and all in the second test were negative. *L. pomona* results were all negative in both the first and second tests. *L. tarassova* results were all negative except for one animal in the first test (ear tag 1 with a titre of 400) with the same animal showing a similar titre of 400 in the second test. *L. topaz* results showed a number of animals with fluctuating titres at the first and second tests. See summary in Table 10 below. Advice from Berrimah laboratory pathologists suggest that the changes in the MAT titres seen in this testing are not large enough to indicate a leptospiral infection.

Table 10 Berrimah Laboratory MAT Results – Tested 12/3/2013

Berrimah Veterinary Laboratories Lab Ref: 13L0064 MATS

Animal	Spec No	Pomona	Hardjo	Tarassovi	Topaz
Case no. 20130210					
Bovine ex Indonesia	01	<50	<50	**400**	**800**
B46099	05	<50	<50	**50**	**400**
	24	<50	**0**	**100**	**400**
	27	<50	50	<50	<50
	32	<50	**50**	<50	**50**
	33	<50	<50	<50	**100**
	34	<50	**50**	**100**	**200**
	36	<50	<50	**100**	**400**
	40	**50**	**400**	**50**	**400**
	46	<50	**200**	<50	**50**
	C01			**400**	**1600**
	C05	<50	<50	<50	**100**
	C24	<50	<50	**50**	**400**
	C27	<50	<50	<50	<50
	C32	<50	<50	<50	**50**
	C33	<50	<50	<50	**100**
	C34	<50	<50	<50	**400**
	C36	<50	<50	**50**	**400**
	C40	<50	**100**	<50	**200**
	C46	<50	**100**	<50	<50

Samples were tested against the laboratory's routine Bovine MAT panel starting at a dilution of 1:50

One of the major concerns with this abortion storm was that it could have been connected with the feeding of the new ration including palm leaves. Palm leaf diets have been fed for many years in Indonesia, Malaysia and other countries where oil palms are grown. Personal communications with those experienced in this industry indicate that there is no evidence to suggest that palm leaf diets cause or contribute to abortions in cattle. This proposition is further supported by the fact that 44 Way Laga cows have recently given normal births after conceiving in the trial.

A further 4 cows are pregnant with live foetuses while one cow has been identified with a mummified foetus estimated to be about 3 to 4 months old.

The time sequence for the abortion storm as illustrated in Table 3 suggests that an infectious agent can't be ruled out as the cause of the abortions. There seems to be a spike in the November to December period followed by a carry-over into January and March. Had the abortions been due to an acute feed toxicity or a seasonal event or stressor, one would have expected to see a sharp epidemiological peak within a one or two week period.

No vaccines were used or are planned to be used to protect the cattle at Way Laga from disease as there are no appropriate products registered or available in Indonesia. There is a Pestivirus vaccine product registered in Indonesia but it is not imported and hence not available for use.

4.10 Financial Analysis

4.10.1 Way Laga 50 head unit

The financial analysis for this project was completed using the Dynama Multi Year Herd Model Version 6. See Appendix 13. Way Laga Dynama Base 50 Sellweaners.xls. The Way Laga 50 model has been created to represent as closely as possible the actual circumstances of the Way Laga R & D project. The model commences with the purchase of the cattle in November 2011 and actual project costs have been used to create both the direct costs and overheads. The net prices received for various classes of cattle used in the Dynama model are outlined in Table 11.

Table 11: Net prices received for cattle sold for Dynama modeling

Heifer weaners	$500
Heifers 1yr	$1,816
Heifers 2 yrs	$1,462
Cows 3 ys	$1,462
Steer weaners	$500
Culled herd bulls	$2,210

Table 12: Main operational costs used in Dynama modeling

Fixed Costs for 50 head Feedlot	
Wages (as per sprdsheet)	$14,142
Wages (overtime)	$2,312
Electricity and Gas	$300
Repair and Maintenance	$543
Office Supplies	$16
Project Costs -Travel	$1,617
Project Costs - Allowance	$175
Project Costs - Meals	$361
Project Costs - Transportation	$409
Project Costs - Promotion	$470
Replacement Tools(Shovel,wheelbarrow)	$270
Transport cattle	$290
Total Fixed Cost	**$20,905**
Variable Costs	
Cost of leaf (7.5 kg/day)/adult cattle	$102.20
Concentrate (delivered)/adult cattle	$340.15
Medicine costs/adult cattle	$14.12
Total variable cost/head p.a.	$456.47
Total Variable costs for 53 head per annum	**$24,192.91**

The analysis is for the 50 head Way Laga project in which weaners were hypothetically sold for $5.56 per kg at 90 kg indicates that there is an annual cash loss of approximately $22,000 which translates to a loss of 16 – 18% on the investment.

There are two main reasons why weaners were “sold” for the purposes of this project. Firstly, there was insufficient project funding and other resources to house, manage and feed the weaners on at the Way Laga location. Secondly, it was assumed that the weaners would logically and logistically be best managed by experienced lot feeders who would grow them out to slaughter weights. Low cost of freighting weaners from remote plantations to feedlots located close to abattoir customer networks appeared to be the best approach at the time. Actual costs

and returns from the Dynama Base 50 model in Appendix 13, however, have shown that this logic only applies if the remote plantation can continue to participate in the value adding margins of the finishing of the weaner to slaughter weights. This is not greatly different to the Australian situation where large northern pastoral properties never sell weaners although they do send young stock to southern fattening properties within their own ownership networks. As per the northern Australian experience, weaners in Indonesia are rarely sold for the same reasons as above - the job of producing the weaner is the most difficult and expensive part of the beef production process while the fattening from weaner to slaughter weight is the most profitable.

Table 13. Annual taxable income over 10 years for 50 head feedlot selling weaners at 3 months of age

Year ended 30th June	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Opening number	0	97	97	97	97	98	98	97	97	97
Purchases number	56	4	4	7	4	3	3	5	1	2
Natural increase	46	46	46	46	46	46	46	46	46	46
Sales number	3	48	48	51	48	48	49	50	46	47
Deaths	2	2	2	2	1	1	1	1	1	1
Closing number	97	97	97	97	98	98	97	97	97	97
Opening value	$0	$80,757	$57,855	$42,743	$35,025	$27,963	$22,256	$18,262	$17,488	$13,410
Purchases cost	$84,000	$6,000	$6,000	$10,500	$6,000	$4,500	$4,500	$7,500	$1,500	$3,000
Sales receipts	**$4,386**	**$25,942**	**$25,942**	**$32,572**	**$25,942**	**$25,942**	**$28,152**	**$31,110**	**$23,018**	**$24,480**
Closing value	$80,757	$57,855	$42,743	$35,025	$27,963	$22,256	$18,262	$17,488	$13,410	$11,593
Other income & stock trading	$1,560	$1,560	$1,560	$1,560	$1,560	$1,560	$1,560	$1,560	$1,560	$1,560
Fixed & var. costs	**$34,266**	**$44,332**	**$44,774**	**$45,016**	**$44,332**	**$44,553**	**$44,781**	**$45,230**	**$44,539**	**$44,546**
Depreciation	$1,500	$1,500	$1,500	$600	$600	$600	$600	$600	$600	$600
Net interest paid (see note)	$1,133	$3,269	$5,375	$7,591	$9,967	$12,540	$15,188	$17,988	$21,088	$24,493
Approximate Taxable Income ...	-$34,196	-$50,501	-$45,259	-$37,293	-$40,459	-$40,398	-$39,350	-$39,422	-$47,226	-$48,416

The primary reason for the actual loss at Way Laga is the relatively high cost of feed. The actual cost of feed at Way Laga is AUD $1.21 per head per day (average includes fronds) which is almost double the original estimate when the project was being planned. If a cow costs 365 days x $1.21 per day, or $442, to feed for the year and the resulting weaner is only worth $500 when sold at 3 months of age, then a detailed financial analysis is not required to confirm that, when all

the other costs (wages, security, electricity, maintenance and, veterinary costs) of the process are included, the result will be a financial loss.

There are two primary reasons for the higher than predicted cost of feed: Way Laga cost inefficiencies, and the fact that the ration fed to lactating and conceiving cows was substantially more expensive than what was fed to the 7 head trial group at AGP in 2010.

The palm plantation at Way Laga consists of only 30 hectares of trees that are around 3 years old. This means that there is not enough leaf to feed 50 head throughout the year. This was always understood as one of the compromises of having Way Laga in a relatively convenient location near Bandar Lampung. The result was that the AJP management were required to purchase leaves from distant plantations and freight them back to Way Laga, which was part of their contribution to the project. As actual costs were used for the purposes of the financial analysis, the leaf actually cost more than if it had been collected from the surrounding plantation. The cost of the concentrate was also slightly higher than commercial rates as small volumes of product needed to be freighted to Way Laga resulting in higher landed costs than larger scale operations.

The second major reason for higher feed costs was that the ration fed to lactating and conceiving cows was substantially more expensive than what the ration fed to the original 7 head trial at the AGP feedlot in 2010. As the aim of this project was to demonstrate that Australian Brahman cows could achieve a relatively short ICI (13.1 weeks), the ration was increased significantly to all cows that had given birth. This was done to reduce the weight loss resulting from lactation and encourage oestrus to return as soon as possible after birth. This was achieved by simply adding energy to the diet of this group by including an additional 4 kg of tapioca waste to their daily ration. It may be possible to achieve a similar result in terms of a short average ICI using a less expensive diet but there were not facilities or desire to risk a potential increase in the ICI by reducing the amount of additional supplementary energy. Further investigation of this question in subsequent trials would be very useful to find out how much the cost of the lactating diet could be reduced without significantly increasing the ICI.

The cost of labour at Way Laga is also an artificial figure because these staff members were on loan from the AGP feedlot and were therefore paid penalty rates for living away from home as well as accommodation and travel expenses. This resulted in their costs being close to double the standard rate. Feeding costs of cows could have been reduced by having a more frequent weaning and pregnancy testing schedule. As mentioned above, weaners were generally kept until convenient truck load lots were available rather than being weaned when each individual was ready. Individual weaning would only be feasible if the weaner destination was quite close to the breeding pen. Pregnancy testing was only carried out on cows at 2 months or more after weaning. Individual weaning at the appropriate time and pregnancy testing of all cows from 3 months post calving would have returned more pregnant cows to the lower cost pregnant ration group earlier.

The actual financials for Way Laga indicate a loss of around AUD$22,000 per annum when

weaners are sold for AUD$5.56 per kg live weight at 90 kg. If the loss is spread over the 48 weaners "sold" then the individual loss is AUD$458 per weaner. This implies that if the 50 head model for selling weaners was to break even, then a price of AUD$10.60 per kg live weight at 90 kg would be required. Despite the encouraging reproductive performance of the Way Laga unit, the negative financial outcomes are unattractive to potential investors.

4.10.2 Hypothetical 300 breeder feedlot production feeding weaners to sale

While the diet needs further investigation to reduce its cost, the two main factors that could result in positive financial outcomes are to increase the size of the unit to a realistic commercial scale and to retain ownership of the weaner until slaughter. This scenario has been modelled using Dynama and is presented as Appendix 14. Way Laga Dynama Base300.xls. The key assumptions for this model are presented below in Table 11.

Table 11. Key input assumptions for a hypothetical 300 head breeder feedlot on a palm frond ration

Assumptions Waylaga 300		
Purchase price heifers	$1,500	Based on market price of heifers, includes $5 freight cost
ADG Weaners	0.77 kg/day	Based on average of heifers and steers ADG
ADG Heifers	0.72 kg/day	Based on Way Laga growth data and average cost of gain ($1.80/kg)
ADG Steers	0.81 kg/day	Based on Way Laga growth data and average cost of gain ($1.80/kg)
Feed cost cows - Palm leaves annual.	$102.20	Based on actual feed costs of Way Laga 50
Annual Concentrate cows	$340.15	Based on actual feed costs of Way Laga 50
Feed cost weaners annual	$338.00	Based on 0.77kg/ADG and daily feed cost of $1.39 for 243 days
Feed cost heifers annual	$474.50	Based on 0.72kg/ADG and daily feed cost of $1.30 for 365 days
Feed cost steers annual	$532.90	Based on 0.81kg/ADG and daily feed cost of $1.46 for 365 days
Average sale weight steers	530	Based on sale age of 24 months @ ADG above
Average sale weight heifers	556	Based on sale age of 24 months @ ADG above
Average price sale stock	$3.40	Provided by R. Ainsworth representative of current market conditions in Indonesia

Weaning rate	92%	Based on Way Laga experience
Death rate cows	4%	Based on Way Laga experience
Medicine costs	$14.12	Based on Way Laga actual costs
Overheads		
Labour - 6 workers for 180 days (peak)	$7,560	Based on estimates of Way Laga feedlot operators,
6 workers for 365 days for normal feedlot operations	15330	Based on estimates of Way Laga feedlot operators,
Bedding	$1,000	Based on estimate of R. Ainsworth(Sawdust for calves only, cows use waste leaves provided by plantation)
Other costs provided by R. Ainsworth estimates		
Depreciation rate -straight line method	15%	Provided by Way Laga financial officer
Interest rate on overdraft	8%	Assume sufficient capital introduced to fund infrastructure and herd purchases

The outcomes of this 300 head scenario are summarized in the Table 12 below and the sensitivity analysis prepared by Trudi Oxley. See Table 13

Table 12. Extract from Dynama 300 - return on investment

	2013	2014	2015	2016	2017	2018	2019
$ return on non-cash assets	(33,403)	151,112	28,541	30,504	35,778	43,444	40,723
% Return	-7.66%	13.88%	2.12%	2.41%	2.89%	3.56%	3.39%

Table 13. Sensitivity Analysis of Gross Margin/ Adult Equivalent (GM/AE) and Return on Investment with changes in selling price of slaughter cattle and feed costs.

Feed costs	GM/AE 25c less	GM/AE Actual	GM/AE 25c more
Sale Price/kg			
$3.00	$93.39	$46.11	$20.72
$3.40	$188.63	$141.35	$155.97
$3.80	$283.88	$236.60	$211.22

Return on Assets

Feed cost	25c less	Actual	25c more
Sale Price/kg			
$3.00	-0.12	-3.19%	-4.87
$3.40	5.97%	3.17%	1.64%
$3.80	11.13%	8.56%	7.16%

The actual figures in this analysis refer to the outcomes from the model using the feed costs and production parameters from the Way Laga project and the actual sale prices for fat cattle sales on today's market. The figures for performance of the weaners from weaning to slaughter are based on actual costs and growth rates in the AGP feedlot as no data is available for weaner growth in a palm plantation feedlot at this time. Measurement of weaner performance in the plantation feedlot is an essential element of future investigation in order to validate the large scale model outcomes.

The reason for using a 300 head model is based on the management structures of palm plantations. Advice from numerous plantation managers confirms that plantations are managed as a network of modules where a village is based centrally in an area of about 6-900 hectares of trees. The village provides all the labour resources for the management of this unit of the plantation. Using the conservative estimate that 2 hectares of mature palm trees will provide adequate leaves to permanently feed one adult cow then a 6-900 hectare module could feasibly support a cattle yard containing 300 adult females.

While this model is based on a 300 head cattle yard, the logical approach would be to have similar modules based in all villages on the plantation. This would allow for efficiencies for the supply of managerial inputs and specialist skills, such as veterinary and AI services. Most plantations need to have a critical mass of 6000 hectares or more to justify an oil extraction mill hence the majority of plantations could support 6 to 10 breeder modules in the one plantation complex. A large plantation complex would also provide an option to grow the weaners out at a central location rather than having a weaner unit for each village module. A further alternative for weaner management would be to participate in a custom feeding arrangement with an

established feedlot. This is a common commercial arrangement in some Indonesian feedlots. Custom feeding has the potential to offer the best of both worlds where the plantation breeder does not have to complete the fattening of the weaner in their remote location but still participates in a share of the returns from the sale of the finished animal.

The Dynama Base 300 model also includes some slightly unusual features as a result of the government policies in Indonesia and the market conditions in Australia. At the present time (June 2013) fat, empty cows in Indonesia are worth around AUD$3.40 per kg live x 420 kg live weight = AUD$1,428 per head. An imported pregnant heifer from Australia is worth around this figure or less. The advantage of buying the imported pregnant heifer is that the pregnancy will usually have progressed about 5 months or more due to the preparation and shipping times and calving would occur in the feedlot much sooner than would be the case for a retained cow.

4.11 Field Day and Symposium

4.11.1 Field day

The field day and symposium was conducted on Wednesday 13 March 2013. The morning seminar and lunch were held at the Sheraton Hotel in Bandar Lampung after which buses and cars ferried the guests to the nearby Way Laga Cattle and Palm Integration Project site. Approximately 100 people attended from a range of backgrounds, but in most cases representing the palm plantation and cattle industries.

The Ministry of State Owned Enterprises, which is responsible for the PTP government owned palm plantations, sent representatives from PTP 1, 3, 4, 5, 6, 7, 8 and 13. The larger private plantation companies who sent representatives included Sampoerna, Astra, Citra Borneo, Inda Gunilang Perkasa, BIO Nusantara Tecknologi, Paeco Agung and Aman Jaya Group. These plantations represent more than 1 million hectares of palm oil trees; more than 10% of national production capacity.

The seminar was opened with an endorsement of the project by Dr. Kusumo Diwyanto from Indonesian Centre for Animal Research and Development (ICARD). Dicky Adiwoso from PT AGP then outlined how the project came about after which Dr. Neny (PT AGP) made the major multi-media presentation, which included Power Point, video, and photographs.

4.11.2 Exit Poll

Of the 100 attendants, 26 completed the exit survey (see Appendix 15). Five people, 19%, of the attendees saw the potential benefits from the project model and were keen to look into it further. Sixteen people, 61.5%, of attendees found the project to be too difficult and not profitable enough. The remaining were unsure. While written feedback was relatively low, we received many verbal questions during and after the seminar, which were recorded.

The overarching theme of the attendees' questions and concerns related to further reducing the costs of the breeding program. Below is a categorized, combined summary of both the verbal questions and written exit survey.

The Feed Ration

- Molasses and tapioca is not produced anywhere near my plantation. Are there ingredients that we can use that replace those ingredients?
- Can we feed the cattle more leaves and less concentrate?
- Why not chop up the entire palm frond and feed it to the cattle?
- Can we use sago or rice bran to replace onggok (tapioca)?
- Can we feed coconut palm leaves to the cattle?
- Is there any other palm factory waste that can be fed to the cattle?

The Health and Welfare of the Cattle

- Does eating the entire palm leaf cause stomach problems for the cattle?
- Is it dangerous to put urea into the feed?
- Will the Australian cows spread disease to the local cows in my plantation?
- Can Australian cows drink Indonesian water, or will they get diarrhoea?
- How many times can I get an Australian cow pregnant before she is too old?
- Will the manure from the cattle spread diseases to the trees in my plantation?
- How much is the potential ADG when feeding palm leaves?

Logistical Inquiries

- Can we use local cattle instead of Australian cattle?
- Can we use artificial insemination?
- How long does it take for Australian cattle to learn to eat palm leaves?
- How can I get assistance to train our staff to feed the cattle this special diet?
- Who can I contact to inquire about importing Australian cattle?
- Can I use local bulls instead of Australian bulls?
- Can I purchase cows that have already been imported from Australia? I would like to start with a small number as opposed to a full shipload.
- How do we get the cows, since it is very difficult to get the cows in Indonesia? Yes, we could get them from East Indonesia, but that is very far to transport them.
- Can I buy only Australian feeder cattle and fatten them on my plantation, as that is the profitable part?

There were also major concerns surrounding the complexity of taking on an additional enterprise within the plantation and the potential for internal and external corruption, which would be difficult to control. The opportunities for corruption and theft include, but are not limited to, stealing cattle feed, secret commissions on the rations, stealing cattle/calves, and stealing funds from the proceeds. The level of profit margin does not justify the effort and new management that would be required to control this potential leakage.

4.12 Extension Material

4.12.1 Social media

Using social media has proved to be an effective means to share our research with a global audience and encourage dialogue from people of many various backgrounds. Furthermore, creating a Business Facebook site and uploading videos to YouTube are free, so this endeavour has not added to project costs.

The Way Laga Facebook page, Way Laga Cattle & Palm Integration Project (http://www.facebook.com/pages/Way-Laga-Cattle-Palm-Integration-Project/351227811662621?fref=ts) has been used to share the Power Point presentations and videos – in Bahasa Indonesian language and English – from the seminar on 13 March 2013 , photo and video documentation from regular visits to the project site, and written articles about the potential non-commercial social and environmental benefits that could come with this breeding station and feedlot model.

All extension materials (i.e. videos, Power Point presentations, and photo galleries are attached as appendices). Appendix 16.

A comprehensive document on breeder cow management is currently being prepared through another MLA Live Export R&D project "*PROJECT NO. W.LIV.0317*, "**Best Practice Beef Breeding Cattle Management in Indonesia**"

4.12.2 The key principles for Best Practice management in palm feedlots

This project was able to successfully establish and manage a breeder feedlot on a palm plantation. In doing so, the research outcomes and the learning experiences along the way have helped contribute to a series of recommendations that can used and further developed to support expansion of a breeder operation using a palm frond based diet. Most of the recommendations could apply to feedlots in general while others relate specifically to feedlots using palm leaves. The recommendations pertain to 5 broad areas: feedlot construction, cow and bull management, calf management, ration management, and faeces management.

Feedlot Construction

The feedlot building needs to include the following features as a minimum to ensure the welfare and production of the cattle:

- Minimum of net area 8 square metres per adult cow.
- Strong, reinforced concrete base 10 cm thickness .
- Minimum 25% roof area providing protection from the rain.
- Minimum 60 cm trough space per cow.
- Forcing pen, race and crush that allows cattle to be isolated and restrained if needed.
- Isolation pens for care of sick cattle and new-born calves.

- Reliable source of suitable drinking water.

Cow and Bull Management

- Pregnant cows need to be maintained at a BCS of 3 to 3.5 at calving.
- Lactating and weaned cows about to conceive need to be on a ration providing additional protein and energy to promote milk production and cycling. Nutrition should aim to have the cows in BCS 3.5 - 4 for efficient conception.
- These two groups can be isolated (to facilitate provision of different diets) using portable panels that are moved as the two groups expand and contract during the year.
- Provide bulls at least 1 per 25 cows. Check bulls for fertility prior to introduction.
- Provide adequate supplies of veterinary products to treat common problems.
- Ensure veterinary attention is available at all times.

Calf management

- Provide intensive care to the calf during first 24 hours after birth.
- Ensure at least 2 litres colostrum is consumed within 3 hours of birth.
- Ensure mother is feeding calf satisfactorily during the first 24 hours.
- Take cow and calf to the crush to allow calf to feed if milk supply is not adequate.
- Keep frozen supplies of colostrum and milk for emergencies.
- Force feed using McGrath Calf Feeder if necessary.
- Provide creep feed for calves including access to palm leaves.
- Provide creep exclusion area with adequate shelter from the rain and sun with clean bedding.
- Wean calves at 75 kg onto special weaner ration.

Ration management

- Ensure rations are provided to keep body condition as above. Modify rations as required.
- Separate rations for pregnant, lactating/conceiving and creep are detailed in the WL report.
- Ensure if leaf supplies are restricted or unavailable for any reason that alternative roughage is available. Rice straw or palm leaf silage are suitable alternatives.

Faeces management

- Clean the pens at least weekly or as required
- Renew bedding after cleaning. Bedding can be any suitable product from waste fronds to sawdust to fibrous waste from the palm factory
- Store faeces away from the yard or ensure that fly control is provided

5 Success in achieving objectives

1. Demonstrate that a large scale (up to 50 head) beef production system, using Australian Brahman cattle and a low cost oil palm based diet, is sustainable and economically viable.

   The concept of recycling the by-products of a palm plantation (the palm frond) through a beef cattle feedlot located on site and then re-using the resultant manure as organic fertiliser represents an ideal model for sustainability. This project has clearly demonstrated the excellent productivity of breeder cows in such a system. Unfortunately, at current commodity prices and labour costs, the system for a 50 head model is not yet economically viable. However, there are various dimensions of the project which require further investigation and evaluation, such as the real benefits of the manure to the plantation owner and refinement of the ration to decrease feed costs and lift weaner output. Furthermore, the social and environmental aspects of the system must be better understood.

   The political ramifications of this project offer real solutions for the Indonesian government to explore in order to realise their policy on of a self-sufficient beef industry in Indonesia. While this project has not achieved the second part of objective one economic viability, it has clearly defined where the economic boundaries lie and viability will fluctuate depending on prices and supply and demand.

2. Host at least one field day/producer symposium to be attended by at least 20 other palm oil plantation owners and relevant government officials from the Department of Agriculture in Indonesia.

   Objective 2 has been over achieved with more than 100 delegates from a wide spectrum of the oil plantation industry and government attending a well organised and supported symposium on producing weaners in a palm oil plantation.

3. Produce extension and promotional material that illustrates the production system involved and outlines the cost benefits and rate of returns available through establishing the new breeding systems on Indonesian palm oil plantations.

   Extension and promotional material has been prepared in accordance with objective 3 and is itemised in Appendix 16. Social media outlets such as Facebook and YouTube have been utilised to capture a wider and more engaged audience. Additionally, the Power Point presentations and videos have been produced in Bahasa Indonesian language and English from the seminar in Bandar Lampung on 13 March 2013.

   Photo and video documentation from regular visits to the project site, and written articles about the potential non-commercial social and environmental benefits that could come with this breeding station and feedlot model are available for dissemination on the Way Laga Cattle and Palm Integration Project Facebook page. Further analysis and promotion will occur post this project as momentum grows and interest in the concept develops.

6 Impact on meat and livestock industry – Now and in five years' time

At first glance, this project could be seen as being detrimental to the long-term prosperity and survival of the beef industry in northern Australia as it could be argued we are effectively reducing market outlet by decreasing Indonesia's need to import feeder steers. However, it takes decades to be able to increase a national breeder herd and in the short term, feed lot operators in Indonesia must demonstrate intent to support local breeder operations in order to sustain their import quotas for Australian feeder steers. Moreover, the Indonesian national herd has been in steady decline for some time as breeding animals have been used to fill the gap created by increased local demand.

From an Indonesian government perspective, this project is a clear demonstration of the Australian industry listening to its requests and actively investing in the development of breeding cattle in Indonesia. This project represents one of the very few actual, real time initiatives that have the potential to contribute to Indonesian food security in the future. If the only result of this project is to confirm to the Indonesian government that the Australian industry is listening and acting on their requests, then it may well have achieved a worthwhile political outcome if not an animal production one. In addition, there have been lingering concerns about the perceived fertility of Australian Brahman breeders in Indonesian farming systems. This project has unequivocally demonstrated that Australian Brahman breeders can perform at the highest level of reproductive efficiency expected in a well-managed breeder operation in Indonesia.

If developing breeder herds under palm trees does progress to the expansion phase, then there will be an increased demand for breeding females from Australia. The north Australian beef industry is well placed to out-compete any other global competitors due to proximity, freedom of disease, and ability to supply the right product. Furthermore, developing an outlet for females in northern Australia will provide an avenue to address the crisis faced when the 350 kg weight restriction was introduced in June 2010. In five years' time, the north Australian beef industry could well be on the road to recovery following the events of recent years which have both depressed land and cattle prices.

7 Conclusions and recommendations

The amount of palm fronds available each year could potentially support a breeding herd of 4.5 million head of cattle. The product is readily available and has excellent palatability; however, the nutrient value is variable and not good enough to support full beef production.

While the protein content is fair, the energy content is quite low and at very best, maintenance is all that could be possibly achieved.

Additionally, there is a cost of harvesting and preparing (albeit low at the moment) that will only ever increase. However, with the addition of other fed additives such as PKC, tapioca waste, and minerals, this project has demonstrated that a palm frond based diet was able to achieve excellent reproductive performance with CCI of around 13.1 weeks and 100% conception rates. This equates to a calf each year, however, in the 50 head model used, the value of the weaner at 90 days was only marginally more than the cost of feeding the cow. This does not include any of the other operational and overhead costs such as wages, security, transport, and veterinary costs. The low protein content of the overall ration probably contributed to poor calf birth weights and lower than expected growth rates. Still, there is an opportunity to perhaps increase weaner output by 30 kgs a head by simply adding additional protein; this has yet to be tested. The ration used in the project was high in starch and the breeders actually ended up in better condition than was required. There is a possibility that a slightly lower energy diet, which would be less costly, will be able to produce adequate reproductive performance. Nevertheless, the economic assessment clearly supported the premise the system was not viable that at AUD$5.50/kg for a 3 month old weaner. Breeding beef is an expensive exercise unless you have access to cheap quality pastures. Subsequent modelling on a 300 head operation that feeds these 3 month old weaners out to a slaughter weight was able to demonstrate that the enterprise could recognise a ROI of around 3.7% p.a. after 7 years. The value to the plantation in acquisition of cheap organic fertiliser for the palm trees has the potential to create cost benefits for plantation owners as well.

The overall net worth of the palm plantation/beef feedlot systems approach has yet to be fully evaluated. While the project was unable to fully meet all of its objectives, it has opened up areas for further investigation and has generated immense interest both at plantation owner level and government level.

A series of recommendation to come out of this work include:

1. Refine ration:
    - Ascertain reproductive performance at higher levels of palm frond content and lower levels of energy supplements to reduce overall ration costs.
    - Examine impact of higher protein content of ration to improve calf birth weight and calf growth rates.
    - Investigate rations for weaner steers and establish most cost effective options from weaning to slaughter.
    - Explore silage options for palm frond collection.
    - Explore alternative options for palm frond replacement during holidays and festivals
    - Investigate the variation in quality of palm fronds.
    - Explore alternate sources for protein in breeder feedlots eg *Leucaena*, *Mucuna* spp., chicken manure. etc.
2. More economic assessment and modelling

- Full economic analysis of palm plantation/beef production farming system incorporating palm frond pruning in palm plantation with collection of frond for rations.
- Examine the feedlot waste systems and full benefits of using feedlot waste as organic source of fertiliser.
- Explore the social economic impacts of using plantation staff in multi skilled work force.
- Examine the various business models ranging from full plantation ownership of the feedlot to contracting out the lot feeding operations to small farm -holders.

3. Building capacity in ration management and health investigations.
    - In conjunction with Indonesian veterinary health officials and pathology laboratories in Australia, investigate pre- and post natal calf losses in Indonesian feedlots.
    - Examine herd health options and vaccination programs for Indonesian breeder feedlots.
4. Examine the impact of genetic improvement in small breeder feedlots.

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9 Appendices

9.1 Appendix 1- Memorandum of Understanding

AUSTRALASIAN LIVESTOCK SERVICES PTY LTD

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*Email:***dr.ross@evet.com.au**

MEMORANDUM OF UNDERSTANDING

Between : PT Agro Giri Perkasa (AGP), Aman Jaya Group (AJP) and Australasian Livestock Services (ALS).

ALS has received funding from Meat and Livestock Australia (MLA) to run a 52 head breeding cattle demonstration using sawit waste products as the primary feed source. The cattle will arrive at the project in the last week of October 2011 and it is intended complete the project at the end of 2013.

Following discussions between Ronald Wijaya (AJP), Greg Pankhurst (AGP) and Ross Ainsworth (ALS), the following principals have been agreed to in order to allow the project to proceed at the Aman Jaya Sawit plantation at Way Laga near Panjang, Lampung.

What each party will contribute to the project;

- ALS provides overall management of the project including passing on MLA funding as provided according to the contract schedule. Dr Ross Ainsworth will visit the project regularly and monitor regular reporting.
- AGP provides 50 head of heifers and two bulls for the life of the project
- AGP provides operational staff for day to day management
- AGP provides all feed resources except for palm leaves
- AJP provides approximately 1500 m of land.
- AJP provides access to 2500 litres of water a day (from your well or a bore)
- AJP provides access to electricity connection for a few lights - AGP will pay the monthly cost
- AJP provides security service from your existing staff
- AJP provides all leaf material for the feeding of the cattle (260 kg per day)
- AGP project staff will collect bulk feaces from the kandang (cattle pen) and deposit in a trailer/bin for AJP to use for distribution in the plantation. Feaces provided free to AJP
- At the end of the program AJP offered 5 % of net profits - expected 15 months after first cattle were placed in the feedlot.
- AJP retains ownership of the facility at the end of the project

- AJP give permission for visitors to attend the demonstration site for purposes of field days to showcase this project to Government and Industry (with advance notification and approval of AJP)

Sign : Ronald Wijaya for AJP x …… Date ...../ 10 / 2011

Sign : Greg Pankhurst for AGP x …… Date ...../ 10 / 2011

Sign : Ross Ainsworth for ALS x …… Date ...../ 10 / 2011

9.2 Appendix 2 – Engineers feedlot drawing and plans

9.3 Appendix 3 – Details of Dairy One Ration analysis

9.4 Appendix 4 – Manure analysis

9.5 Appendix 5 – Details and information on abortion after induction

9.6 Appendix 6 – Mark Hearnden's spreadsheet results with data analysis

9.7 Appendix 7– Autopsy details of dead cows

9.8 Appendix 8 – Additional photos of calves

https://www.facebook.com/pages/Way-Laga-Cattle-Palm-Integration-Project/351227811662621

9.9 Appendix 9 – Paper by Tunas Muda on Manure

9.10 Appendix 10 – Paper by Dr Askardiya R Patrianov

9.11 Appendix 11 – Matthew Reid's assessment of value of manure to plantations

9.12 Appendix 12 – Results of blood tests on abortions.

9.13 Appendix 13 – Trudi Oxley's economic modeling: 50 head operation

9.14 Appendix 14 – Trudi Oxley's economic modeling: 300 head operation

9.15 Appendix 15 – Exit poll results post the symposium and field day.

9.16 Appendix 16 – Extension material prepared as a result of project

https://www.facebook.com/pages/Way-Laga-Cattle-Palm-Integration-Project/351227811662621

APPENDICES COMBINED

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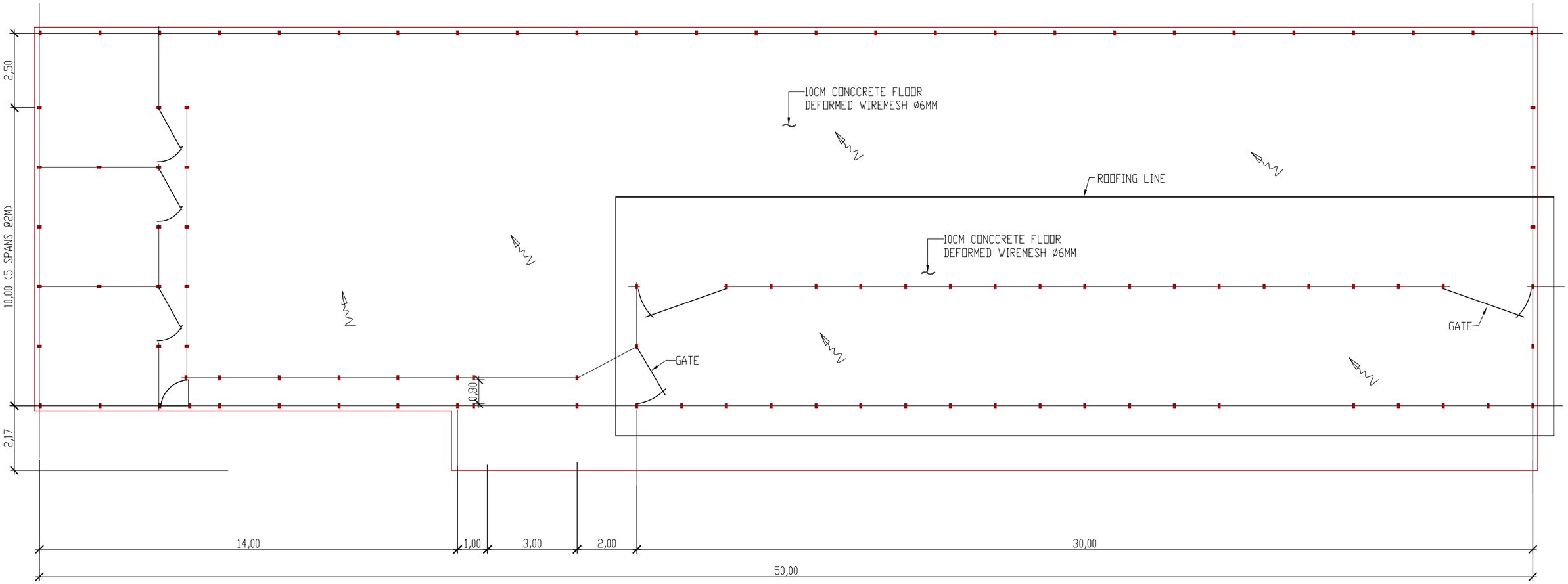

NOTE:

1. ALL DIMENSION AND ELEVATION IN METRE(M) EXCEPT NOTED OTHERWISE
2. ALL POSTS MATERIAL TO BE WOOD POST SIZE 7CM X 14CM EXCEPT NOTED OTHERWISE
3. ALL RAILING MATERIAL TO BE WOOD RAILING SIZE 6CM X 12CM EXCEPT NOTED OTHERWISE

LAYOUT-1
GENERAL

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DRAWN BY:	TS	SUBJECT:	SUBJECT
CHECKED BY:	----		
APPROVED BY:	----	TITTLE:	TITTLE
REV DATE:	08/11/2010		
REV. NO:	----		
PROJECT NO:	----	DWG NO:	----

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08/11/2010

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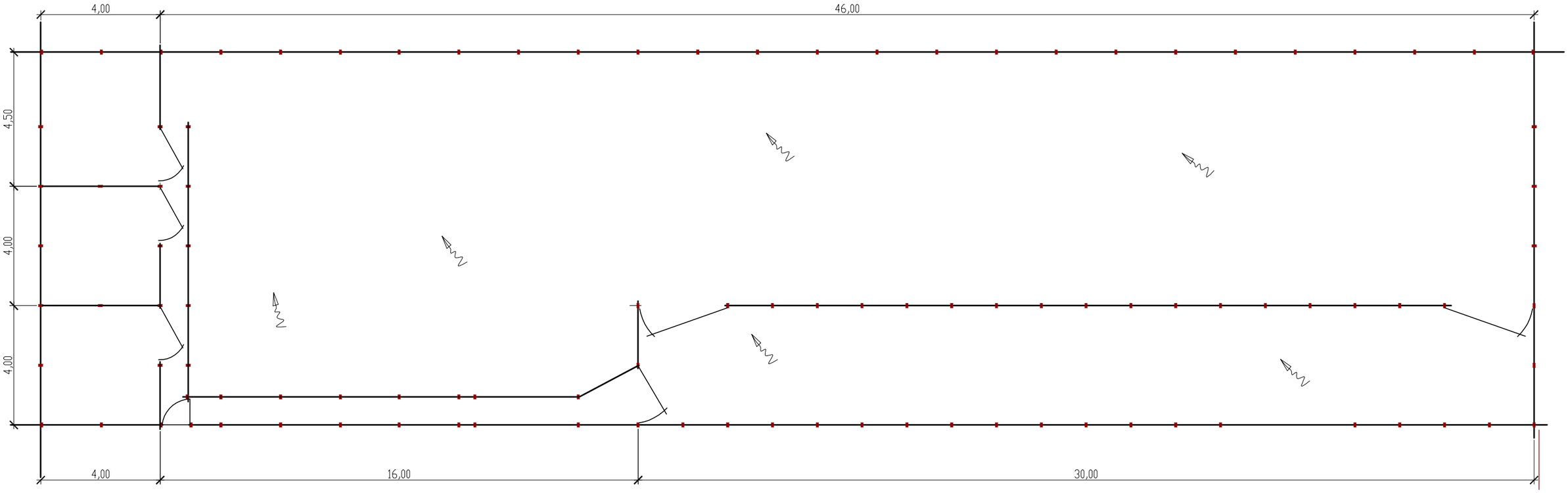

LAYOUT-2
DENAH

NOTE:
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2. ALL POSTS MATERIAL TO BE WOOD POST SIZE 7CM X 14CM EXCEPT NOTED OTHERWISE
3. ALL RAILING MATERIAL TO BE WOOD RAILING SIZE 6CM X 12CM EXCEPT NOTED OTHERWISE

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APPROVED BY:	----	TITTLE:	TITTLE
REV DATE:	08/11/2010		
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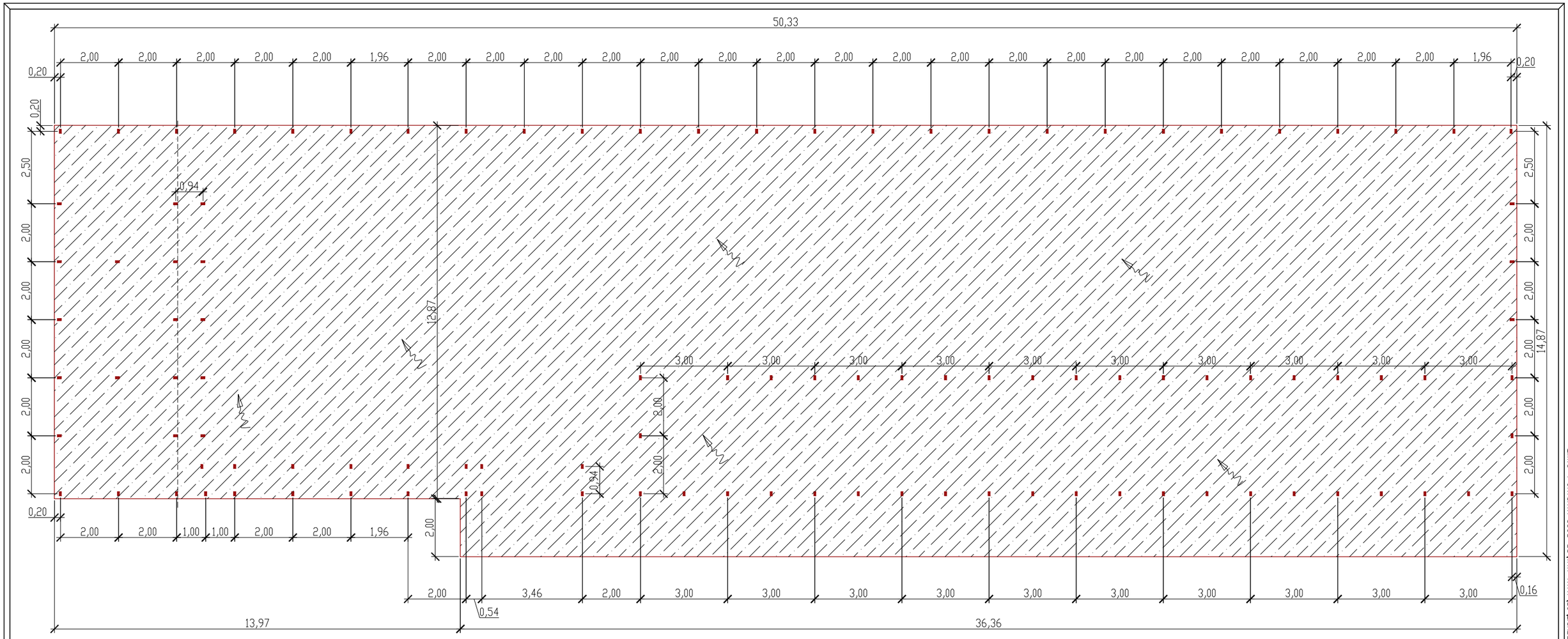
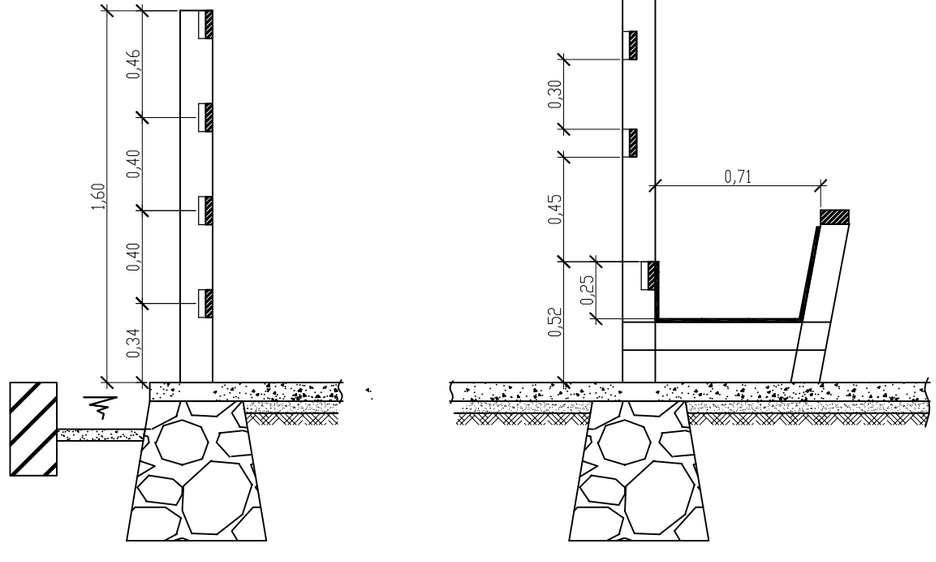
08/11/2010

USER:TONNY SITORUS



LAYOUT-3
TIANG-TIANG



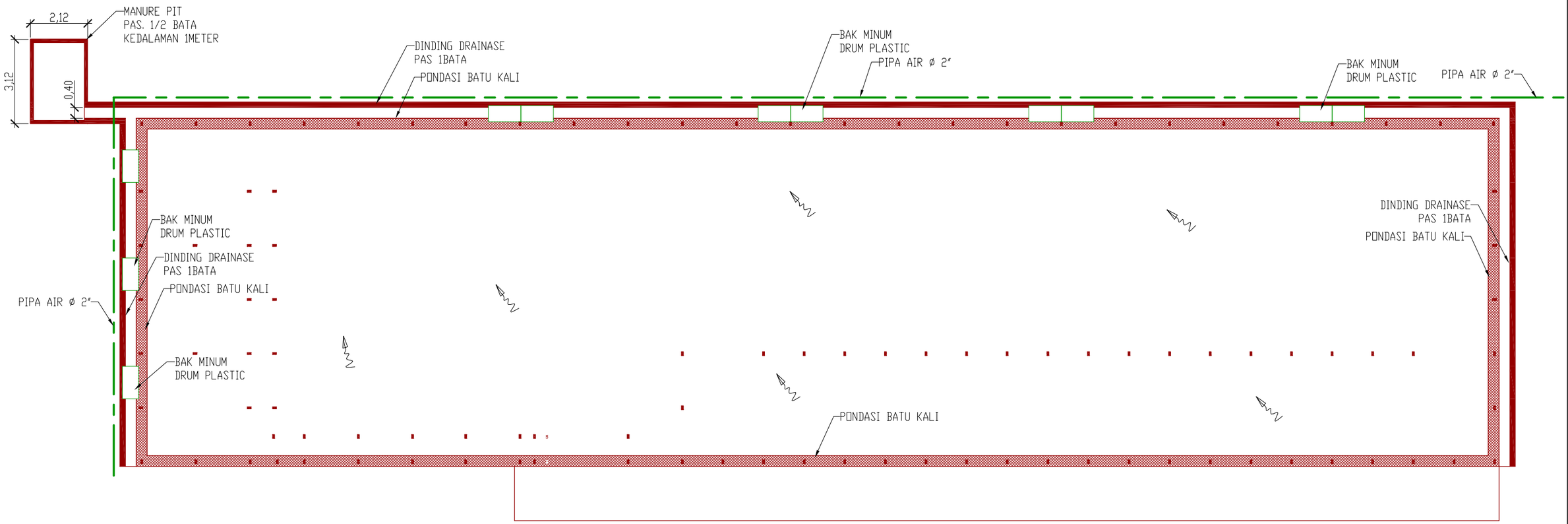
NOTE:
1. ALL DIMENSION AND ELEVATION IN METRE(M) EXCEPT NOTED OTHERWISE
2. ALL POSTS MATERIAL TO BE WOOD POST SIZE 7CM X 14CM EXCEPT NOTED OTHERWISE
3. ALL RAILING MATERIAL TO BE WOOD RAILING SIZE 6CM X 12CM EXCEPT NOTED OTHERWISE

DESIG BY:	TS	SCALE:NTS
DRAWN BY:	TS	SUBJECT: SUBJECT
CHECKED BY:	----	
APPROVED BY:	----	TITTLE: TITTLE
REV DATE:	08/11/2010	
REV. NO:	----	
PROJECT NO:	----	DWG NO: ----

E:\003-BENDIT GP\AMAN JAYA\DR-ROSS KANDANG L-SAWIT

08/11/2010

USERTONNY SITORUS



LAYOUT-4
PONDASI DAN DRAINASE

NOTE:
1. ALL DIMENSION AND ELEVATION IN METRE(M) EXCEPT NOTED OTHERWISE
2. ALL POSTS MATERIAL TO BE WOOD POST SIZE 7CM X 14CM EXCEPT NOTED OTHERWISE
3. ALL RAILING MATERIAL TO BE WOOD RAILING SIZE 6CM X 12CM EXCEPT NOTED OTHERWISE

DESIG BY:	TS	SCALE: NTS	
DRAWN BY:	TS	SUBJECT: SUBJECT	
CHECKED BY:	----		
APPROVED BY:	----	TITTLE: TITTLE	
REV DATE:	08/11/2010		
REV. NO:	----		
PROJECT NO:	----	DWG NO: ----	

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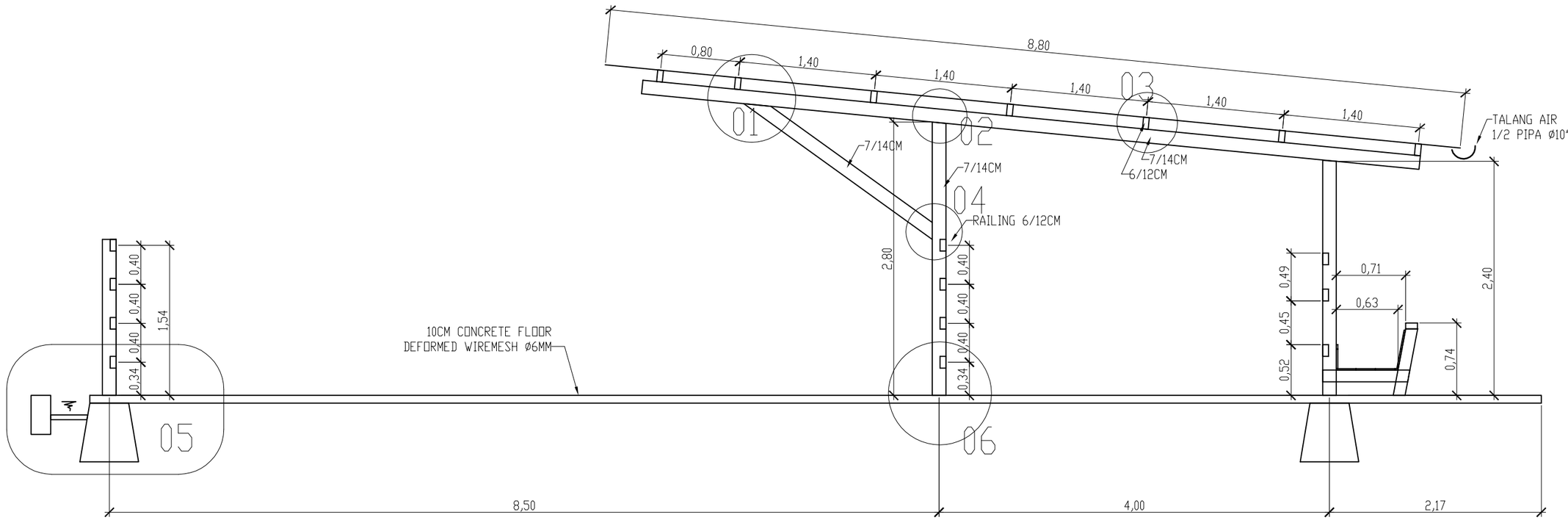
08/11/2010
USERTONNY SITORUS



POTONGAN

NOTE:
1. ALL DIMENSION AND ELEVATION IN METRE(M) EXCEPT NOTED OTHERWISE
2. ALL POSTS MATERIAL TO BE WOOD POST SIZE 7CM X 14CM EXCEPT NOTED OTHERWISE
3. ALL RAILING MATERIAL TO BE WOOD RAILING SIZE 6CM X 12CM EXCEPT NOTED OTHERWISE

DESIG BY:	TS	SCALE:NTS
DRAWN BY:	TS	SUBJECT: SUBJECT
CHECKED BY:	----	
APPROVED BY:	----	TITTLE: TITTLE
REV DATE:	08/11/2010	
REV. NO:	----	
PROJECT NO:	----	DWG NO: ----

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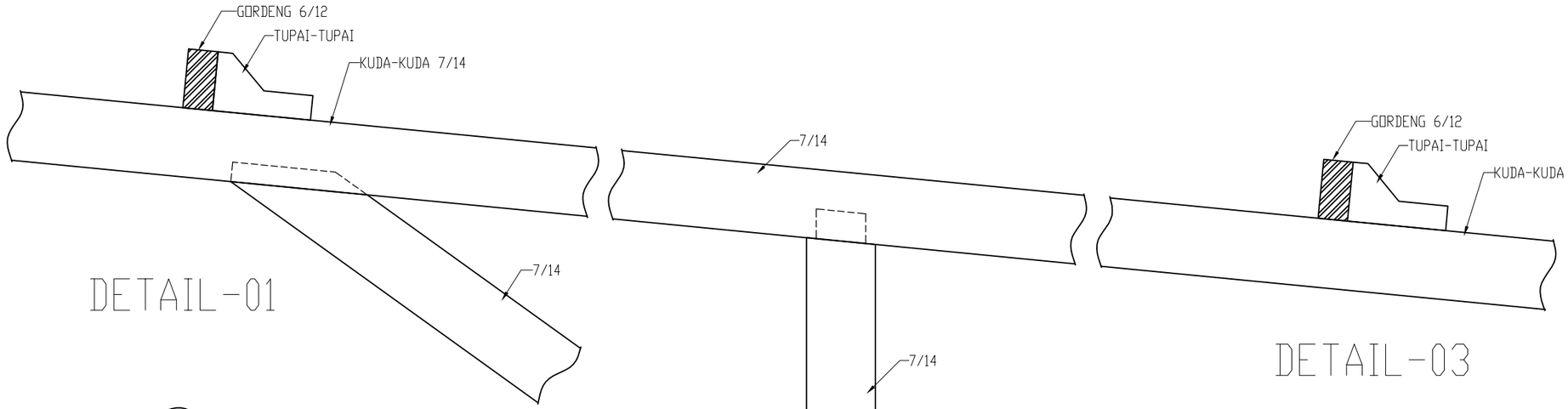
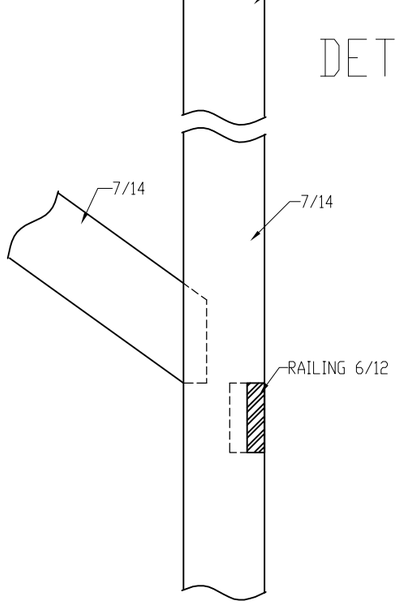
USERTONNY SITORUS

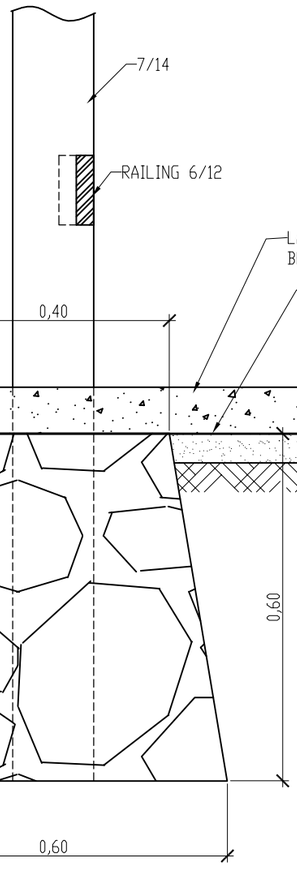


DETAIL-01

DETAIL-03

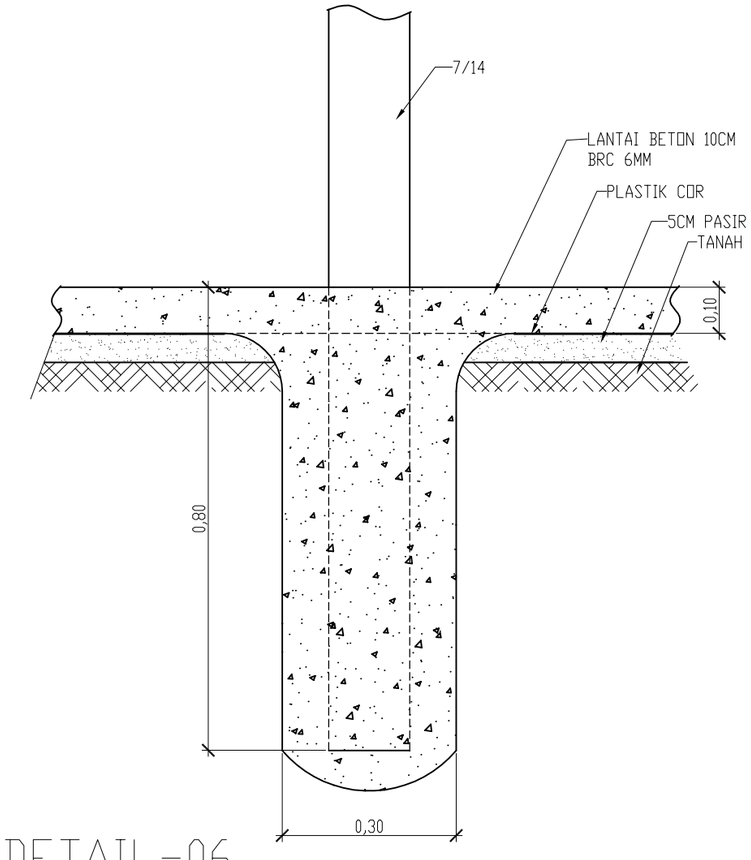


DETAIL-02



DETAIL-04

DETAIL-05



DETAIL-06

NOTE:
1. ALL DIMENSION AND ELEVATION IN METRE(M) EXCEPT NOTED OTHERWISE
2. ALL POSTS MATERIAL TO BE WOOD POST SIZE 7CM X 14CM EXCEPT NOTED OTHERWISE
3. ALL RAILING MATERIAL TO BE WOOD RAILING SIZE 6CM X 12CM EXCEPT NOTED OTHERWISE

DESIG BY:	TS	SCALE:NTS
DRAWN BY:	TS	SUBJECT: SUBJECT
CHECKED BY:	----	
APPROVED BY:	----	TITLE: TITTLE
REV DATE:	08/11/2010	
REV. NO:	----	
PROJECT NO:	----	DWG NO: ----

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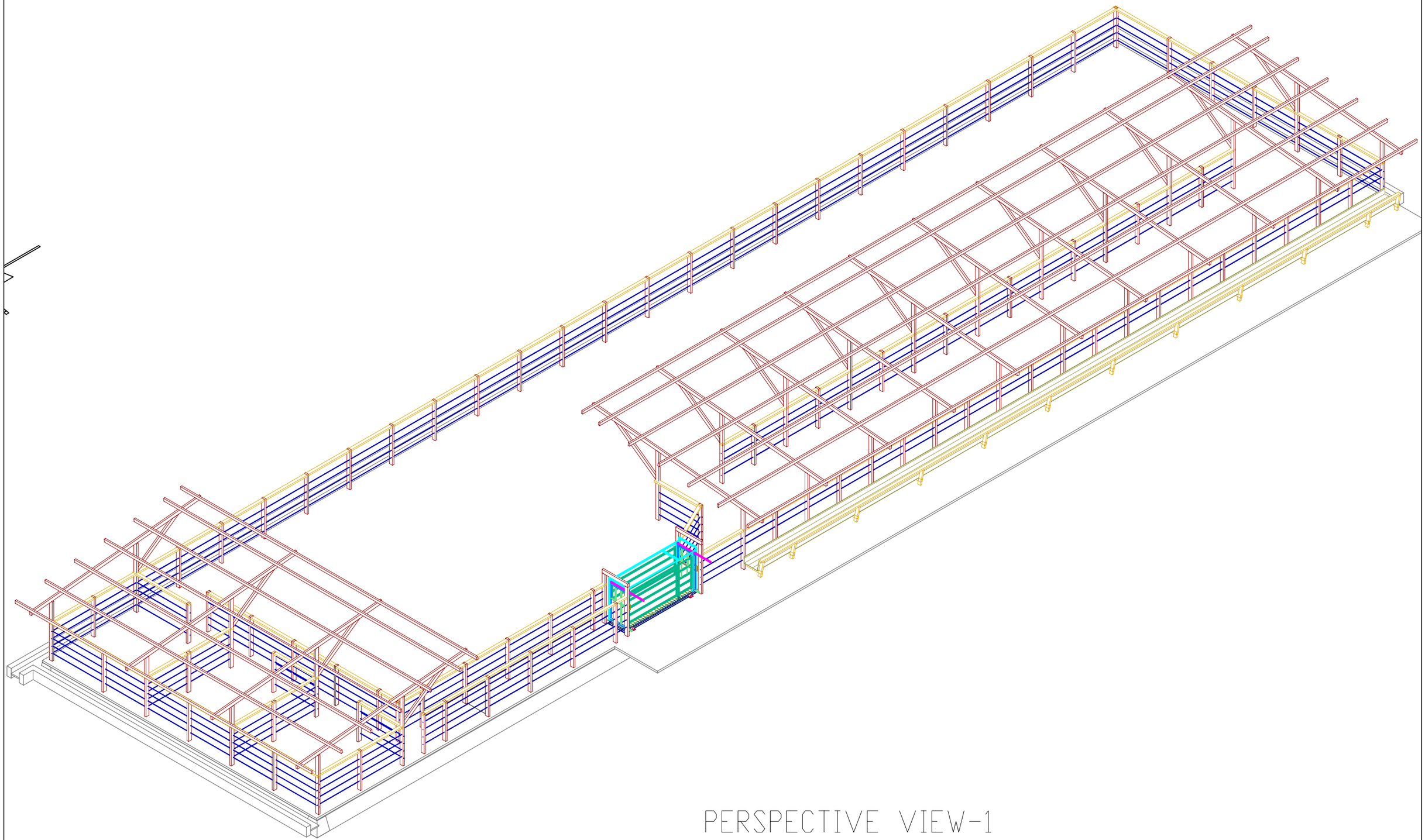

PERSPECTIVE VIEW-1

DESIG BY:	TS	SCALE:	NTS
DRAWN BY:	TS	SUBJECT:	SUBJECT
CHECKED BY:	----		
APPROVED BY:	----	TITTLE:	TITTLE
REV DATE:	07/05/2011		
REV. NO:	----		
PROJECT NO:	----	DWG NO:	----

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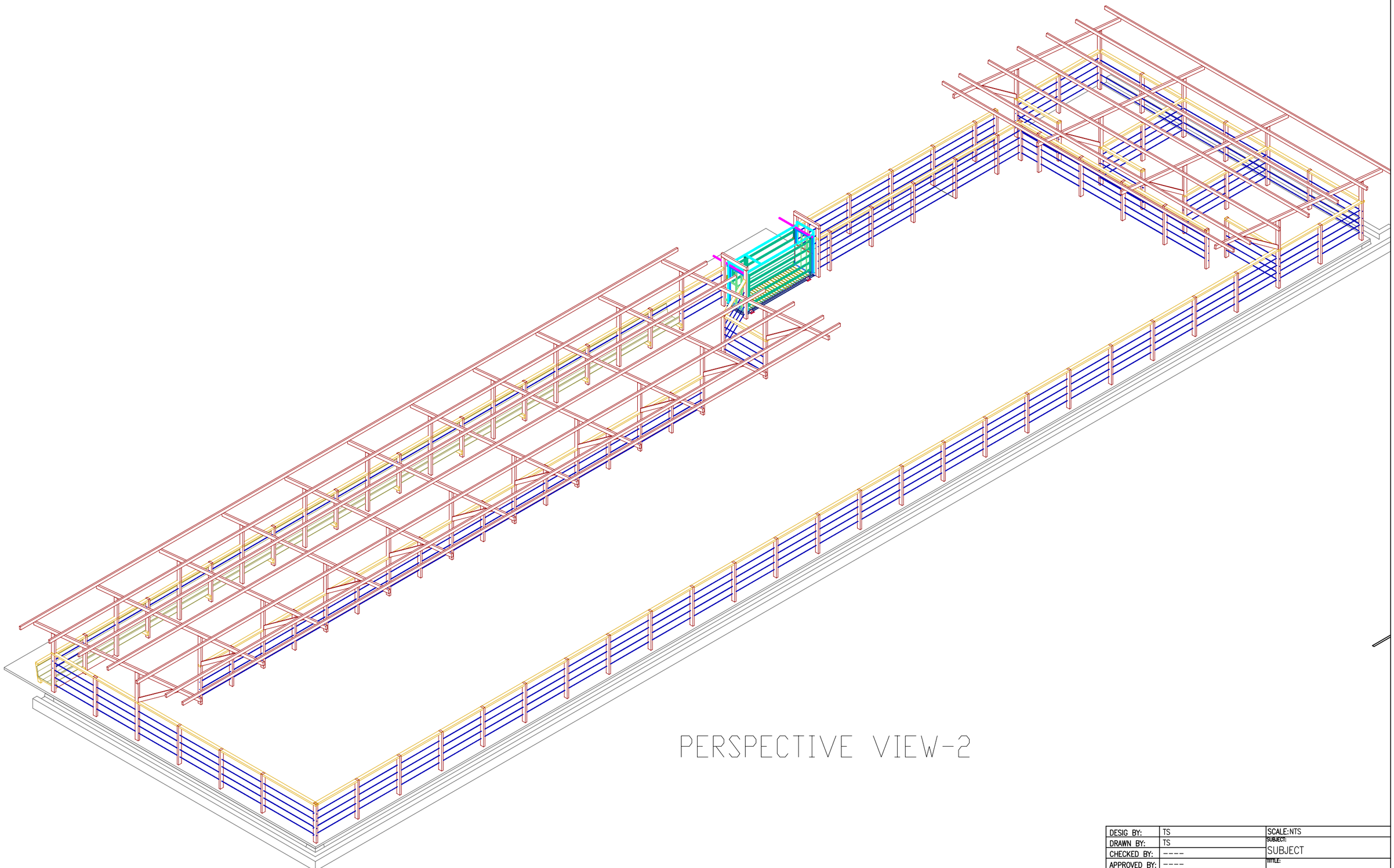
07/05/2011

USER:ONNY SITORUS



PERSPECTIVE VIEW-2

DESIG BY:	TS	SCALE: NTS	
DRAWN BY:	TS	SUBJECT: SUBJECT	
CHECKED BY:	----		
APPROVED BY:	----	TITLE: TITTLE	
REV DATE:	07/05/2011		
REV. NO:	----		
PROJECT NO:	----	DWG NO: ----	

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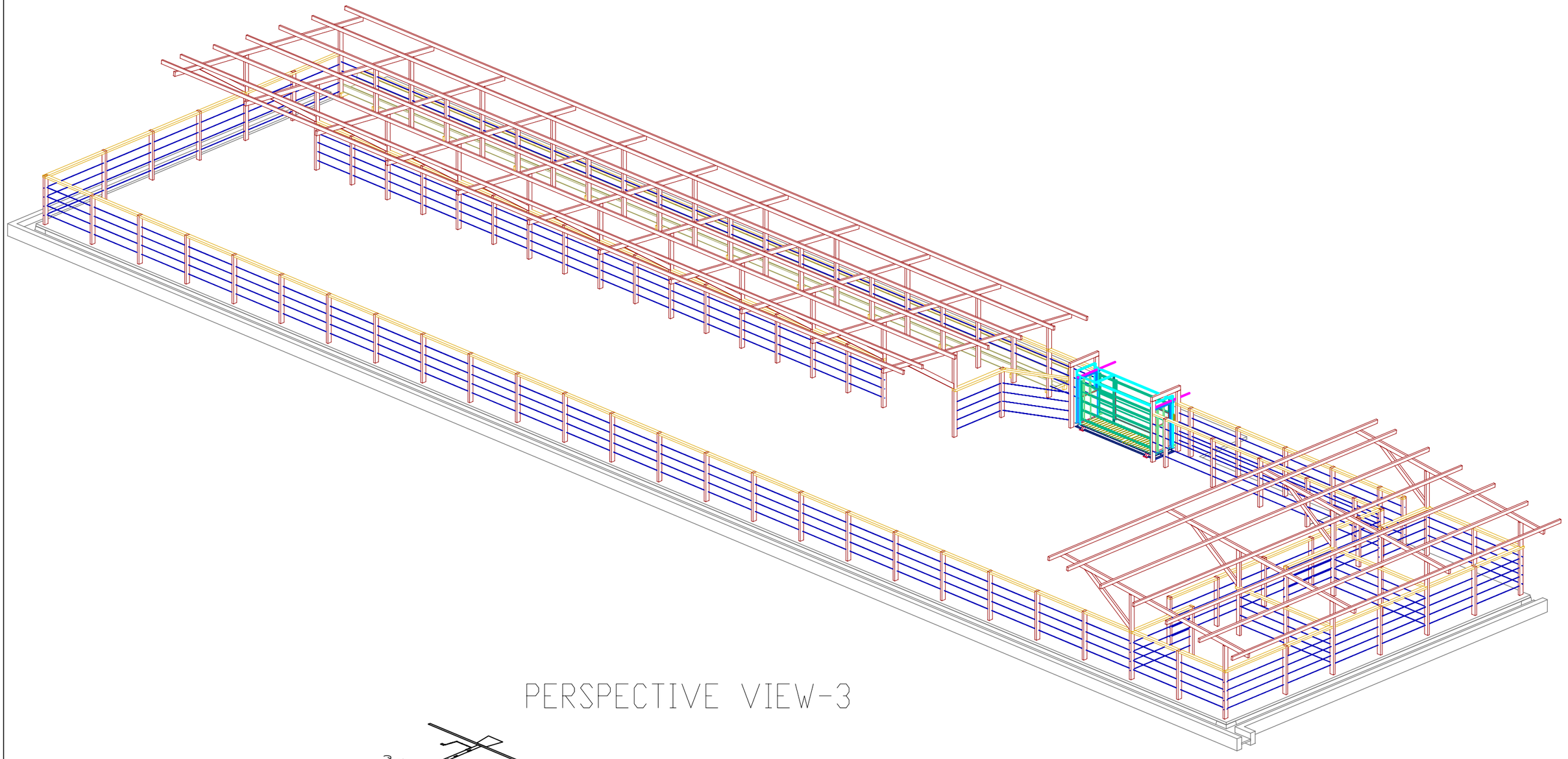
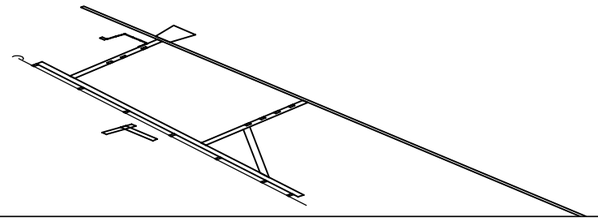
07/05/2011

USER:TONNY SITORUS



PERSPECTIVE VIEW-3



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CHECKED BY:	----		
APPROVED BY:	----	TITTLE:	TITTLE
REV DATE:	07/05/2011		
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PROJECT NO:	----	DWG NO:	----

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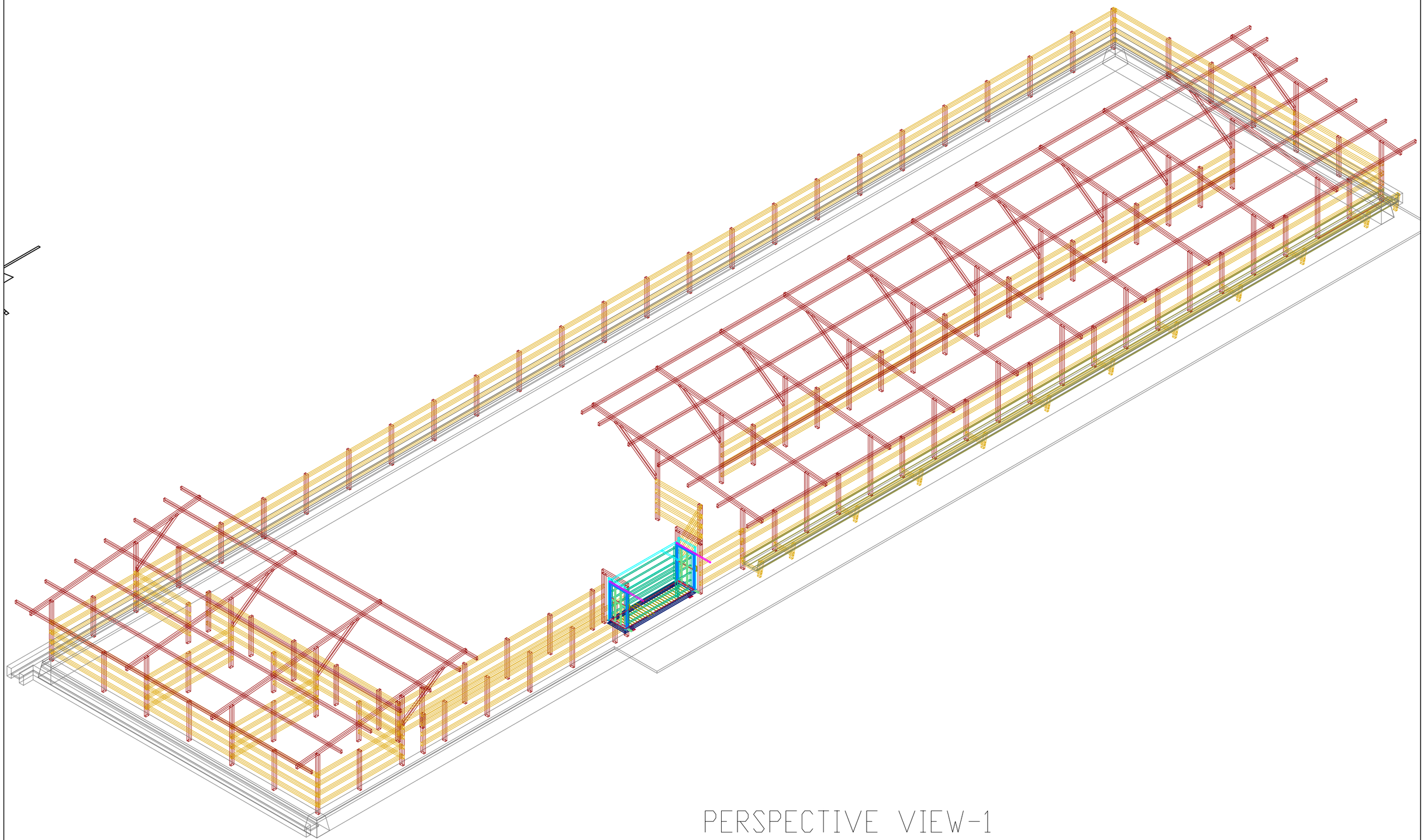

PERSPECTIVE VIEW-1

DESIG BY:	TS	SCALE: NTS	
DRAWN BY:	TS	SUBJECT: SUBJECT	
CHECKED BY:	----		
APPROVED BY:	----	TITTLE: TITTLE	
REV DATE:	08/11/2010		
REV. NO:	----		
PROJECT NO:	----	DWG NO: ----	

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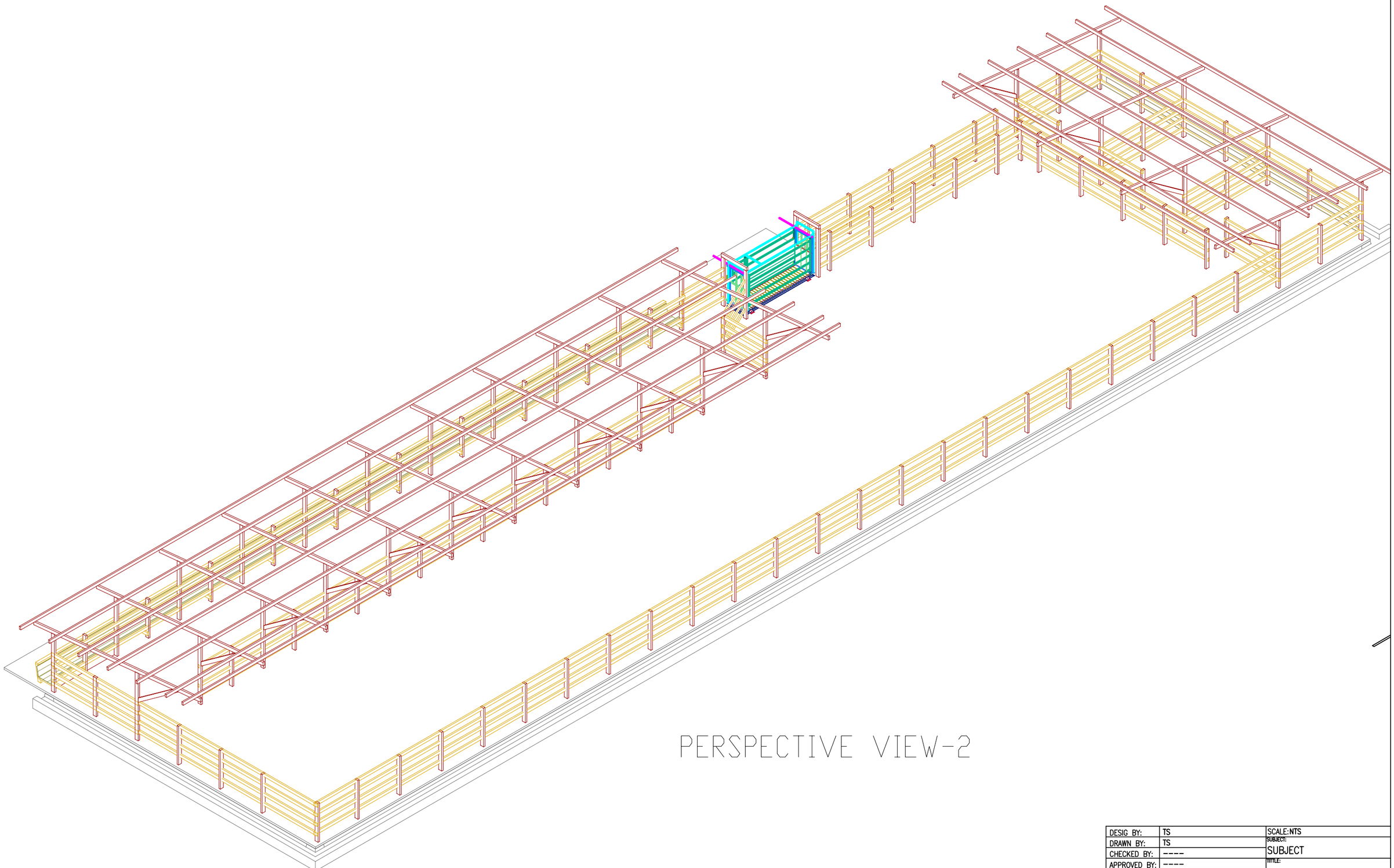

PERSPECTIVE VIEW-2

DESIG BY:	TS	SCALE: NTS	
DRAWN BY:	TS	SUBJECT: SUBJECT	
CHECKED BY:	----		
APPROVED BY:	----	TITTLE: TITTLE	
REV DATE:	08/11/2010		
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PROJECT NO:	----	DWG NO: ----	

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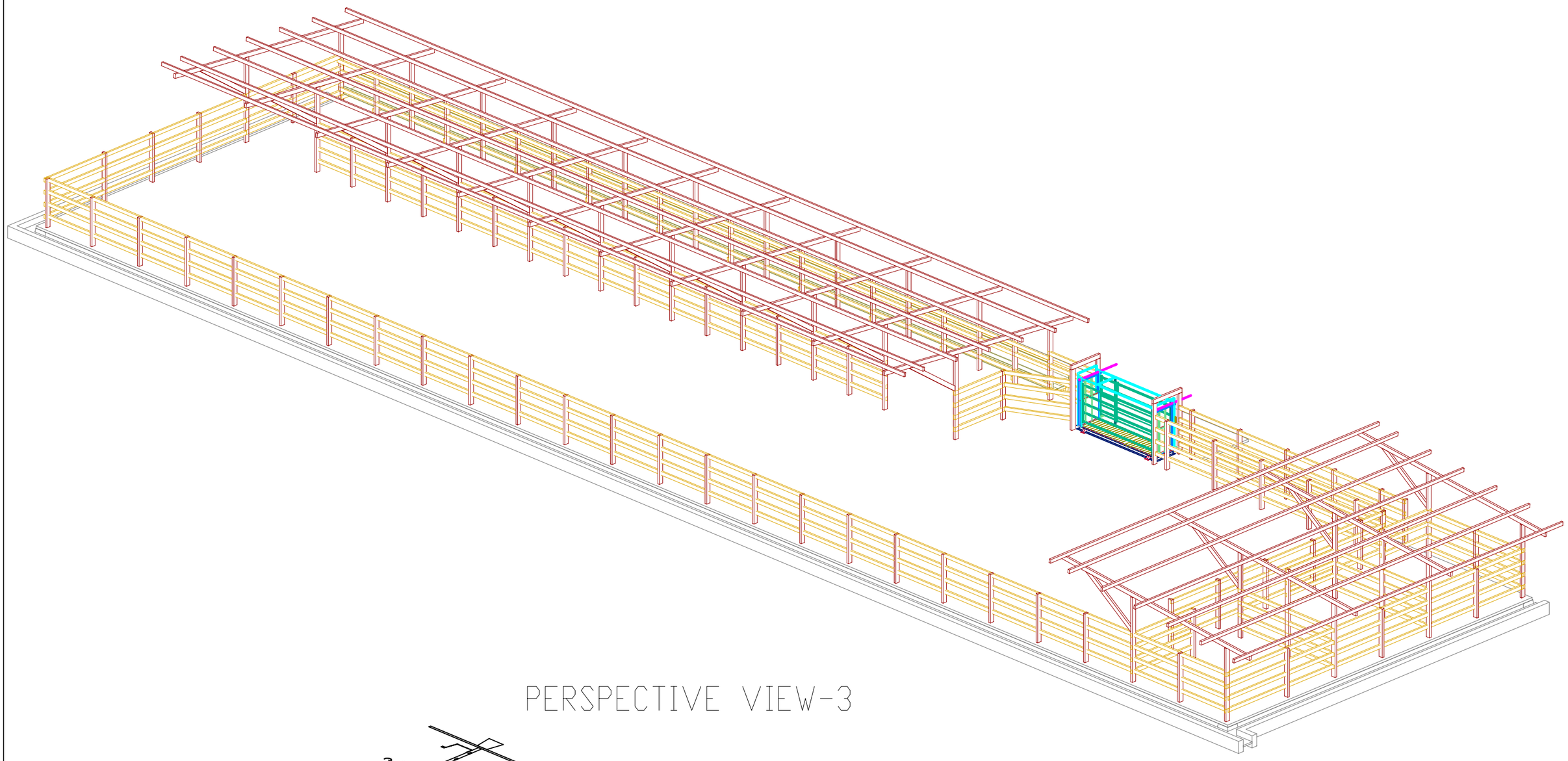
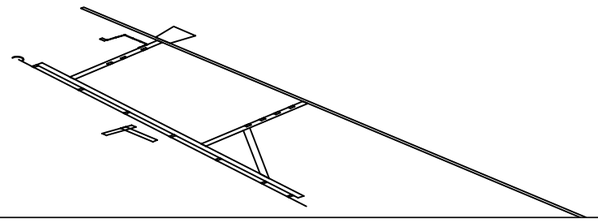


PERSPECTIVE VIEW-3



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CHECKED BY:	----		
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ITHACA, NEW YORK 14850
607-257-1272 (fax 607-257-1350)

Sampled	Recvd	Printed	ST	CO
	04/16/13	04/17/13		

RATION MENYUSUI WAYLAGA
GREGORY PANKHURST
TERUSAN H JUANDA GA
BANDAR LAMPUNG
LAMPUNG, 35213
INDONESIA

ENERGY TABLE - NRC 2001

	Mcal/Lb	Mcal/Kg
DE, 1X	1.50	3.32
ME, 1X	1.32	2.91
NEL, 3X	0.78	1.71
NEM, 3X	0.82	1.80
NEG, 3X	0.53	1.17
TDN1X, %	76	

NEW PACKAGES AND PRICING EFFECTIVE 01/28/2013. VISIT OUR WEBSITE FOR MORE INFO WWW.DAIRYONE.COM*******

Sample Description	Farm	Code	Sample
GRAIN MIX, Dry		646	19133660

Analysis Results

Components	As Fed	DM
% Moisture	21.7	
% Dry Matter	78.3	
% Crude Protein	8.2	10.5
% Adjusted Crude Protein	8.2	10.5
% Acid Detergent Fiber	26.6	34.0
% Neutral Detergent Fiber	30.5	38.9
% Starch	27.4	35.0
% TDN	58	75
NEL, Mcal/Lb	.62	.80
NEM, Mcal/Lb	.63	.81
NEG, Mcal/Lb	.41	.52
Horse DE, Mcal/Lb	1.02	1.30

Dairy One

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#39 PALM LEAVE
GREGORY J PANKHURST
TERUSAN H JUANDA GA
BANDAR LAMPUNG
LAMPUNG
INDONESIA

ENERGY TABLE - NRC 2001

	Mcal/Lb	Mcal/Kg
DE, 1X	1.01	2.23
ME, 1X	0.82	1.81
NEL, 3X	0.45	0.99
NEM, 3X	0.45	0.99
NEG, 3X	0.20	0.44
TDN1X, %	50	

Sample Description	Farm	Code	Sample
FR LEAVES, MISC.		249	15708730

Analysis Results

Components	As Fed	DM
% Moisture	52.6	
% Dry Matter	47.4	
% Crude Protein	5.1	10.8
% Adjusted Crude Protein	5.1	10.8
Soluble Protein % CP		25
% Acid Detergent Fiber	16.2	34.2
% Neutral Detergent Fiber	25.8	54.4
% Lignin	3.8	8.0
% NFC	7.7	16.2
% Crude Fat	2.1	4.5
% Ash	7.87	16.61
% TDN	24	50
NEL, Mcal/Lb	.23	.49
NEM, Mcal/Lb	.20	.42
NEG, Mcal/Lb	.08	.18
% Calcium	.41	.86
% Phosphorus	.06	.13
% Magnesium	.10	.21
% Potassium	.57	1.20
% Sodium	.009	.020
PPM Iron	131	276
PPM Zinc	9	19
PPM Copper	3	6
PPM Manganese	137	290
PPM Molybdenum	< 0.1	< 0.1
% Sulfur	.06	.12

Page 1

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PALM LEAF WAYLAGA
GREGORY PANKHURST
TERUSAN H JUANDA GA
BANDAR LAMPUNG
LAMPUNG, 35213
INDONESIA

ENERGY TABLE - NRC 2001

	Mcal/Lb	Mcal/Kg
DE, 1X	1.28	2.82
ME, 1X	1.10	2.43
NEL, 3X	0.65	1.42
NEM, 3X	0.65	1.44
NEG, 3X	0.39	0.86
TDN1X, %	63	

NEW PACKAGES AND PRICING EFFECTIVE 01/28/2013. VISIT OUR WEBSITE FOR MORE INFO WWW.DAIRYONE.COM*******

Sample Description	Farm	Code	Sample
FR LEAVES, MISC.		249	19133640

Analysis Results

Components	As Fed	DM
% Moisture	61.0	
% Dry Matter	39.0	
% Crude Protein	5.8	14.8
% Adjusted Crude Protein	5.8	14.8
Soluble Protein % CP		25
% Acid Detergent Fiber	15.6	40.1
% Neutral Detergent Fiber	20.2	51.8
% Lignin	4.2	10.7
% NFC	6.9	17.6
% Crude Fat	4.0	10.4
% Ash	3.47	8.92
% TDN	25	63
NEL, Mcal/Lb	.25	.65
NEM, Mcal/Lb	.26	.66
NEG, Mcal/Lb	.15	.40
% Calcium	.28	.72
% Phosphorus	.10	.27
% Magnesium	.10	.26
% Potassium	.26	.67
% Sodium	.007	.018
PPM Iron	78	200
PPM Zinc	19	49
PPM Copper	14	36
PPM Manganese	171	440
PPM Molybdenum	< 0.1	< 0.1
% Sulfur	.08	.20

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PALM LEAF WAYLAGA
GREGORY PANKHURST
TERUSAN H JUANDA GA
BANDAR LAMPUNG
LAMPUNG, 35213
INDONESIA

ENERGY TABLE - NRC 2001

	Mcal/Lb	Mcal/Kg
DE, 1X	1.28	2.82
ME, 1X	1.10	2.43
NEL, 3X	0.65	1.42
NEM, 3X	0.65	1.44
NEG, 3X	0.39	0.86
TDN1X, %	63	

NEW PACKAGES AND PRICING EFFECTIVE 01/28/2013. VISIT OUR WEBSITE FOR MORE INFO WWW.DAIRYONE.COM*******

Sample Description	Farm	Code	Sample
FR LEAVES, MISC.		249	19133640

Analysis Results

Components	As Fed	DM
% Moisture	61.0	
% Dry Matter	39.0	
% Crude Protein	5.8	14.8
% Adjusted Crude Protein	5.8	14.8
Soluble Protein % CP		25
% Acid Detergent Fiber	15.6	40.1
% Neutral Detergent Fiber	20.2	51.8
% Lignin	4.2	10.7
% NFC	6.9	17.6
% Crude Fat	4.0	10.4
% Ash	3.47	8.92
% TDN	25	63
NEL, Mcal/Lb	.25	.65
NEM, Mcal/Lb	.26	.66
NEG, Mcal/Lb	.15	.40
% Calcium	.28	.72
% Phosphorus	.10	.27
% Magnesium	.10	.26
% Potassium	.26	.67
% Sodium	.007	.018
PPM Iron	78	200
PPM Zinc	19	49
PPM Copper	14	36
PPM Manganese	171	440
PPM Molybdenum	< 0.1	< 0.1
% Sulfur	.08	.20

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FRESH MANURE WAYLAGA
GREGORY PANKHURST
TERUSAN H JUANDA GA
BANDAR LAMPUNG
LAMPUNG, 35213
INDONESIA

NEW PACKAGES AND PRICING EFFECTIVE 01/28/2013. VISIT OUR WEBSITE FOR MORE INFO WWW.DAIRYONE.COM*******

Sample Description	Farm	Code	Sample
MANURE, MISC., Wet		755	19133670

Analysis Results

Components	As Fed	DM
% Moisture	76.0	
% Dry Matter	24.0	
% Crude Protein	3.1	12.8
% Adjusted Crude Protein	3.1	12.8
Soluble Protein % CP		19
% Acid Detergent Fiber	13.2	55.1
% Neutral Detergent Fiber	14.6	60.9
% Lignin	4.5	18.6
% NFC	.6	2.6
% Crude Fat	.6	2.4
% Ash	5.13	21.41
% Calcium	.35	1.45
% Phosphorus	.05	.22
% Magnesium	.08	.34
% Potassium	.26	1.10
% Sodium	.180	.752
PPM Iron	317	1,320
PPM Zinc	8	34
PPM Copper	3	13
PPM Manganese	145	603
PPM Molybdenum	< 0.1	.2
% Sulfur	.05	.22

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MOLASSES JJAA
GREGORY PANKHURST
TERUSAN H JUANDA GA
BANDAR LAMPUNG
LAMPUNG, 35213
INDONESIA

ENERGY TABLE - NRC 2001

	Mcal/Lb	Mcal/Kg
DE, 1X	1.53	3.38
ME, 1X	1.34	2.96
NEL, 3X	0.79	1.74
NEM, 3X	0.83	1.84
NEG, 3X	0.55	1.21
TDN1X, %	79	

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Sample Description	Farm	Code	Sample
Liquid		452	19133690

Analysis Results

Components	As Fed	DM
% Moisture	23.5	
% Dry Matter	76.5	
% Crude Protein	3.5	4.5
% Crude Fat	.4	.5
% Ash	8.71	11.38
% TDN	61	80
NEL, Mcal/Lb	.64	.84
NEM, Mcal/Lb	.68	.89
NEG, Mcal/Lb	.45	.59
% Calcium	.54	.71
% Phosphorus	.04	.06
% Magnesium	.14	.18
% Potassium	2.02	2.64
% Sodium	.030	.040
PPM Iron	312	408
PPM Zinc	6	8
PPM Copper	3	3
PPM Manganese	20	26
PPM Molybdenum	.2	.2
% Sulfur	.37	.49
% Est. Carbs	63.9	83.6

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AMPAS BIR JJAA
GREGORY PANKHURST
TERUSAN H JUANDA GA
BANDAR LAMPUNG
LAMPUNG, 35213
INDONESIA

ENERGY TABLE - NRC 2001

	Mcal/Lb	Mcal/Kg
DE, 1X	1.57	3.45
ME, 1X	1.39	3.07
NEL, 3X	0.84	1.85
NEM, 3X	0.86	1.89
NEG, 3X	0.57	1.25
TDN1X, %	74	

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Sample Description	Farm	Code	Sample
WET BREWERS GRAINS		711	19133760

Analysis Results

Components	As Fed	DM
% Moisture	81.3	
% Dry Matter	18.7	
% Crude Protein	4.5	24.3
% Adjusted Crude Protein	4.5	24.3
Soluble Protein % CP		18
% Acid Detergent Fiber	5.2	28.0
% Neutral Detergent Fiber	9.5	50.9
% Lignin	1.4	7.6
% NFC	3.8	20.3
% Crude Fat	1.9	10.1
% Ash	.85	4.57
% TDN	14	74
NEL, Mcal/Lb	.15	.82
NEM, Mcal/Lb	.15	.82
NEG, Mcal/Lb	.10	.54
% Calcium	.06	.31
% Phosphorus	.12	.62
% Magnesium	.04	.22
% Potassium	.04	.20
% Sodium	.010	.053
PPM Iron	56	300
PPM Zinc	14	74
PPM Copper	3	14
PPM Manganese	9	50
PPM Molybdenum	.2	1.1
% Sulfur	.05	.28
Horse DE, Mcal/Lb	.23	1.24

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	12/10/12	12/14/12		

WAY LAGA PALM LEAF JJAA
GREGORY J PANKHURST
TERUSAN H JUANDA GA
BANDAR LAMPUNG
LAMPUNG
INDONESIA

ENERGY TABLE - NRC 2001

	Mcal/Lb	Mcal/Kg
DE, 1X	1.10	2.42
ME, 1X	0.90	1.99
NEL, 3X	0.50	1.10
NEM, 3X	0.51	1.13
NEG, 3X	0.26	0.58
TDN1X, %	55	

COMMENTS:
1.EFFECTIVE 4/01/12, PREPAID POSTAGE MAILER FEES WILL INCREASE TO $4 FOR INDIVIDUAL MAILERS AND $10 FOR LARGE MAILERS. VISIT OUR WEBSITE FOR INFO ON OUR NEW UPS SERVICE. WWW.DAIRYONE.COM/FORAGE/SERVICES

****FORAGE LAB HOLIDAY CLOSINGS***
*NOVEMBER 22ND AND NOVEMBER 23RD**
*DECEMBER 24TH AND DECEMBER 25TH**

Sample Description	Farm	Code	Sample
MISC HAYLAGE		360	18797670

Analysis Results

Components	As Fed	DM
% Moisture	45.0	
% Dry Matter	55.0	
% Crude Protein	5.7	10.3
% Available Protein	4.4	8.0
% ADICP	1.3	2.4
% Adjusted Crude Protein	4.9	9.0
% Acid Detergent Fiber	25.4	46.2
% Neutral Detergent Fiber	33.5	60.8
% NFC	11.8	21.4
% TDN	30	55
NEL, Mcal/Lb	.27	.50
NEM, Mcal/Lb	.27	.48
NEG, Mcal/Lb	.13	.23
Relative Feed Value		81

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Dairy One

FORAGE TESTING LABORATORY
DAIRY ONE, INC.
730 WARREN ROAD
ITHACA, NEW YORK 14850
607-257-1272 (fax 607-257-1350)

Sampled	Recvd	Printed	ST	CO
	04/16/13	04/17/13		

RATION BUNTING WAYLAGA
GREGORY PANGHURST
TERUSAN H JUANDA 8A
BANDAR LAMPUNG
LAMPUNG, 35213
INDONESIA

ENERGY TABLE - NRC 2001

	Mcal/Lb	Mcal/Kg
DE, 1X	1.53	3.37
ME, 1X	1.34	2.96
NEL, 3X	0.78	1.73
NEM, 3X	0.83	1.83
NEG, 3X	0.55	1.20
TDN1X, %	78	

Sample Description	Farm	Code	Sample
GRAIN MIX, Dry		040	13133050

Analysis Results

Components	As Fed	DM
% Moisture	16.9	
% Dry Matter	83.1	
% Crude Protein	13.1	15.7
% Adjusted Crude Protein	13.1	15.7
% Acid Detergent Fiber	20.3	24.5
% Neutral Detergent Fiber	34.6	41.6
% Starch	22.7	27.3
% TDN	61	74
NEL, Mcal/Lb	.66	.79
NEM, Mcal/Lb	.66	.80
NEG, Mcal/Lb	.43	.51
Horse DE, Mcal/Lb	1.33	1.24

NEW PACKAGES AND PRICING EFFECTIVE 01/28/2013. VISIT OUR WEBSITE FOR MORE INFO WWW.DAIRYONE.COM*******

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Dairy One

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730 WARREN ROAD
ITHACA, NEW YORK 14850
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Sampled	Recvd	Printed	ST	CO
	04/10/13	04/17/13		

RATION BENTUNG WAYLAGA
GREGORY PANGHURST
TERUSAN H JUANDA 8A
BANDAR LAMPUNG
LAMPUNG, 35213
INDONESIA

ENERGY TABLE - NRC 2001

	Mcal/Lb	Mcal/Kg
DE, 1X	1.50	3.32
ME, 1X	1.32	2.91
NEL, 3X	0.78	1.71
NEM, 3X	0.82	1.80
NEG, 3X	0.53	1.17
TDN1X, %	76	

Sample Description	Farm	Code	Sample
GRAIN MIX, Dry		040	13133080

Analysis Results

Components	As Fed	DM
% Moisture	21.7	
% Dry Matter	78.3	
% Crude Protein	8.2	10.5
% Adjusted Crude Protein	8.2	10.5
% Acid Detergent Fiber	26.6	34.0
% Neutral Detergent Fiber	30.3	38.9
% Starch	27.4	35.0
% TDN	58	74
NEL, Mcal/Lb	.62	.80
NEM, Mcal/Lb	.63	.81
NEG, Mcal/Lb	.41	.52
Horse DE, Mcal/Lb	1.02	1.30

NEW PACKAGES AND PRICING EFFECTIVE 01/28/2013. VISIT OUR WEBSITE FOR MORE INFO WWW.DAIRYONE.COM*******

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	04/16/13	04/18/13		

PALM LEAF WAYLAGA
GREGORY PANGHURST
TERUSAN H JUANDA 8A
BANDAR LAMPUNG
LAMPUNG, 35213
INDONESIA

ENERGY TABLE - NRC 2001

	Mcal/Lb	Mcal/Kg
DE, 1X	1.28	2.82
ME, 1X	1.10	2.43
NEL, 3X	0.65	1.42
NEM, 3X	0.65	1.44
NEG, 3X	0.39	0.86
TDN1X, %	63	

Sample Description	Farm	Code	Sample
PK LEAVES, MISC.		249	13133040

Analysis Results

Components	As Fed	DM
% Moisture	60.8	
% Dry Matter	39.2	
% Crude Protein	5.8	14.8
% Adjusted Crude Protein	5.8	14.8
Soluble Protein % CP		28
% Acid Detergent Fiber	15.8	40.1
% Neutral Detergent Fiber	20.2	51.8
% Lignin	4.2	10.7
% NFC	6.8	17.4
% Crude Fat	4.0	10.4
% Ash	2.47	6.30
% TDN	25	63
NEL, Mcal/Lb	.25	.65
NEM, Mcal/Lb	.26	.66
NEG, Mcal/Lb	.15	.40
% Calcium	.28	.72
% Phosphorus	.10	.27
% Magnesium	.10	.25
% Potassium	.26	.67
% Sodium	.007	.018
PPM Iron	78	200
PPM Zinc	19	48
PPM Copper	14	36
PPM Manganese	171	440
PPM Molybdenum	< 0.1	< 0.1
% Sulfur	.08	.20

NEW PACKAGES AND PRICING EFFECTIVE 01/28/2013. VISIT OUR WEBSITE FOR MORE INFO WWW.DAIRYONE.COM*******

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Dairy One

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Sampled	Recvd	Printed	ST	CO
	04/16/13	04/18/13		

FRESH MANURE WAYLAGA
GREGORY PANGHURST
TERUSAN H JUANDA 8A
BANDAR LAMPUNG
LAMPUNG, 35213
INDONESIA

Sample Description	Farm	Code	Sample
MANURE, MISC., Wet		730	13133070

Analysis Results

Components	As Fed	DM
% Moisture	76.0	
% Dry Matter	24.0	
% Crude Protein	3.1	12.8
% Adjusted Crude Protein	3.1	12.8
Soluble Protein % CP		19
% Acid Detergent Fiber	13.2	55.1
% Neutral Detergent Fiber	14.6	60.9
% Lignin	4.5	18.6
% NFC	.6	2.4
% Crude Fat	.6	2.4
% Ash	5.13	21.41
% Calcium	.35	1.45
% Phosphorus	.05	.22
% Magnesium	.08	.34
% Potassium	.28	1.15
% Sodium	.180	.752
PPM Iron	317	1,320
PPM Zinc	8	34
PPM Copper	3	13
PPM Manganese	145	603
PPM Molybdenum	< 0.1	.2
% Sulfur	.05	.22

NEW PACKAGES AND PRICING EFFECTIVE 01/28/2013. VISIT OUR WEBSITE FOR MORE INFO WWW.DAIRYONE.COM*******

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Sampled	Recvd	Printed	ST	CO
	04/16/13	04/18/13		

FRESH MANURE WAYLAGA
GREGORY PANKHURST
TERUSAN H JUANDA GA
BANDAR LAMPUNG
LAMPUNG, 35213
INDONESIA

NEW PACKAGES AND PRICING EFFECTIVE 01/28/2013. VISIT OUR WEBSITE FOR MORE INFO WWW.DAIRYONE.COM*******

Sample Description	Farm	Code	Sample
MANURE, MISC., Wet		755	19133670

Analysis Results

Components	As Fed	DM
% Moisture	76.0	
% Dry Matter	24.0	
% Crude Protein	3.1	12.8
% Adjusted Crude Protein	3.1	12.8
Soluble Protein % CP		19
% Acid Detergent Fiber	13.2	55.1
% Neutral Detergent Fiber	14.6	60.9
% Lignin	4.5	18.6
% NFC	.6	2.6
% Crude Fat	.6	2.4
% Ash	5.13	21.41
% Calcium	.35	1.45
% Phosphorus	.05	.22
% Magnesium	.08	.34
% Potassium	.26	1.10
% Sodium	.180	.752
PPM Iron	317	1,320
PPM Zinc	8	34
PPM Copper	3	13
PPM Manganese	145	603
PPM Molybdenum	< 0.1	.2
% Sulfur	.05	.22

WAY LAGA CATTLE BACK TO JJAA

Date: 19. Mar. 2012

No	EID	SHIP	FID Out to Way Laga	FID PKB	Remarks	abortus date
1	982 000162485431	162/6-03-11	1	8745	Abortus	Before 15'th dec 2011
2	982 000149113160	162/6-03-11	5	8394	Abortus	3-Mar-12
3	982 000090423797	162/6-03-11	24	8654	Abortus	7-Jan-12
4	982 000123619381	162/6-03-11	27	8245	Abortus	12-Nov-11
5	982 000184002746	162/6-03-11	32	8174	*Abortus*	14-Nov-11
6	982 000123595067	162/6-03-11	33	8679	Abortus	3-Jan-12
7	982 000123458138	162/6-03-11	34	8254	Abortus	Before 15'th dec 2011
8	982 000184002091	162/6-03-11	36	8002	*Abortus*	14-Nov-11
9	982 000163132456	162/6-03-11	40	8279	Abortus	Before 15'th dec 2011
10	982 000138474057	162/6-03-11	46	8444	Abortus	16-Nov-11

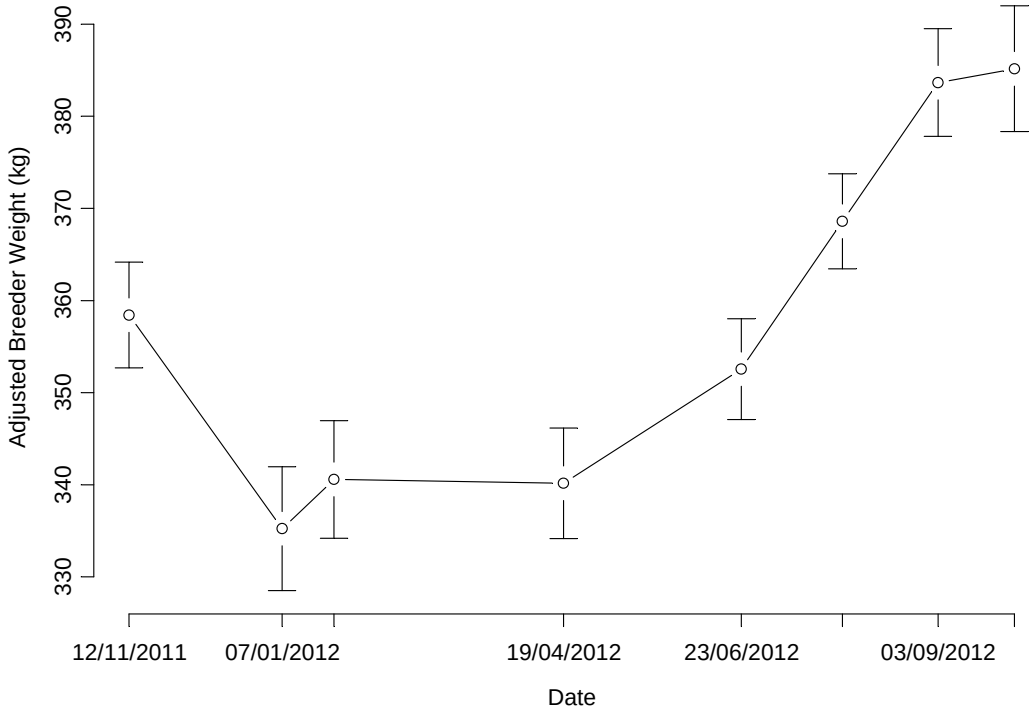
Tag	CalfBirthDate	CalfWeanDate	PregTestDate	CalfAgeWeaningWeeks	MonthsGestation	WeeksGestation	WeeksSinceCalving	DateInSecondCalf	TimeToReconceptionWeeks	TimeToReconceptionMonths
2	25/04/2012	23/07/2012	23/08/2012	13	3	13.0	17.1	23/05/2012	4.1	1.0
4	30/04/2012	4/09/2012	5/11/2012	18	1.5	6.5	27.0	20/09/2012	20.5	4.7
6	26/03/2012	18/05/2012	5/11/2012	8	4	17.3	32.0	6/07/2012	14.7	3.4
7	2/04/2012	23/07/2012	23/08/2012	16	3	13.0	20.4	23/05/2012	7.4	1.7
8	1/04/2012	23/07/2012	6/12/2012	16	5	21.7	35.6	6/07/2012	13.9	3.2
9	11/05/2012	4/09/2012	5/11/2012	17	4	17.3	25.4	6/07/2012	8.1	1.9
10	4/04/2012	23/07/2012	23/08/2012	16	1	4.3	20.1	23/07/2012	15.8	3.6
11	10/04/2012	23/07/2012	6/12/2012	15	3	13.0	34.3	5/09/2012	21.3	4.9
12	3/04/2012	23/07/2012	23/08/2012	16	2	8.7	20.3	23/06/2012	11.6	2.7
13	28/03/2012	23/07/2012	5/11/2012	17	1.5	6.5	31.7	20/09/2012	25.2	5.8
14	10/04/2012	23/07/2012	23/08/2012	15	4	17.3	19.3	23/04/2012	2.0	0.5
15	19/03/2012	18/05/2012	23/08/2012	9	1	4.3	22.4	23/07/2012	18.1	4.2
16	27/03/2012	4/09/2012	14/11/2012	23	5	21.7	33.1	14/06/2012	11.5	2.6
18	20/03/2012	18/05/2012	23/08/2012	8	2	8.7	22.3	23/06/2012	13.6	3.1
19	5/04/2012	23/07/2012	23/08/2012	16	2	8.7	20.0	23/06/2012	11.3	2.6
20	24/03/2012	18/05/2012	23/08/2012	8	2	8.7	21.7	23/06/2012	13.0	3.0
21	24/04/2012	23/07/2012	6/12/2012	13	5	21.7	32.3	6/07/2012	10.6	2.5
22	20/03/2012	18/05/2012	23/08/2012	8	3	13.0	22.3	23/05/2012	9.3	2.1
23	23/03/2012	18/05/2012	23/08/2012	8	4	17.3	21.9	23/04/2012	4.5	1.0
25	3/04/2012	23/07/2012	6/12/2012	16	4	17.3	35.3	6/08/2012	18.0	4.1
26	21/03/2012	23/07/2012	23/08/2012	18	2	8.7	22.1	23/06/2012	13.5	3.1
28	4/04/2012	23/07/2012	23/08/2012	16	2	8.7	20.1	23/06/2012	11.5	2.6
29	19/04/2012	23/07/2012	5/11/2012	14	3	13.0	28.6	5/08/2012	15.6	3.6
30	24/03/2012	23/07/2012	23/08/2012	17	3	13.0	21.7	23/05/2012	8.7	2.0
35	3/04/2012	18/05/2012	14/11/2012	6	5	21.7	32.1	14/06/2012	10.5	2.4
37	19/03/2012	18/05/2012	14/11/2012	9	5	21.7	34.3	14/06/2012	12.6	2.9
38	13/04/2012	4/09/2012	5/11/2012	21	2	8.7	29.4	5/09/2012	20.8	4.8
39	3/04/2012	23/07/2012	6/12/2012	16	4	17.3	35.3	6/08/2012	18.0	4.1
41	24/03/2012	23/07/2012	23/08/2012	17	2	8.7	21.7	23/06/2012	13.0	3.0
42	21/04/2012	23/07/2012	23/08/2012	13	3	13.0	17.7	23/05/2012	4.7	1.1
43	23/03/2012	23/07/2012	23/08/2012	17	2	8.7	21.9	23/06/2012	13.2	3.0
44	8/04/2012	23/07/2012	6/12/2012	15	4	17.3	34.6	6/08/2012	17.2	4.0
45	18/04/2012	4/09/2012	14/11/2012	20	5	21.7	30.0	14/06/2012	8.3	1.9
48	29/02/2012	18/05/2012	23/08/2012	11	3	13.0	25.1	23/05/2012	12.1	2.8
49	27/05/2012	4/09/2012	5/11/2012	14	2	8.7	23.1	5/09/2012	14.5	3.3
50	23/04/2012	23/07/2012	5/11/2012	13	3	13.0	28.0	5/08/2012	15.0	3.5
51	10/04/2012	23/07/2012	23/08/2012	15	3	13.0	19.3	23/05/2012	6.3	1.5
52	10/03/2012	23/07/2012	23/08/2012	19	3	13.0	23.7	23/05/2012	10.7	2.5
2155	6/09/2012	6/11/2012	30/01/2013	9	2	8.7	20.9	30/10/2012	12.2	2.8
2163	2/07/2012	3/10/2012	6/12/2012	13	3	13.0	22.4	5/09/2012	9.4	2.2
2173	21/09/2012	6/11/2012	14/02/2013	7	2	8.7	20.9	15/12/2012	12.2	2.8
2242	6/06/2012	dead	5/11/2012		4	17.3	21.7	6/07/2012	4.4	1.0
2270	22/07/2012	4/09/2012	14/02/2013	6	3	13.0	29.6	14/11/2012	16.6	3.8
2353	7/07/2012	3/10/2012	5/11/2012	13	1.5	6.5	17.3	20/09/2012	10.8	2.5
4035	24/05/2012	4/09/2012	6/12/2012	15	5	21.7	28.0	6/07/2012	6.3	1.5
8154	24/05/2012	3/10/2012	5/11/2012	19	3	13.0	23.6	5/08/2012	10.6	2.4
8277	29/03/2012	23/07/2012	23/08/2012	17	4	17.3	21.0	23/04/2012	3.7	0.8
8288	23/04/2012	3/10/2012	5/11/2012	23	3	13.0	28.0	5/08/2012	15.0	3.5
9259	21/04/2012	dead	6/12/2012		3	13.0	32.7	5/09/2012	19.7	4.5

AverageTimes	**12.28**	**2.83**
StandardError	**0.73**	**0.17**

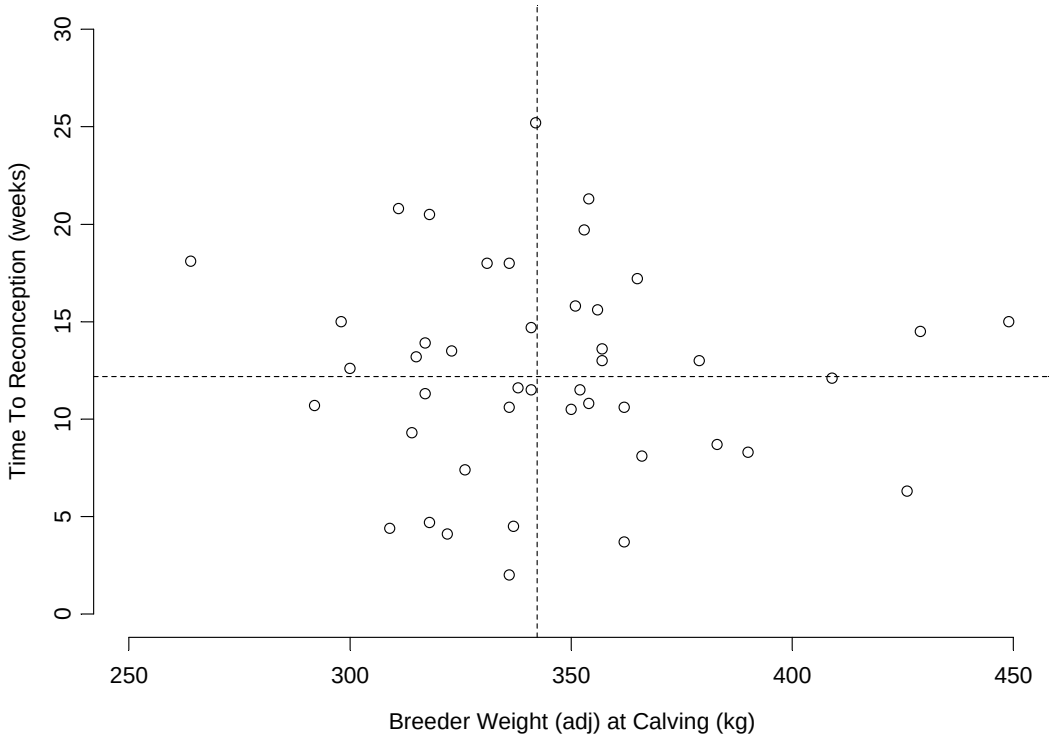
N=49

(See file RA.20121217.SummaryData.xlsx for all data used in plots below – contains calculations for means, standard errors of means and number)

Mean Live Weights (+/- Standard Error) for Breeders on each weigh date. Weights are adjusted for stage of pregnancy determined by first calf birth date or pregnancy diagnosis (prior to second calf) using O'Rourke et.al.



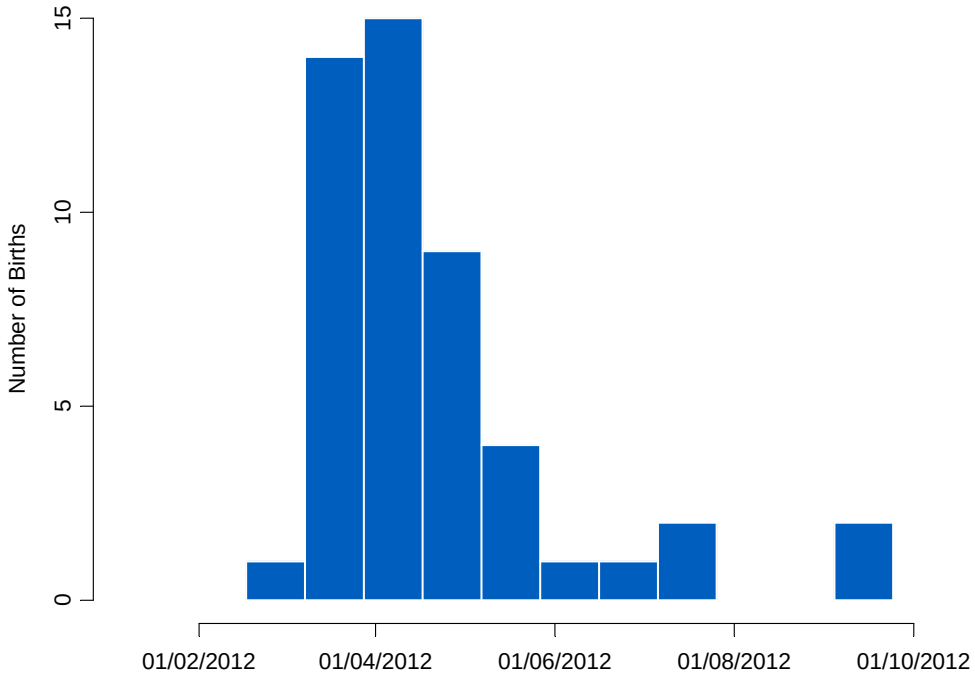
Cow Weight at Calving (kg adjusted for Pregnancy) v Time to Reconception (weeks). Dotted lines show mean Cow Weight at Calving (vertical) and mean Time to Reconception (horizontal)



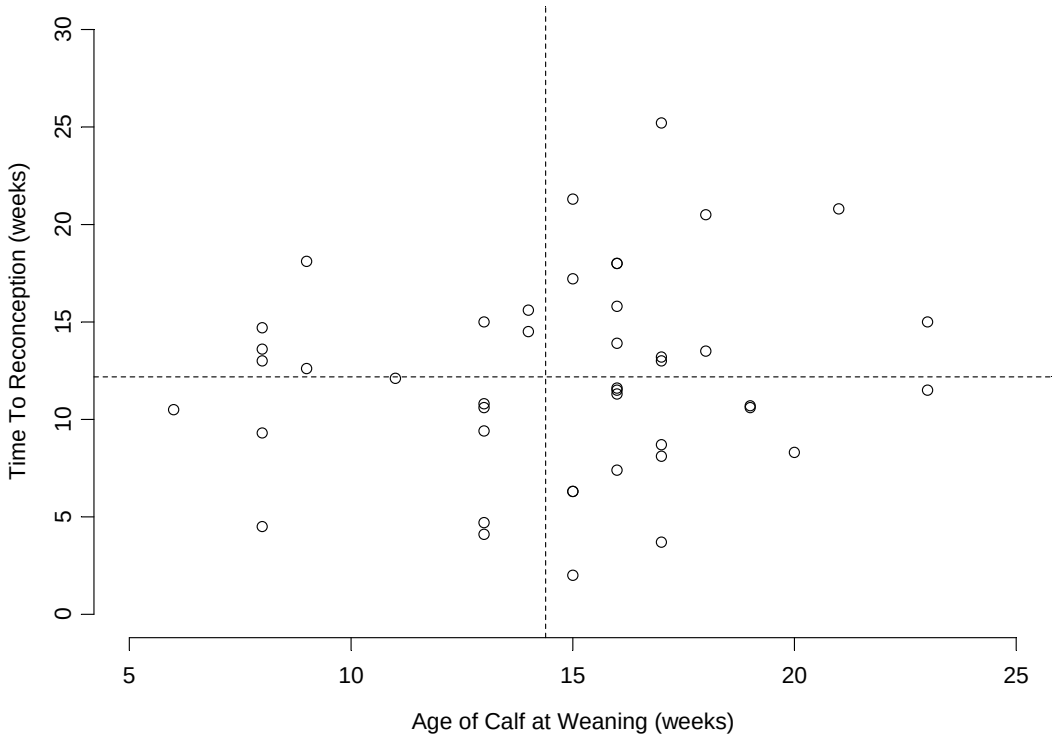
There is NO relationship between cow weight at calving and time to reconception (regression coefficient r^2=0.0043, Analysis of Variance of Regression $F_{1,42}$=0.180, p=0.674)

It is not possible to generate an analysis for the relationship between Cow BCS at calving and Time to Reconception. Most calves were born between March and April and comprehensive data for BCS on the breeding herd was not recorded until June July and September. BCS for these dates are shown in the summary data file.

Distribution of Calf Birth Dates

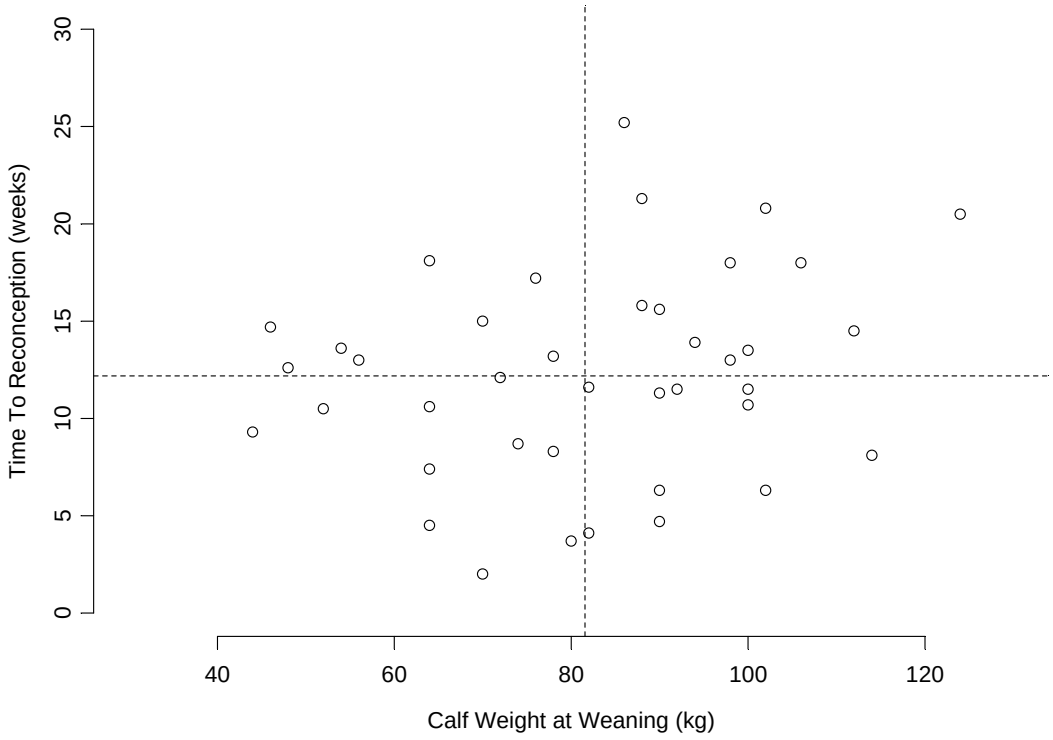


Age of Calf (weeks) v Time to Reconception (weeks). Dotted lines show mean Age of Calf (vertical) and mean Time to Reconception (horizontal).



There is NO relationship between age of calf at weaning and time to reconception (regression coefficient r^2=0.0194, Analysis of Variance of Regression $F_{1,42}$=0.830, p=0.367)

Calf Weight at Weaning (kg) v Time to Reconception (weeks). Dotted lines show mean Weight of Calf (vertical) and mean Time to Reconception (horizontal).



There is NO relationship between weight of calf at weaning and time to reconception (regression coefficient r^2=0.0474, Analysis of Variance of Regression $F_{1,38}$=1.889, p=0.177)

PT. JUANG JAYA ABDI ALAM
Desa Sukabanjar, Sidomulyo Lampung Selatan

BERITA ACARA SAPI MATI

Pada hari ini Kamis tanggal 10 Mei 2012 telah terjadi kematian ternak dengan indentifikasi sebagai berikut,

Sex	:	Heifer
Shipment	:	162
Ear tag	:	47 (Way Laga)
Pen	:	Isolasi
Berat	:	± 400 Kg.
Waktu identifikasi	:	08.00 WIB.
Perkiraan jam kejadian	:	02.00 WIB.
Diagnosa	:	- Infeksi septikemia post partus - Perdarahan di paru-paru, selaput jantung, dan jantung.

Demikianlah berita acara ini dibuat agar dapat dipergunakan sebagaimana mestinya.

Petugas Animal Health,

(Drh. Nery Santy J.L.T.)

Mandor PT. AJP,
Way Laga,

GEN DOM

PALM- CATTLE INTEGRATION SYSTEM (SISKA)


Prepared by :

M. Saleh

Chief of Farmer Group named “Tunas Muda”

Farmer Group named "Tunas Muda", address at Kusau Makmur Village, Kabupaten Kampar-Riau

1. Chief : Muhammad Saleh
2. Secretary : Hotmatua Hasibuan
3. Accounting : Masraya
4. Member : 20 Person

Introduction

In order to support food savety at Riau, it is very important to have ability to provide livestock as food source

The number of Indonesia's citizen increase quite high every year and their awareness of nutrition also improve

This fact inspire **Farmer Group "Tunas Muda"** to develop cattle bussines and increase it, specially at Kecamatan Tapung Hulu, Kabupaten Kampar.

History of the establisment of Tunas Muda farmer group

Tunas Muda farmer group, established in May 24 2008

Address : Kusau Makmur village, Riau Province

This group has work together in manure processing,
and used the manure as organic fertilizer for member use.

Asset of Tunas Muda farmer group :

1. **Manual dig equipment 4 piece, shovel 4 piece, wheel barrow 2 unit**
2. **Garden knife 4 units, Hammer 1 unit, iron bar 1 unit, saw 2 units**
3. **Three wheel motorcycle 1 unit**
4. **Motorcycle 1 unit**
5. **Water pump machine 1 unit**
6. **Chopper (1 unit)**
7. **Grinder machine 1 unit**
8. **Office toll's**

Sumber : http://hotsidesite.blogspot.com/2010/07/organ-reproduksi-hewan-betina.html, tanggal 12 Maret 2012

Asset of Tunas Muda farmer group :

1. Cattle pen (2 unit)
2. Cattle Feces pool (1 unit)
3. Urine pool (1 unit)
4. Fertilizer house (1 Unit)
5. Guard house (1 unit)
6. Grass field (2 Ha)

Group member’s field

2 to 4 ha each, in same location.

162 ha total.

Tunas Muda Farmer group purpose

1. **To Increase society Prosperity specially for group member**
2. **To increase Cattle population and makes Kusau Makmur village become cattle and goat center at Kampar Region.**
3. **Support government's aim for meat surplus, specialy in Tapung Hulu district**

Population growth in Tunas Muda Farmer Group

In June 2008 to December 2009 : 6 head (individual expense)

In October 2010 : 36 head (integration System)

Total amount : 42 head

Population Growth in 2012

Until June 2012 : total calf born 11 head
Total population : 53 head

Farmer Group Activity

1. **First Urine processing, January 2010**

   material :

   Urine 2,500 liters

   Urea (nitrogen) 100 kg

   EM4 1 liter

   brown sugar 10 kg

Note : fermented urine package in 2 liters plastic bottle

Farmer Group Activity

2. Second Urine processing, June 2010

material :

Urine	**2,500 liters**
Urea (nitrogen)	**150 kg**
EM4	**1 litre**
brown sugar	**10 kg**

Note : fermented urine package in 2 liter plastic bottle

Farmer Group Activity

3. Third Urine processing, January 2011

material :

Urine	**8,000 liters**
Urea (nitrogen)	**300 kg**
EM4	**3 liters**
brown sugar	**30 kg**

Note : fermented urine package in 2 liter splastic bottle

Farmer Group Activity

4. Manure processing, march 2011

material :

cattle manure 4,500 kg

rice straw 150 kg

rice hull 50 kg

rice hull charcoal 50 kg

dolomit/calk 150 kg

detro 3 liters

Organdec (probiotik/starter) 15 kg

Note : fermented, dry, grind, and package in sack, dry matter 60%

Farmer Group Activity

5. Manure processing, october 2011

material :

cattle manure	**5 ton**
solid	**7.5 ton**
ashes	**3 ton**
dolomit/calk	**350 kg**
detro	**6 liter**
Organdec (probiotik/starter)	**15 kg**

Note : fermented, dry, grind, and package in sack, dry matter 60%

Farmer Group Activity

6. Manure processing, october 2011

material :

cattle manure	**5 ton**
solid	**2.5 ton**
ashes	**2,5 ton**
dolomit/calk	**100 kg**
detro	**2 liter**
Organdec (probiotik/starter)	**5 kg**

Note : fermented, dry, grind, and package in sack, dry matter 60%

Beside production of organic fertilizer, Tunas Muda Farmer Group also gets government funding in Encourage Productive Cow program in 2012.

At that time, Farmer group has 17 head pregnant cows that more than 5 months old pregnancy, checked by local Vet.

This group also develop Artificial insemination since 2012.

Farmer Group planning Activity

Activity planning in 2012 in supplying organic fertilizer

Organic Fertilizer preparation

material

cattle manure	20 tons
solid	5 tons
ashes	5 tons
detro	5 liters
Organdec (probiotik/starter)	15 kg

Note : fermented, dry, grind, and package in sack

Farmer Group planning Activity

Activity planning in 2012 in supplying organic fertilizer from cattle urine

Organic Fertilizer preparation

material

cattle urine	8000 liters
nitrogen/ urea	300 kg
brown sugar	30 kg

Note : fermented, and package in 2 liters bottle plastic

Production Analysis before and after use organic fertilizer

1. Palm tree age more than 8 years in 2 ha area (chemical fertilizer)

Fertilizer	dose	Application	Crop result
Chemicals	1 kg/tree	Twice a year	31.2 ton

2. Palm tree age more than 8 years in 2 ha area (chemical fertilizer + organic fertilizer)

Fertilizer	dose	Application	Crop result
Chemicals	0.5 kg/tree	Twice a year	
organic	2.5 kg/tree	Twice a year	42 ton

Production Analysis with chemicals feritilizer

Palm tree age more than 8 years in 2 ha plantation

Fertilizer	dose	Application	Crop result
Chemicals	1 kg/tree	Twice a year	31.2 ton

Note :
Fertilizer need : - chemical 264 trees used 528 kg : 3,960,000 INR

Crop result : 31.2 ton/year; 1,250 INR/Kg = 39,000,000 INR
Nett : crop result – (chemicals fertilizer)
: 39,000,000 – 3,960,000
: 35,040,000 INR

Production raise analysis after used the organic fertilizer

Palm tree age more than 8 years in 2 ha plantation

Fertilizer	dose	Application	Crop result
Chemicals	0.5 kg/tree	Twice a year	
organic	2.5 kg/tree	Twice a year	42 ton

Note :
Fertilizer need : - chemical 264 trees used 264 kg : 1,980,000 INR
- organic 1320 kg : 4,620,000 INR
Crop result : 42 ton/year, 1,250 INR/Kg = 52,500,000 INR
Nett : crop result – (chemicals + Organic)
: 52,500,000 – 6,600,000
: 45,900,000 INR

Production raise analysis with organic fertilizer used

Conclusion:

1. Palm fruits proven increase from 31,2 ton become 42 ton.
2. Because the palm fruit increase, raise in income in 2 ha about 10.860.000 INR.

Urine package in 2 liter plastic bottle

Chopper machine and grinder

Organic fertilizer before grinding

USING LOCAL RESOURCES POTENCY FOR DEVELOPMENT IN ANIMAL HUSBANDRY

LIVESTOCK-PLANTS INTEGRATION PROGRAM MODEL MP3EI IMPLEMENTASION IN REGION

Learning Process at AGRICINAL
Juli 2009

Drh. Askardiya R Patrianov,MP
PEMERINTAH PROVINSI RIAU
Dinas Peternakan dan Kesehatan Hewan Provinsi Riau,
patrianov_84@yahoo.com

2012

I. BACKGROUND

a. Macro

- **Sumatera position in Indonesian economic corridor context with core competence in plantation and energy.**
- **Sectoral and spacial approachment will increase country development.**
- **Livestock - Plants integration avoid spacial conflict.**
- **Livestock-Plants integration, built balance in growth and even in distribution that create diversification in community income.**

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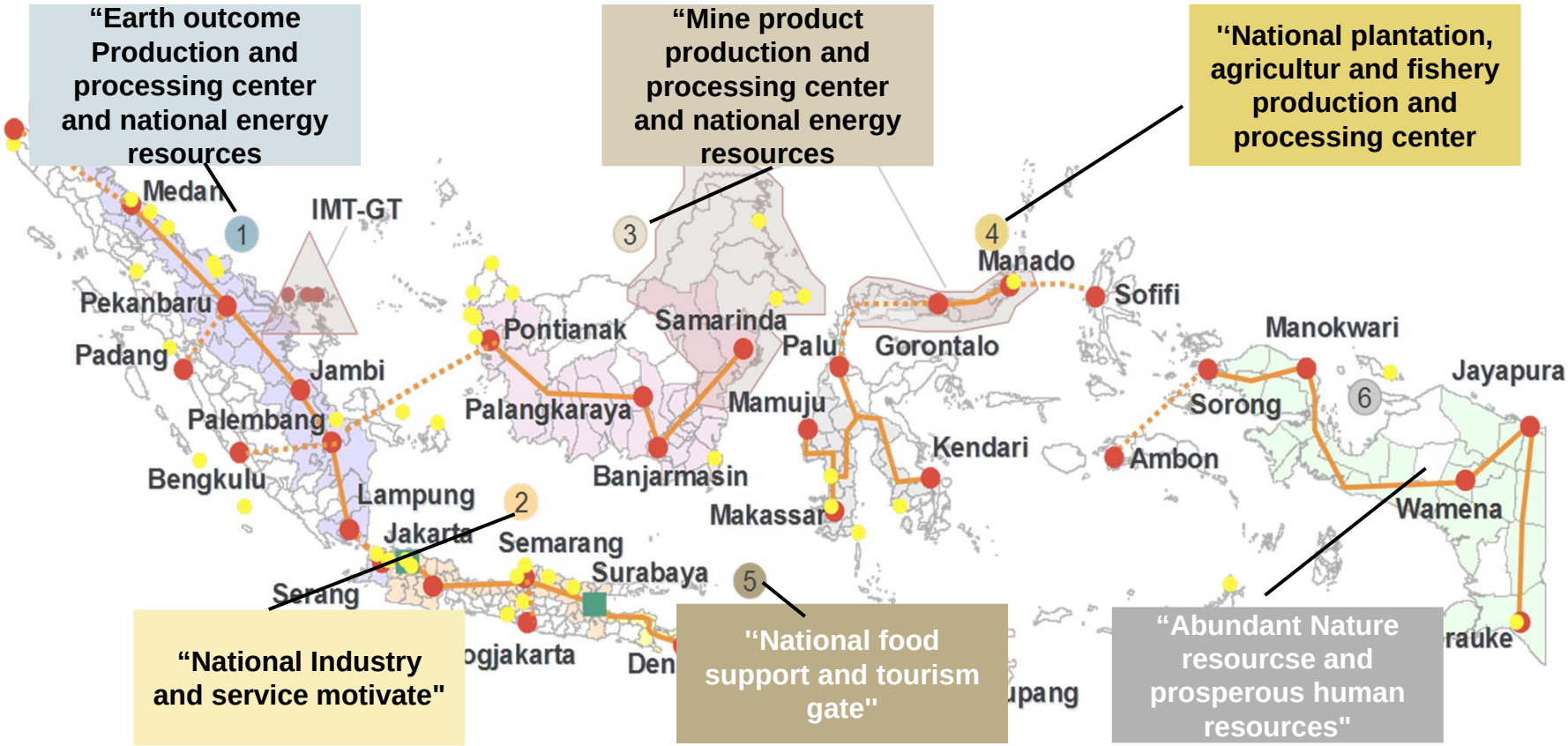
Indonesian Economic Corridor Master Plan developing unique potency in each corridor

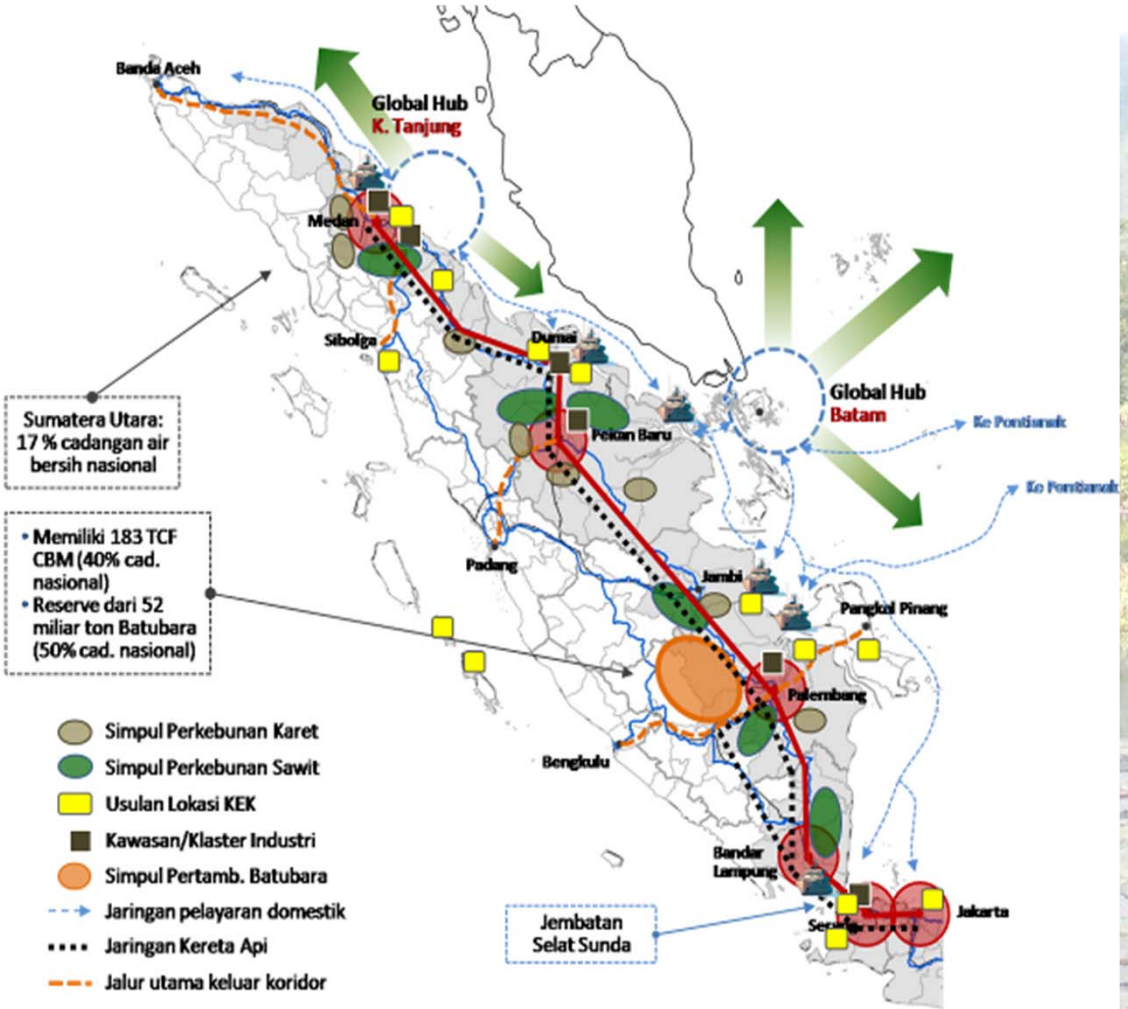
Ref: Doc, Feb, 2011, EKUIN



Sumatera Economic Corridor

" Earth outcome Production and processing center and national energy resources

Ref: Doc, Feb, 2011, EKUIN



Overview

Terdiri dari 7 hub: **Medan, Pekanbaru, Jambi, Palembang, Lampung, Serang, Jakarta**

Koridor diestimasikan dapat ***meningkatkan PRDB sebesar ~3.4x dari $139 milyar di 2010 ke $473 milyar di 2030*** dengan ***laju pertumbuhan*** *koridor sebesar* ***6.3%*** *dibandingkan estimasi* ***baseline 4.5%***

Fokus Sektor

1. **Minyak Kelapa Sawit/CPO** → Fokus pada industri hulu melalui peningkatan panen dan konversi *mature plantation.*
2. **Karet** → Meningkatkan hasil panen dan memperluas industri hilir
3. **Batubara** → Meningkatkan produksi pertambangan melalui percepatan infrastruktur rel kereta api

Infrastruktur Kunci yang Dibutuhkan

Pelabuhan:
- Metro Medan, Dumai, Palembang

Rel Kereta/Jalan:
- Trans Sumatera (*Rel kereta/Jalan*), termasuk rel kereta untuk CPO di Riau.

Pembangkit Listrik di Sumatera
- Pembangkit Listrik di Sumatera untuk menumbuhkan industri hilir
- Mine-mouth dan processing plant untuk batubara di Sumatera Selatan

SUMATERA connection in Livestock Development perspective

Sumatera Potency

1. SmoothTransportation
2. > 60 % National Palm plantation, as Agroecosystem Potency
3. Faced with Trade Center Area
4. People population as Market potency
5. Average economic growth

LATAR BELAKANG , mikro

DAGING

- DEFISIT PERDAGANGAN **DAGING SAPI** ANTAR PROVINSI RATA-RATA > Rp. 578 MILYAR pertahun, 2011

TELUR

- DEFISIT PERDAGANGAN ANTAR PROVINSI RATA-RATA > Rp. 483 Milyar pertahun.

SUSU

- DEFISIT PERDAGANG SUSU dan OLAHAN TAHUN 2011 > Rp. 267 Milyar

NERACA PERDAGANGAN TERNAK&HASIL TERNAK PROVINSI RIAU,> 1 Trilyun pertahun SEBAGAI POTENSI AGROEKONOMI

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2010 Phase , posisition in Oktober 2010.

- INISIASI RANSUM PAKAN BERBASIS SAWIT
- PEMBAHASAN DAN DISKUSI TEKNIS

PUSLITBANG NAK

PERUSAHAAN & PERBANKAN

- PT.TBS, 1997
- PT ASIAN AGRI,
- PTPN V, pemeliharaan ternak sapi di kawasan kebun
- SMART Tbk, di Kampar,
- KKPE BANK RIAU&BRI

BB MEKTAN

PEMPROV RIAU

- Project INHUL
- Pra DESIGN SIAK

RUMAH KOMPOS, KAB SIAK, PLA, 1 UNIT

- PEMBIBITAN, APBN-P, KAB SIAK, PELALAWAN, INHUL
- **Kawalan BPTP**

TAHUN 2011, posisi bulan JULI 2011.

- RANSUM PAKAN BERBASIS SAWIT
- **KAWALAN PROSES KUPS dr PSE KP, BUN, SDL, NAK & VET**

- PT ASIAN AGRI, PTPN V, TORUS GANDA, SMART Tbk
- PT PEPUTRA GRUP, KUPS DI PELALAWAN DAN KAMPAR
- **BANK RIAU, BRI, BANK MANDIRI, BUKOPIN**

- ALOKASI ALSIN PABRIK PAKAN
- JEJARING TEKNOLOGI
- **PRA DESIGN KAMPAR, PLLW, INHUL**

- **PABRIK PAKAN**
- APBN PERBIBITAN
- UPPO
- SITT

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II. KOMPONEN SUMBERDAYA PENGEMBANGAN

PETERNAK → Perorangan, Kelompok, Badan Usaha

TERNAK → **Ruminansia, khususnya SAPI POTONG**

LAHAN → **Sumber Pakan, Basis Budidaya, Optimalisasi utilitas lahan**

TEKNOLOGI → **Produksi,Reproduksi, Keswan, Pakan, Pengolahan Hasil.**

PASAR → **Peningkatan Posisi Tawar Peternak**

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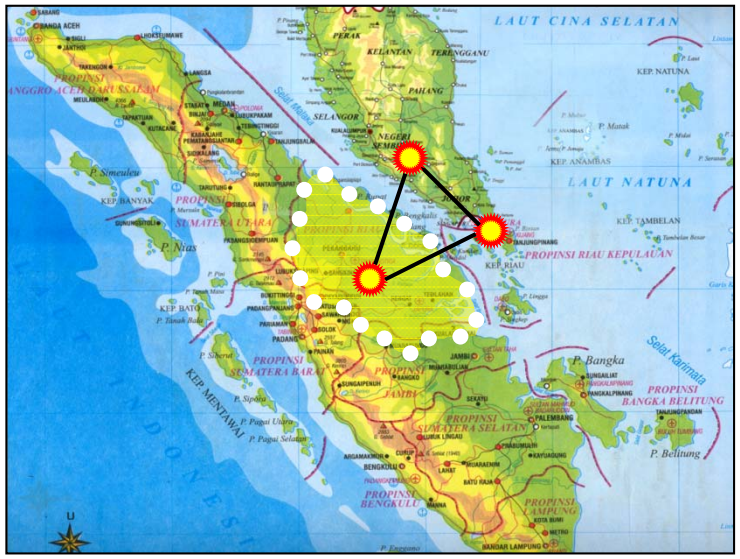
III. Potensi Agroekosistem



- Potensi agro-ekosistem pengembangan ternak sapi potong, mampu mendukung 1,7 jt ekor
- Potensi agro-ekonomi, tingkat pertumbuhan ekonomi, 2006-2011 dengan migas rata2 7,72 %/tahun
- Neraca defisit transaksi perdagangan daging sapi potong, merupakan potensi pasar

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DAYA DUKUNG LAHAN : 1.706.921 ekor (SAPI) dari total daya dukung 2,1 jt ST setara ruminansia, luas kebun Sawit, 2,3 jt Ha

POPULASI TERNAK SAPI : 161.203 ekor setara 9,19 %

PELUANG PENGEMBANGAN: 1.545.719 ekor

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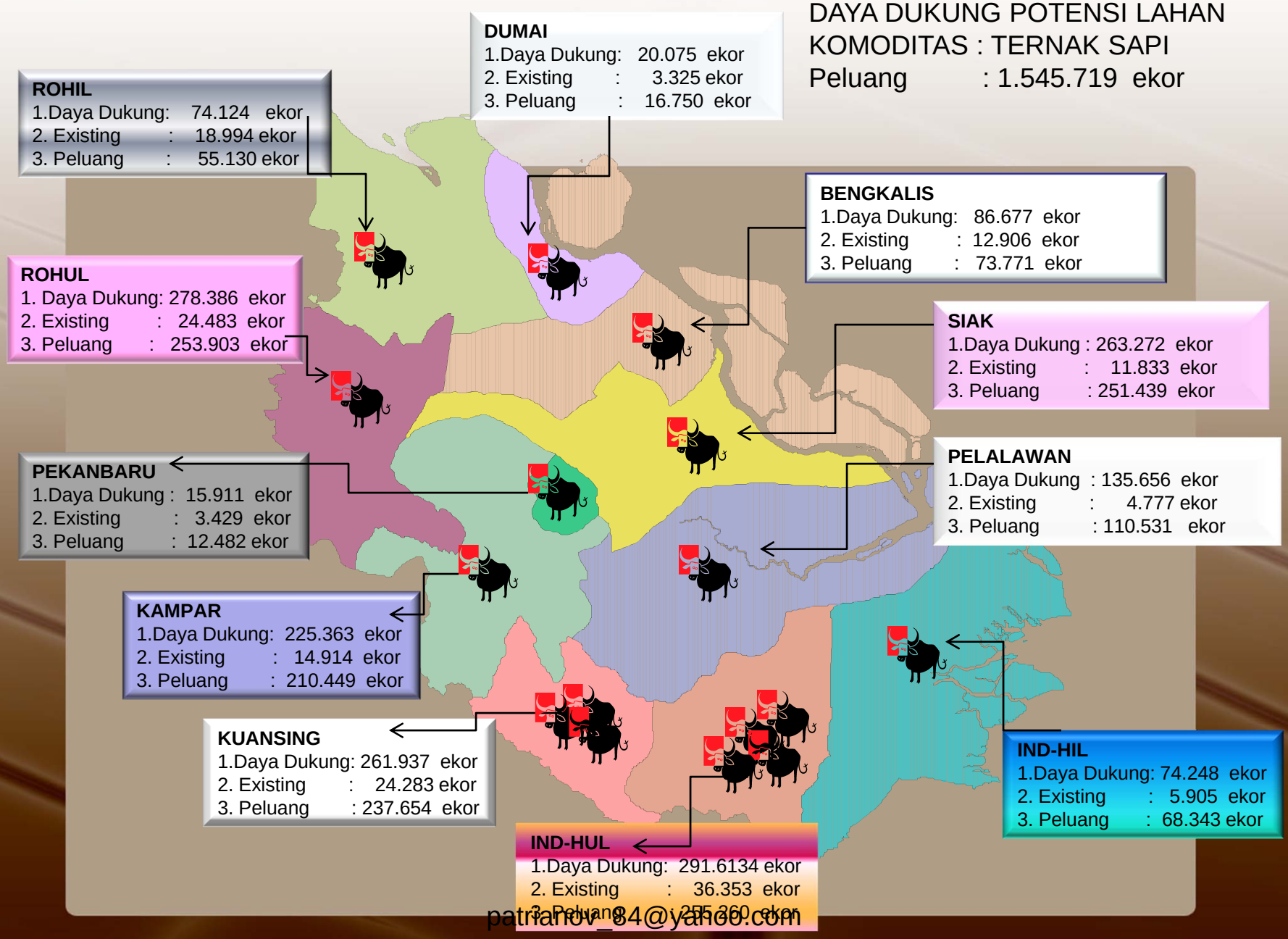
DAYA DUKUNG POTENSI LAHAN
KOMODITAS : TERNAK SAPI
Peluang : 1.545.719 ekor



DUMAI
1.Daya Dukung: 20.075 ekor
2. Existing : 3.325 ekor
3. Peluang : 16.750 ekor

ROHIL
1.Daya Dukung: 74.124 ekor
2. Existing : 18.994 ekor
3. Peluang : 55.130 ekor

BENGKALIS
1.Daya Dukung: 86.677 ekor
2. Existing : 12.906 ekor
3. Peluang : 73.771 ekor

ROHUL
1. Daya Dukung: 278.386 ekor
2. Existing : 24.483 ekor
3. Peluang : 253.903 ekor

SIAK
1.Daya Dukung : 263.272 ekor
2. Existing : 11.833 ekor
3. Peluang : 251.439 ekor

PEKANBARU
1.Daya Dukung : 15.911 ekor
2. Existing : 3.429 ekor
3. Peluang : 12.482 ekor

PELALAWAN
1.Daya Dukung : 135.656 ekor
2. Existing : 4.777 ekor
3. Peluang : 110.531 ekor

KAMPAR
1.Daya Dukung: 225.363 ekor
2. Existing : 14.914 ekor
3. Peluang : 210.449 ekor

KUANSING
1.Daya Dukung: 261.937 ekor
2. Existing : 24.283 ekor
3. Peluang : 237.654 ekor

IND-HIL
1.Daya Dukung: 74.248 ekor
2. Existing : 5.905 ekor
3. Peluang : 68.343 ekor

IND-HUL
1.Daya Dukung: 291.6134 ekor
2. Existing : 36.353 ekor
3. Peluang : 255.260 ekor

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IV. Focus point INTEGRASI TERNAK TANAMAN

- Pengembangan **KELEMBAGAAN**, proses pelibatan berbagai pelaku dalam proses integrasi dengan memposisikan **Kelompok** sebagai ***core competence***.
- Inisiasi **PEMBIAYAAN**, merupakan komponen pembiayaan terhadap proses integrasi yang melibatkan pembiayaan berbagai sumber baik yang berasal dari pemerintah, perbankan, dana swasta dan masyarakat.
- Keterkaitan **KEGIATAN**, integrasi **multi facet** merupakan keterkaitan berbagai tingkatan kegiatan yang saling memanfaatkan sehingga menghasilkan **nilai tambah yg signifikan.**
- **Implementasi** dengan PERUSAHAAN,perusahaan berfungsi sebagai komponen proses dengan berbagai tingkatan fungsi baik sebagai pelaku utama (inti) maupun sebagai pendamping.

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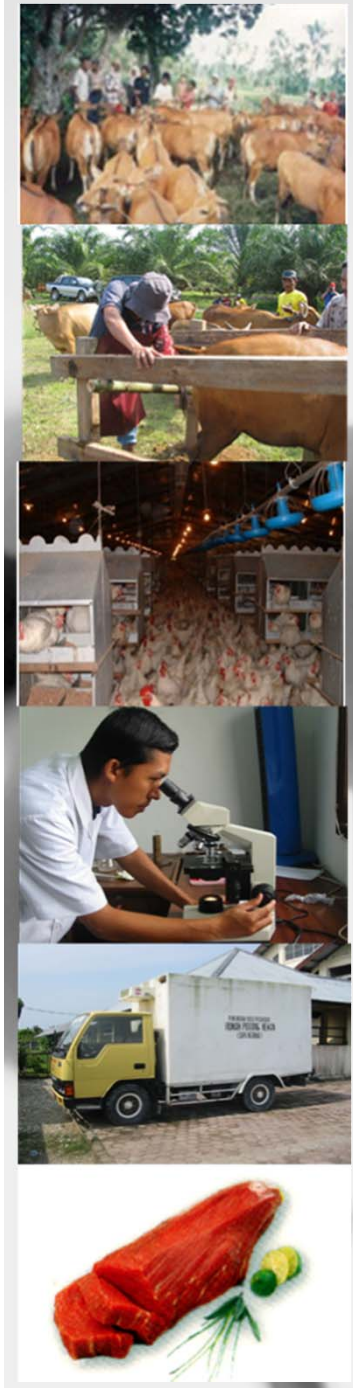
- **Replikasi** antar WILAYAH.



V. KONSEP & DEFINISI

- **Proses integrasi ternak di kawasan tanaman (bun-pangan) berpengaruh dalam proses BUDIDAYA TANAMAN, melalui efisiensi penggunaan PUPUK KANDANG (padat dan cair) dan MENINGKATKAN PRODUKTIVITAS TANAMAN. Kompilasi EFISIENSI dan PRODUKTIVITAS merupakan NILAI TAMBAH TERHADAP TANAMAN**
- **Proses INTEGRASI Tanaman –Ternak, mengurangi KONFLIK SPASIAL dan MENINGKATKAN utilitas LAHAN**
- **Pengembangan cluster secara mikro, merupakan proses kolaborasi dan aglomerasi setiap komponen kegiatan dalam satuan unit wilayah. Dengan unit aktivitas utama pada tingkat kelompok.**

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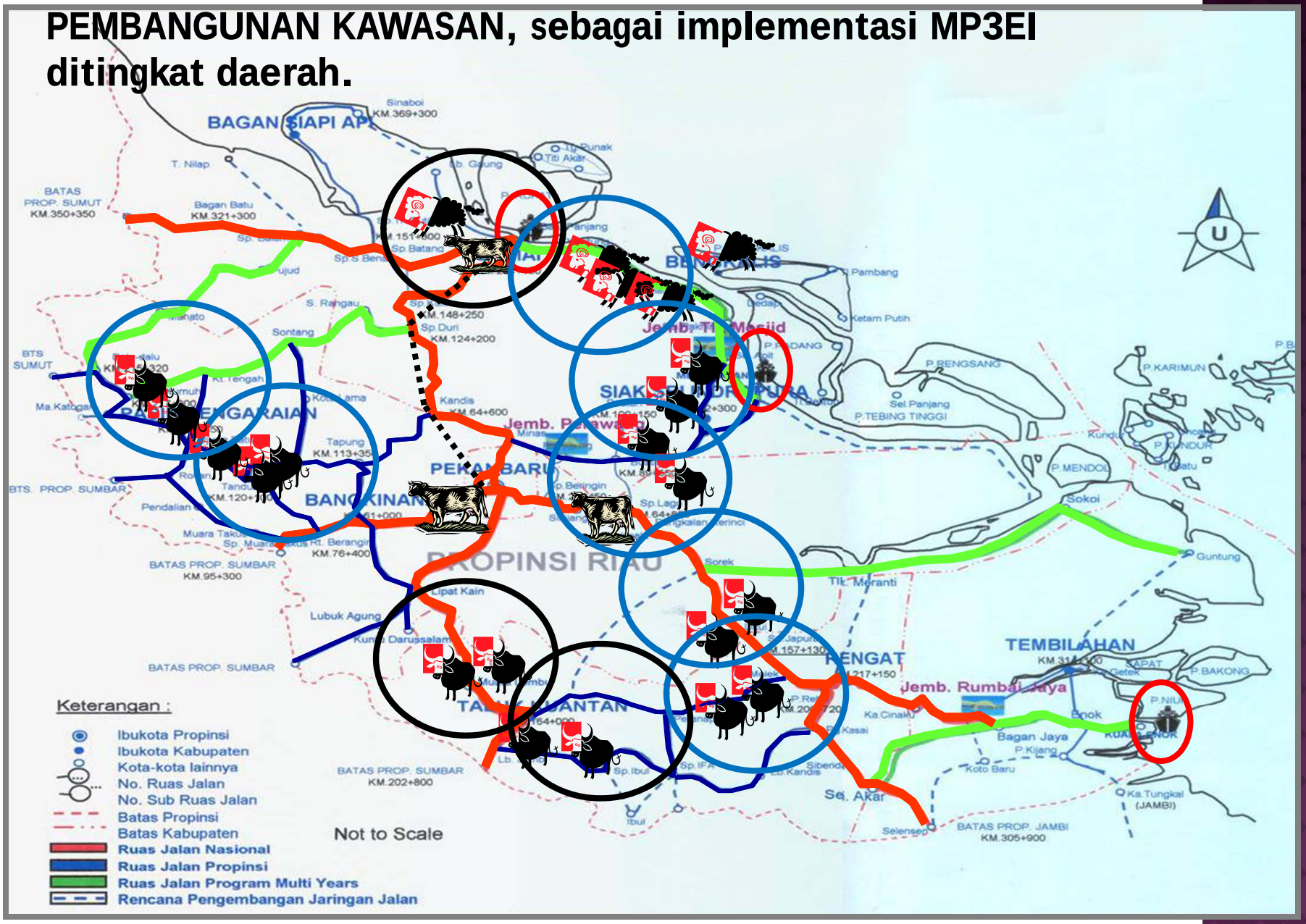
SKENARIO SPASIAL KLUSTER PETERNAKAN DALAM KONTEKS PEMBANGUNAN KAWASAN, sebagai implementasi MP3EI ditingkat daerah.



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VI. ARAHAN TEMATIK SPASIAL KLASTER PETERNAKAN

BUFFER ZONE

KORIDOR I

Penguatan Modal BANK & CSR
Intergrasi Nak-Bun
Pabrik Pakan by product sawit

BUFFER ZONE

KORIDOR II

Penguatan Modal BANK
Insentif APBN-APBD
Pabrik Pakan by product TAPANG

Insentif APBN-APBD
Pabrik Pakan by product
TAPANG

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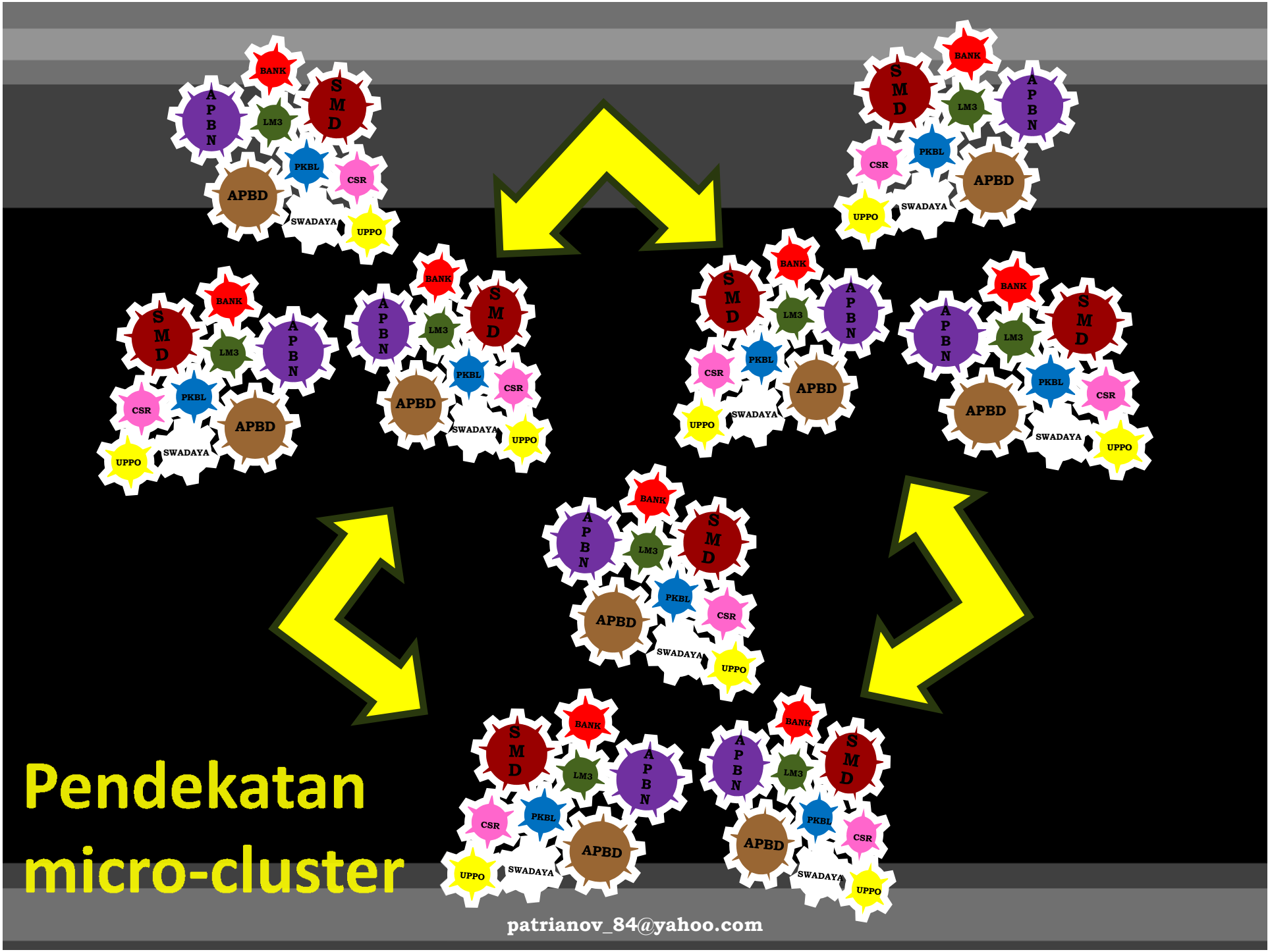
Pendekatan
micro-cluster
BANK
SMD
APBN
LM3
PKBL
CSR
APBD
SWADAYA
UPPO
patrianov_84@yahoo.com

VII . PAKET KEBIJAKAN OPERASIONAL KORIDOR

- **PENGUATAN MODAL PERBANKAN dengan memanfaatkan fasilitas KREDIT PROGRAM (KKPE-KUPS)**
- **Lebih fokus melibatkan INVESTASI SWASTA baik melalui DANA CSR, fasilitas PKBL. Dana CSR sebagai entry point proses integrasi.**
- **Difokuskan pada INTEGRASI NAK-BUN**
- **PEMBANGUNAN PABRIK PAKAN BERBASIS PRODUK SAMPING SAWIT, sebagai scaling up dan MENCIPTAKAN NILAI TAMBAH**
- **FOKUS KOMODITI SAPI POTONG**

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PAKET KEBIJAKAN OPERASIONAL BUFFER ZONE..... lanjutan

- **Fokus pembiayaan melalui INSENTIF APBN DAN APBD sebagai entry point penguatan modal kelompok**
- **Fokus area kawasan sentra produksi tanaman pangan**
- **Fokus kegiatan untuk menciptakan nilai tambah.**
- **Sebagai upaya meningkatan utilitas lahan dan antisipasi alih fungsi lahan.**
- **PEMBANGUNAN PABRIK PAKAN BERBASIS PRODUK SAMPING TANAMAN PANGAN& COCO**
- **FOKUS KOMODITI SAPI POTONG dan KAMBING**

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VIII. MODEL Sawit-Sapi

KANDANG,Buana Bakti
Binaan PT Asian Agri

BIO-GAS INST

Swasembada enerji
Pedesaan dan reduksi
Gas methane
Model Bukit Harapan
4 ekor = 2,5 liter MITAN/hr
Setara Rp. 350.000,-/bln/
Untuk paket 4 ekor

Ref: Prof DR. Ir. Ali Agus

ORGANIC FERTILIZER production, binaan PTPN V
MODEL SRI GADING, LB DALAM
1 lt cattle urine = Rp. 10.000,-
Production/hd/day= 4-7 lt, equal with Rp.40.000,-/hd/day
1 kg compost = Rp. 1.200,-
Production/hd/day 5 kg dry matter, equal with Rp.6.000,-/hd/day

PABRIK PAKAN MODEL KERINCI KANAN
Ref. Prof I W MATHIUS

Production cost Rp. 975,-- Rp. 1.250,-/kg
Perlu 5 kg, setara Rp. 6.750,-/hr/ekor
Asal pelepeah Rp. 12.500,-/hr/ekor
Total Rp. 19.250,-/hr/ekor

POTENSI BIO MASSA

Increase PROD, > 15 %
Fertilizer eficiency, 30 %
Create DIVERSIFICATION

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Ref: Prof I W Mathius
Inisiasi DIT PAKAN dan MEKTAN, 2011

MEKANISME EFISIENSI

Posisi, 2012
BSR, 1 unit, Siak
BNI, 1 unit, Siak
LIPI, 1 unit, Siak
APBN, 3 unit

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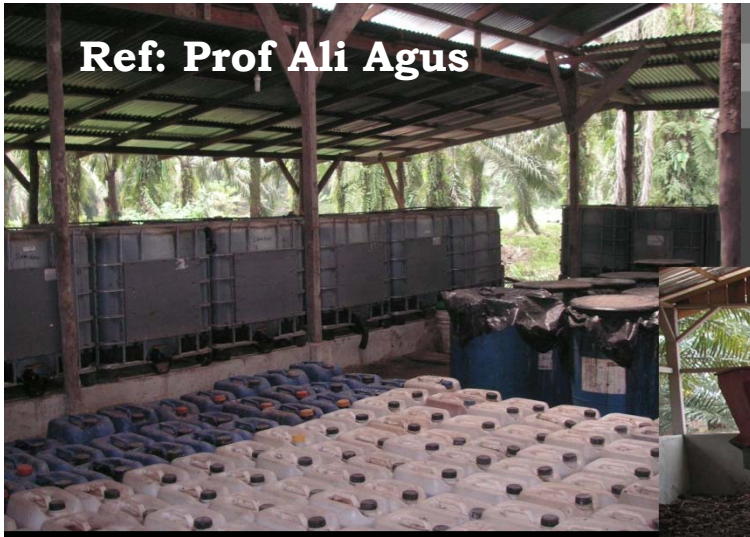
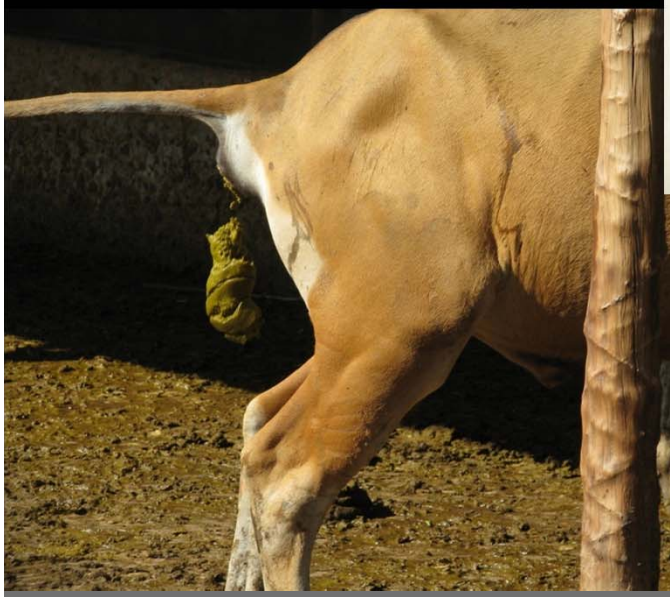
Ref: Prof Ali Agus



MEKANISME NILAI TAMBAH



Posisi, 2012
BSR, 1 unit, Siak
BNI, 1 unit, Siak
LIPI, 1 unit, Siak
MEKTAN, 1 unit INHUL
UPPO, 9 unit

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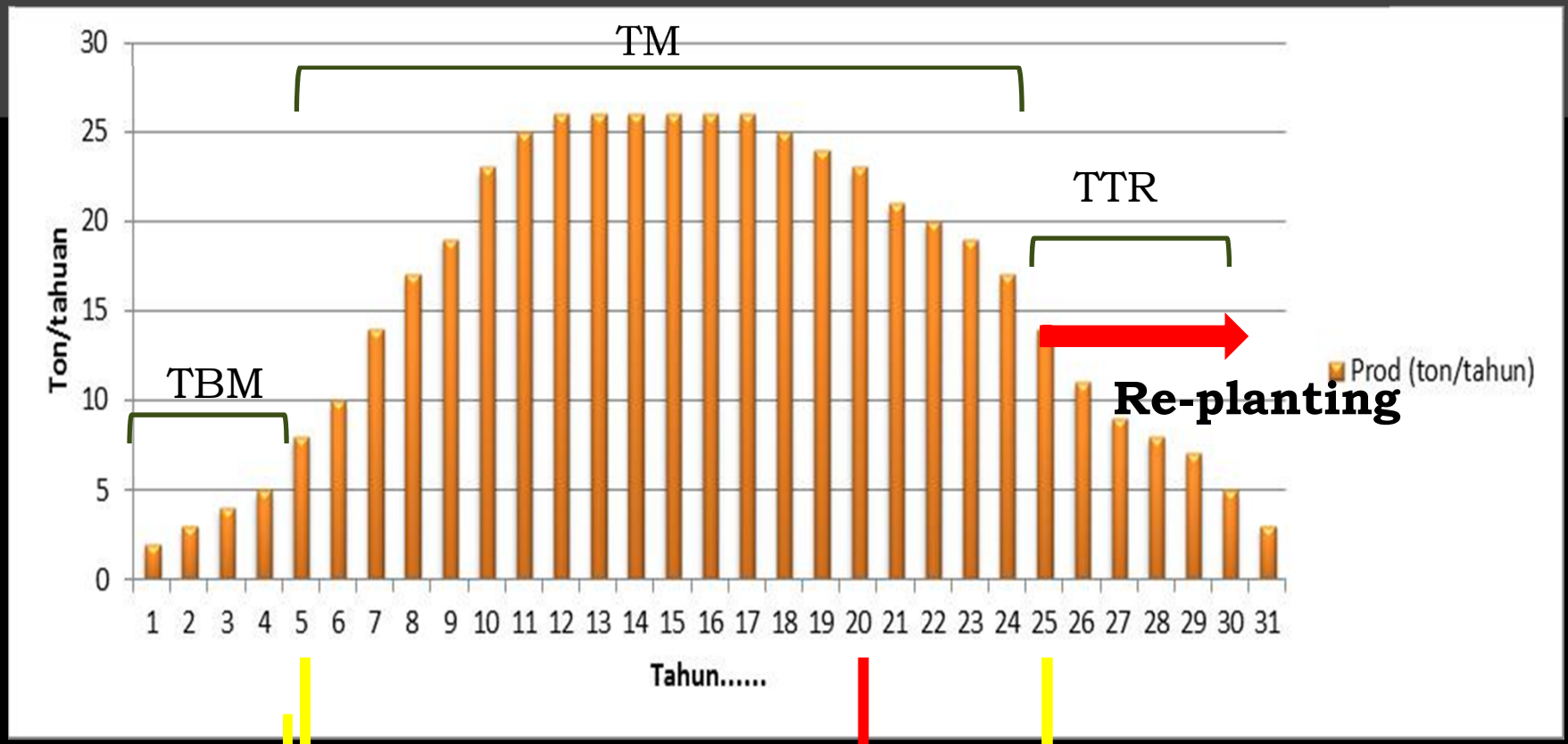
SKENARIO PENGEMBANGAN



Pola Integrasi
- Pemanfaatan Bio-massa kebun sbg PAKAN
- Pemanfaatan Bio-fertilizer NAK sbg INPUT PROD KEBUN

Pola Integrasi
- Sebagi DIVERSIFIKASI PENDAPATAN MASYARAKAT MASA REPLANTING
- Sebagai INTERVENSI SOSIAL

POLA INTEGRASI MULTI FACET MERUPAKAN ALT MEMBANGUN PABRIK PUPUK ORGANIK DI TK PETANI

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Result analytic , Kab Siak dan Indragiri Hulu,
ref: DR IR Nyak Ilham,

- Plant Productivity, fruit production increase **15 – 25 %** based on fruits weight
- Fertilizer Cost eficiency, decrease **30-40 %**
- Feed cost from Palm by product, equal with Rp. 19.250,-/head/day (temporary data trial result of small scale Feed Mill APBN –TP 2011).
- Efiensi enersi asal fosil, setara 3 liter MITAN/hari/ 4 ekor. Nilai BBM **setara Rp. 350.000,-/bulan**
- Pendapatan asal produk samping harian
  - produksi urine rata2 4 liter/ekor/hr, nilai urine (fermentasi) Rp. 10.000,-/liter, setara Rp. 40.000,-/ekor/hr. ***lag time 28 hari***
  - produksi kohe rata-rata 5 kg/ekor/hr, nilai kohe Rp. 1.200,-/kg, setara Rp. 6.000,-/ekor/hr, ***lag time 35 hari***
  - total pendapatan kotor asal produk samping Rp. **46.000**,-

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Produk samping tanaman dan olahan buah dan inti kelapa sawit untuk setiap hektar , Kab SIAK. Ref: Siti Roliah, PPL K Kanan

- 1 ha, 120 pokok pohon
- 1 pohon dapat menyediakan sejumlah 22 pelepah per tahun,
- 1 pelepah, bobot 6 -10 kg, rata2 7 kg
- Bobot daun per pelepah 0,5 kg
- Ketersediaan pelepah dalam 1 tahun, 1 ha = 120 x 22 pelepah = 2.640 plph
- Kebutuhan pakan perekor/ hari 2.5 pelepah
- Daya dukung pakan ruminansia basis pelepah, 1 ha = (2.640/2,5)/365= 2,89 ekor

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IX.Tahapan PENGEMBANGAN SAPI POTONG

Phase 1

1. STUDI KELAYAKAN
2. Pengembangan PAKAN
3. Penyediaan CALON BIBIT
4. Perbaikan KONDISI CB
5. Re-test Brucellosis
6. Mapping STATUS REPRO
7. Breeding TAHAP 1

Phase 2

1. Crossing
2. Seleksi
3. Grading-Up
4. Penyebaran Breed terSELEKSI
5. Re-test Brucellosis

Phase 3

1. Pengembangan
2. Evaluasi Ras
3. Penetapan Ras unggulan DAERAH
4. Re-test Brucellosis

KATA KUNCI...

Pengembangan SAPI POTONG erat dengan DAYA DUKUNG LAHAN, keberadaan PETERNAK, ketersediaan BIBIT dan SARANA PELAYANAN REPRODUKSI

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lanjutan

- Jantan , 10 % anak jantan dijadikan BIBIT, sisa 90 % untuk dibudidaya.
- BETINA, 90 % anak betina dijadikan BIBIT dan dibagi 3 dengan pendekatan grade A (20%), grade B (30 %), grade C (40%)

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X. Matriks Keterkaitan antar pelaku

Pelaku	Aset Ternak	Pabrik Pakan	UPPO	Biogas Inst	Pendam pingan	Fasilitasi Kredit	Kebijak an	Fas PASAR
PUSAT								
A. KEMENTAN								
B. KEMENDAGRI								
C. KEMENKO EKUIN								
D. KEMENEG BUMN								
DAERAH								
A. PEMPROV								
B. PEMKAB								
PERUSAHAAN								
A. PBN								
B. PBS								
PERBANKAN								
A. BI								
B. BANK RIAU KEPRI								
C. BRI								
D. BANK BNI								
PERGURUAN TINGGI								
ASOSIASI PROFESI								
ASOSIASI PEMASARAN								

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XI. DUKUNGAN PAKET KEBIJAKAN PEMERINTAH UNTUK PERCEPATAN

1. Komponen **B I S** dalam **PAKET CSR**, akan SANGAT BERPENGARUH dalam membangun KAWASAN INTEGRASI SAPI SAWIT (Kemeneg BUMN dan Kemendag)

2. **UPPO** di pedesaan sebagai ENTRY POINT substitusi **SUBSIDI PUPUK, perlu KEBIJAKAN NASIONAL sehingga NILAI TAMBAH akan DITERIMA OLEH PETANI (Kementerian EKUIN)**

3. Kemudahan **FASILITASI KREDIT PROGRAM** bagi PELAKU USAHA diluar PETERNAKAN SEBAGAI PELAKU PEMBIBITAN. (Kementerian Keuangan)

4. Komponen **INSTALASI BIO GAS**, merupakan upaya membangun **KEMANDIRIAN ENERSI PEDESAAN** (Kemeneterian ESDM)

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XII .Rancangan Keterkaitan klastering antar kabupaten/kota

No.	Kabupaten-Kota	Klaster - Kecamatan	Tahapan
1	Dumai - Bengkalis	Bukit Kapur, Medang Kampai, Bukit Batu	Koridor I
2	Bengkalis - Siak	Siak Kecil, Sabak Auh, Bunga Raya	Koridor I
3	Siak - Pelalawan	Koto Gasib, Dayun, Lb Dalam, Kerinci Kanan	Koridor I
		Pangkalan Kerinci, Langgam	
4	Pelalawan - Indragiri Hulu	Pangkalan Kuras, Ukui, Pangkalan Lesung,	Koridor I
		Pasir Penyu, Sei Lala, Lb Batu Jaya	
5	Indragiri Hulu - Kuansing	Peranap, Cerenti, Kuantan Hilir, Singingi	Koridor II
		Singingi Hilir	
6	Kampar - Rokan Hulu	Tapung, Tapung Hulu, Tapung Hilir,	Koridor II
		Kunto Darussalam, Kepenuhan	
		Tambusai, Tambusai Utara	

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Klastering BUFFER

No.	Kabupaten-Kota	Klaster - Kecamatan	Tahapan
1	Rohil - Dumai	Sei Sembilan, Bagan Batu, Bangko Pusako	Buffer I
		Rimba Melintang,	
2	Siak - Bengkalis	Sungai Mandau, Bunga Raya, Siak Kecil	Buffer II
3	Rokan Hulu	Rambah, Rambah Samo, Rambah Hilir	Buffer II
4	Kuansing	Kuantan Tengah, Logas Tanah Darat	Buffer II
5	Indragiri Hulu	Kuala Cinaku	Buffer II
6	Indragiri Hilir	Keritang, Reteh, Tempuling, Batang Tuaka	Buffer I
		Gaung, GAS, Mandah, Kateman,	
		Keritang, Reteh,	

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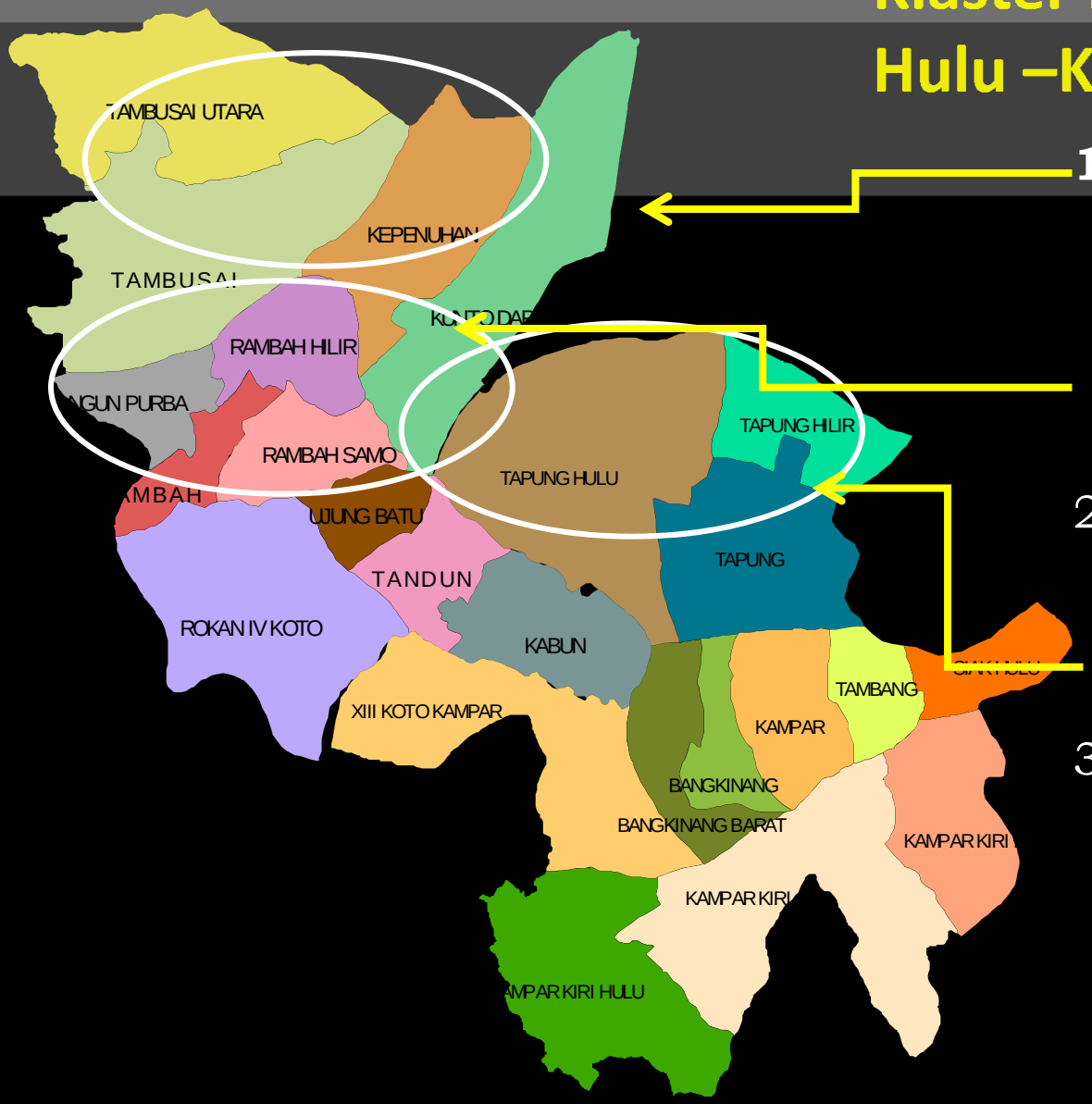
Klaster ROKAM (Rokan Hulu –Kampar)



1. **Klaster Tambusai-Tambusai Utara-Kepenuhan. Sentra di Tambusai/Tambusai Utara**
2. Klaster Bangun Purba-Rambah Hilir-Rambah-Rambah Samo
3. Klaster Tapung-Tapung Hilir-Tapung

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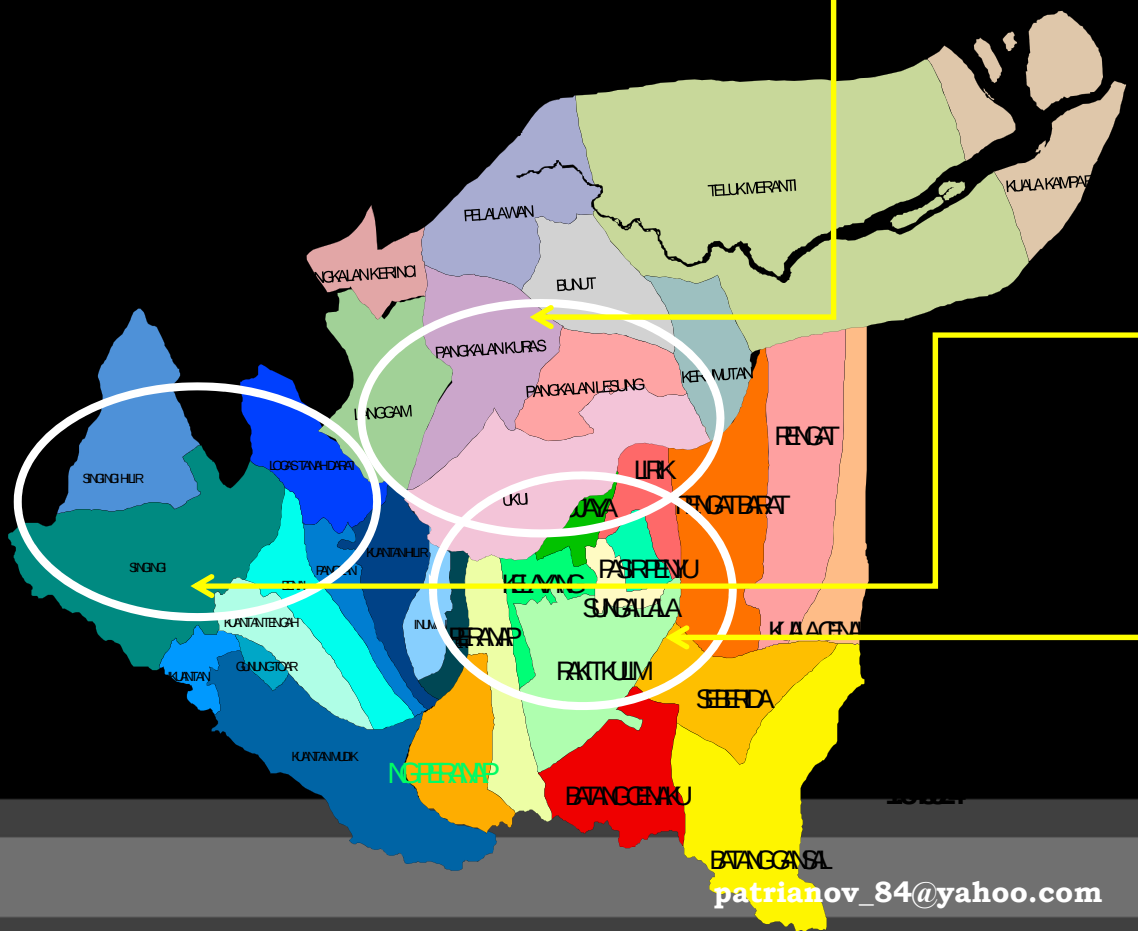
Kawasan Pelakuanhulu (Pelalawan-Kuansing-Indragiri Hulu)



1. Klaster Pangkalan Kuras- Pangkalan Lesung-Kerumutan-Ukui
2. Klaster Pasir Penyu-Sei Lala-Lb. Batu Jaya
3. Klaster Logas Tanah Darat-Singingi- Singingi Hilir

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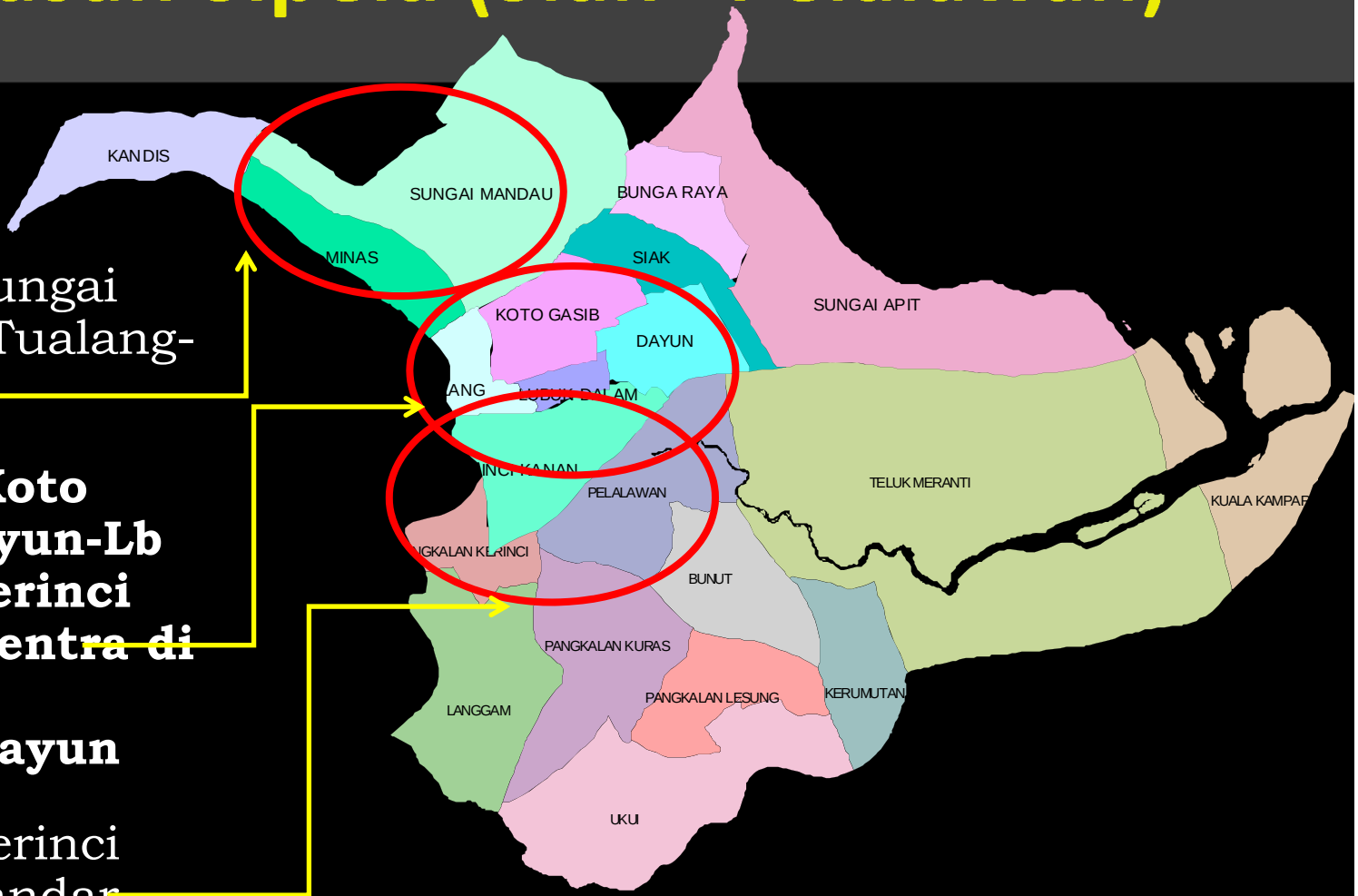
Kawasan Sipela (Siak –Pelalawan)

1. Klaster Sungai Mandau-Tualang-Minas
2. **Klaster Koto Gasib-Dayun-Lb Dalam-Kerinci Kanan. Sentra di Kerinci Kanan/Dayun**
3. Klaster Kerinci Kanan-Bandar Sekijang-Pelalawan



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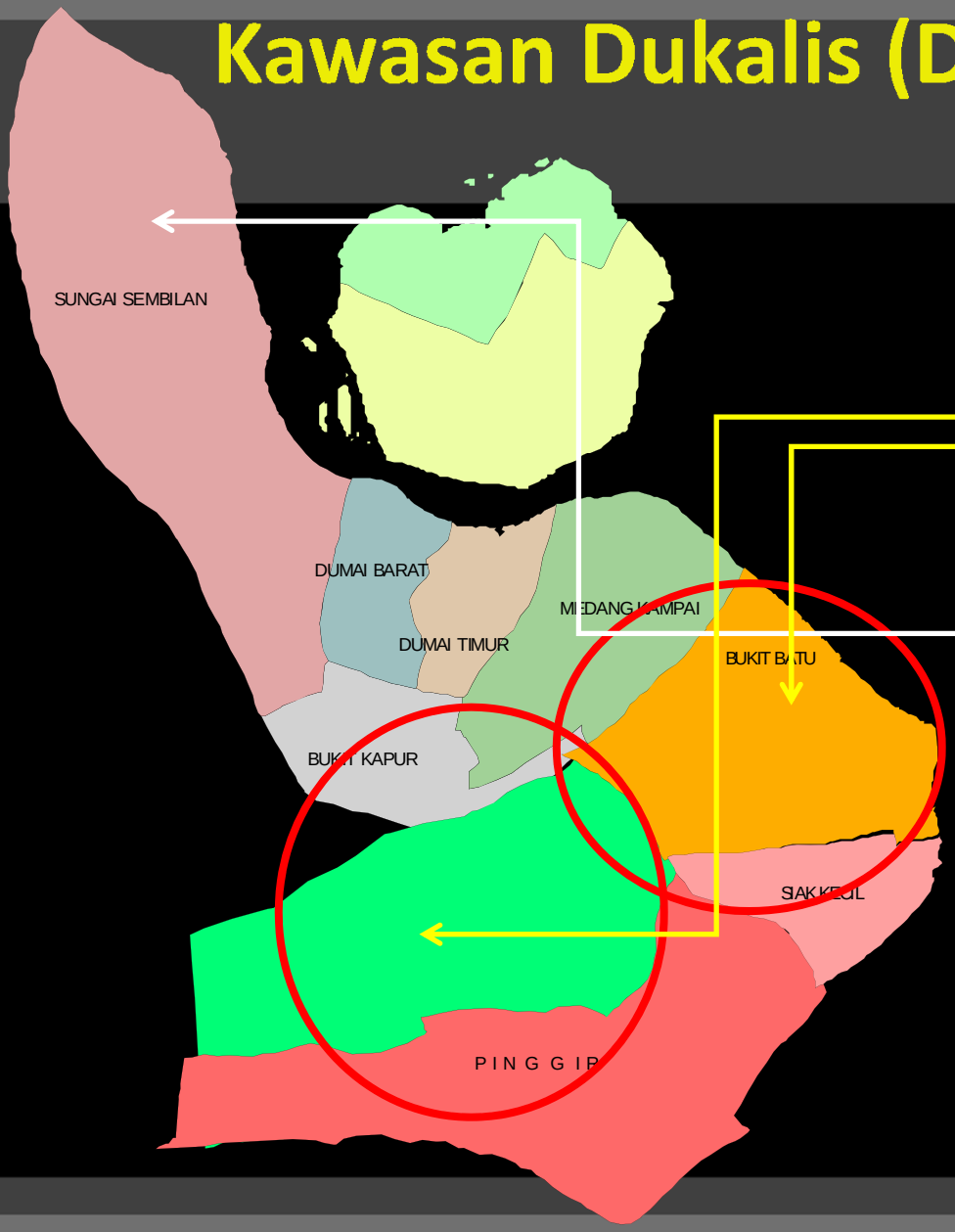
Kawasan Dukalis (Dumai –Bengkalis)



1. Klaster Medang Kampai-Bukit Batu-Siak Kecil
2. Klaster Bukit Kapur-Mandau-Pinggir
3. Klaster Sei Sembilan

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Kawasan Rokan (Rokan Hulu-Rokan Hilir)

1. Klaster Pujud-Bagan Sinembah-Simpang Kanan
2. **Klaster Tambusai –Tambusai Utara-Pujud. Sentra di Tambusai/Tambusai Utara**
3. Klaster Kepenuhan- Kunto Darussalam

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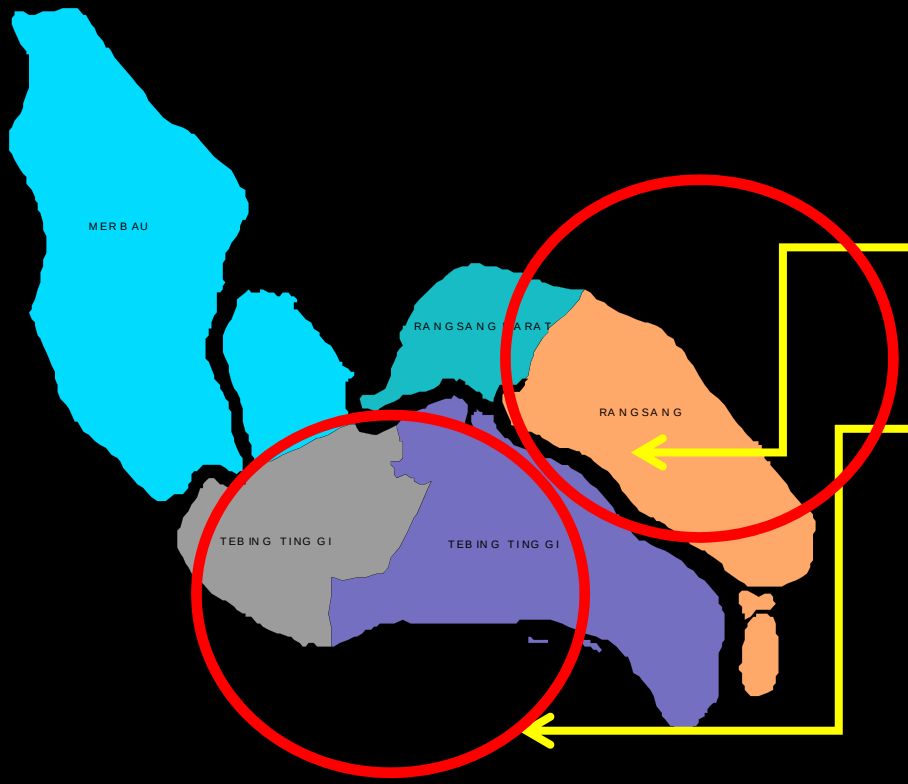
Kawasan Perbatasan Meranti



1. Klaster Rangsang-Rangsang Barat
2. **Klaster Tebing Tinggi - Tebing Tinggi Barat. Sentra di Tebing Tinggi Barat**

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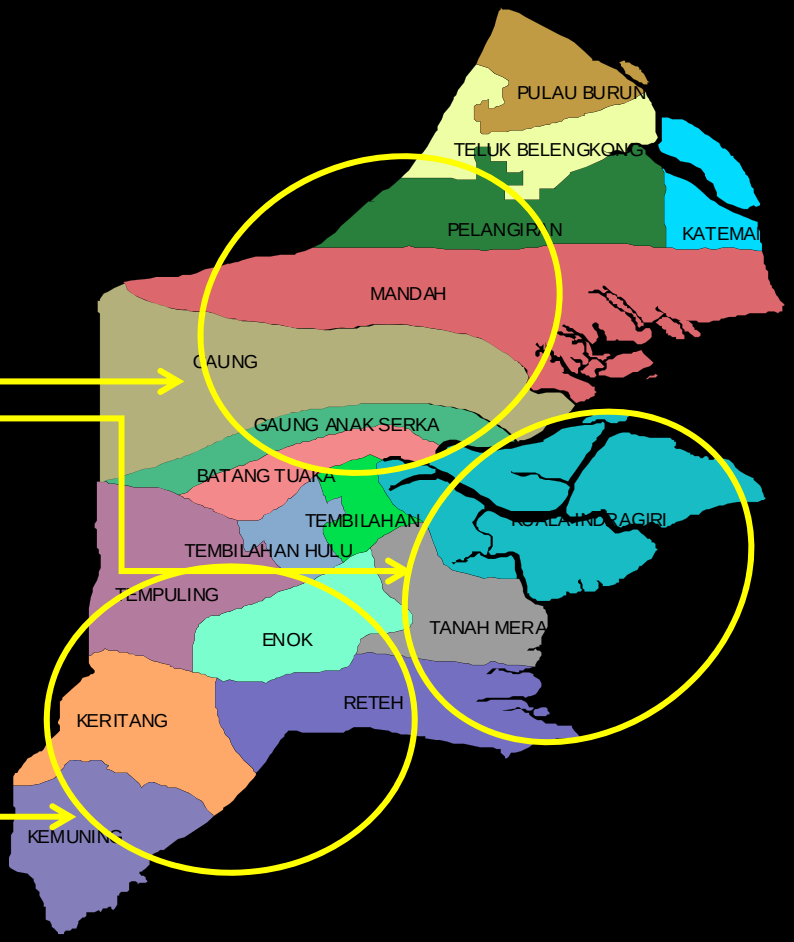
Kawasan Indragiri Hilir

1. Klaster Gaung-Mandah-Pelangiran-Kateman
2. Klaster Tanah Merah-Reteh
3. **Klaster Reteh-Keritang-Enok-Tempuling, sentra di Tempuling**



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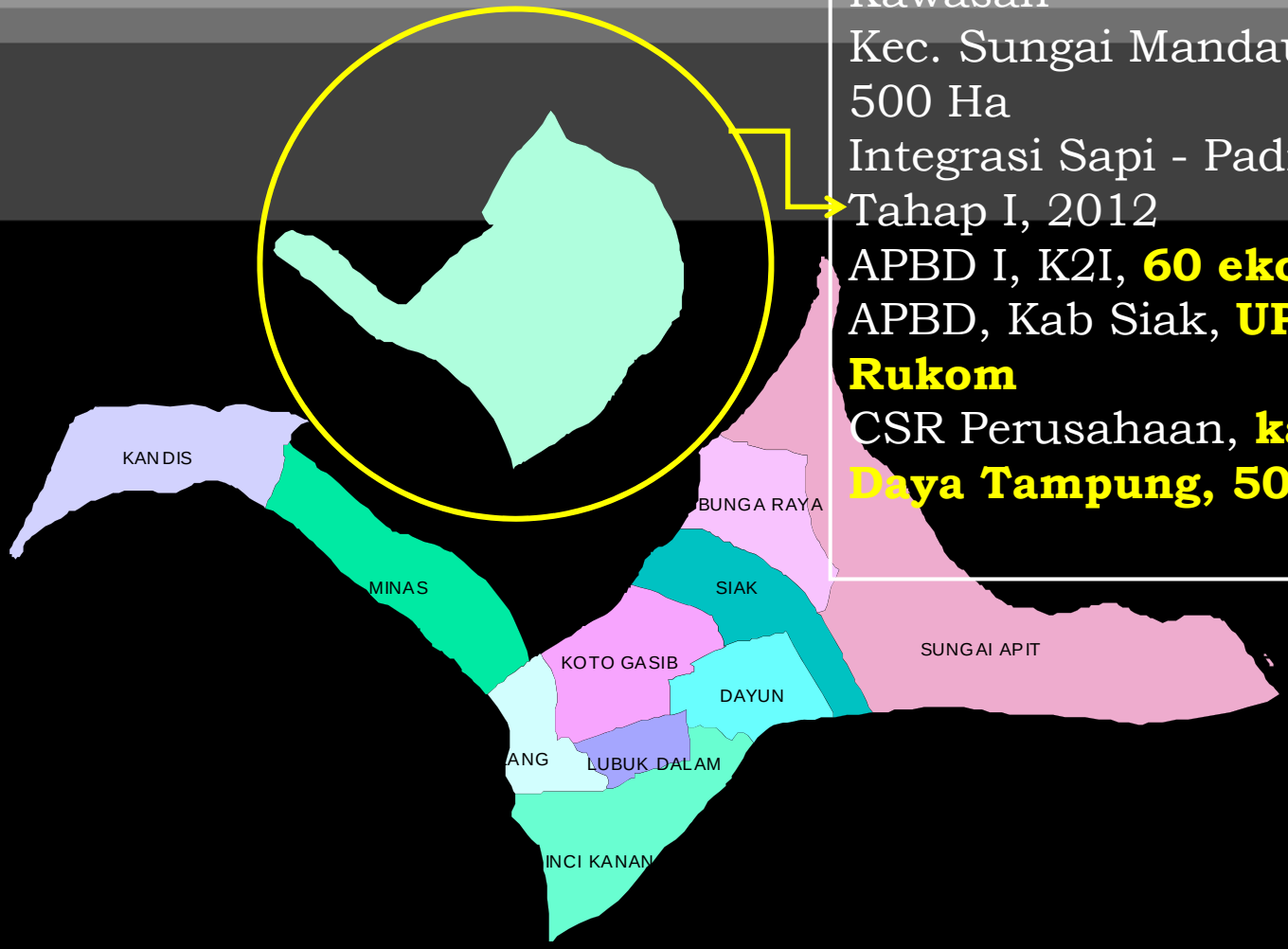
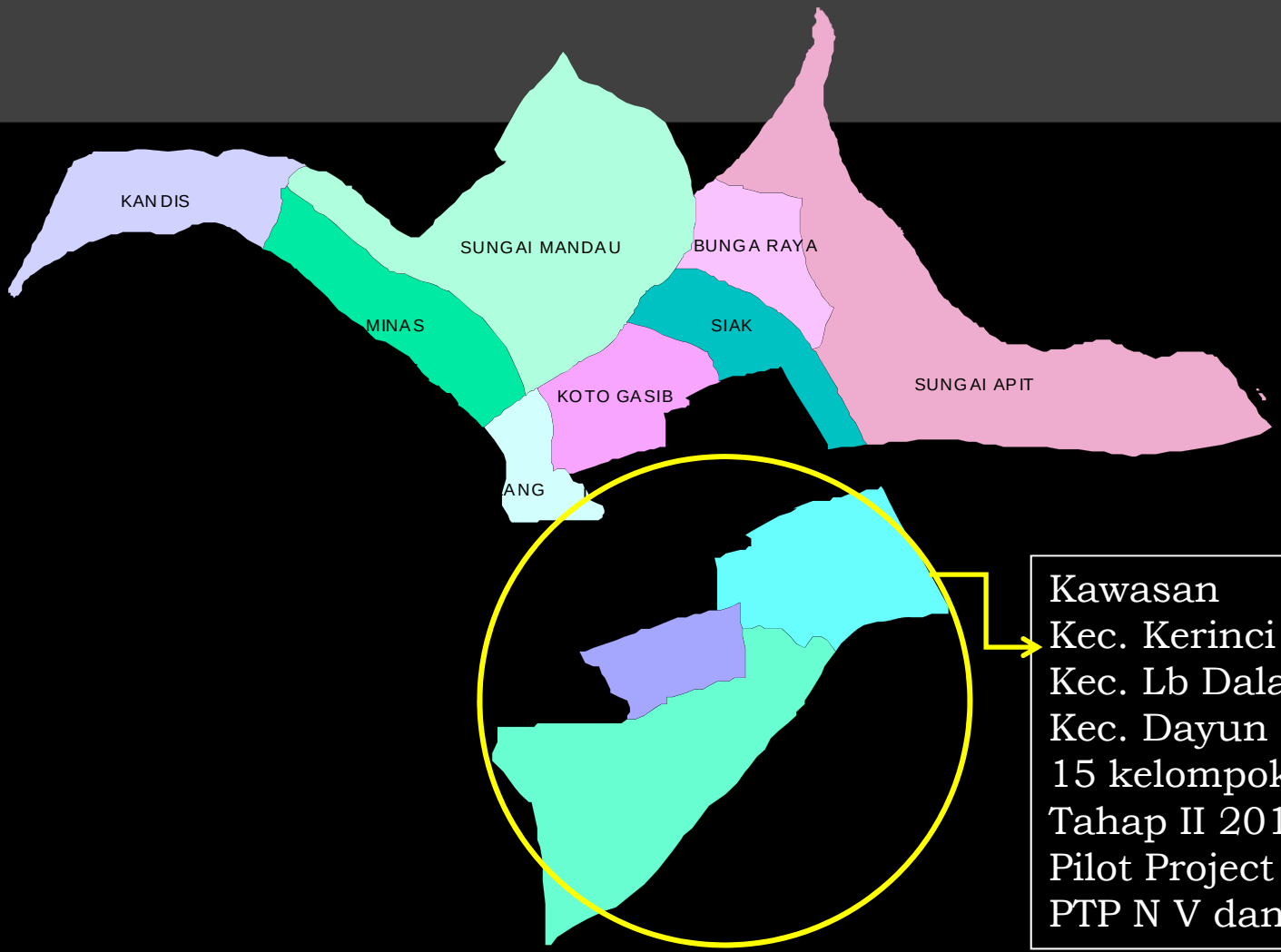


Kawasan
Kec. Sungai Mandau
500 Ha
Integrasi Sapi - Padi
Tahap I, 2012
APBD I, K2I, **60 ekor**
APBD, Kab Siak, **UPPO& Rukom**
CSR Perusahaan, **kandang**
Daya Tampung, 500 ekor

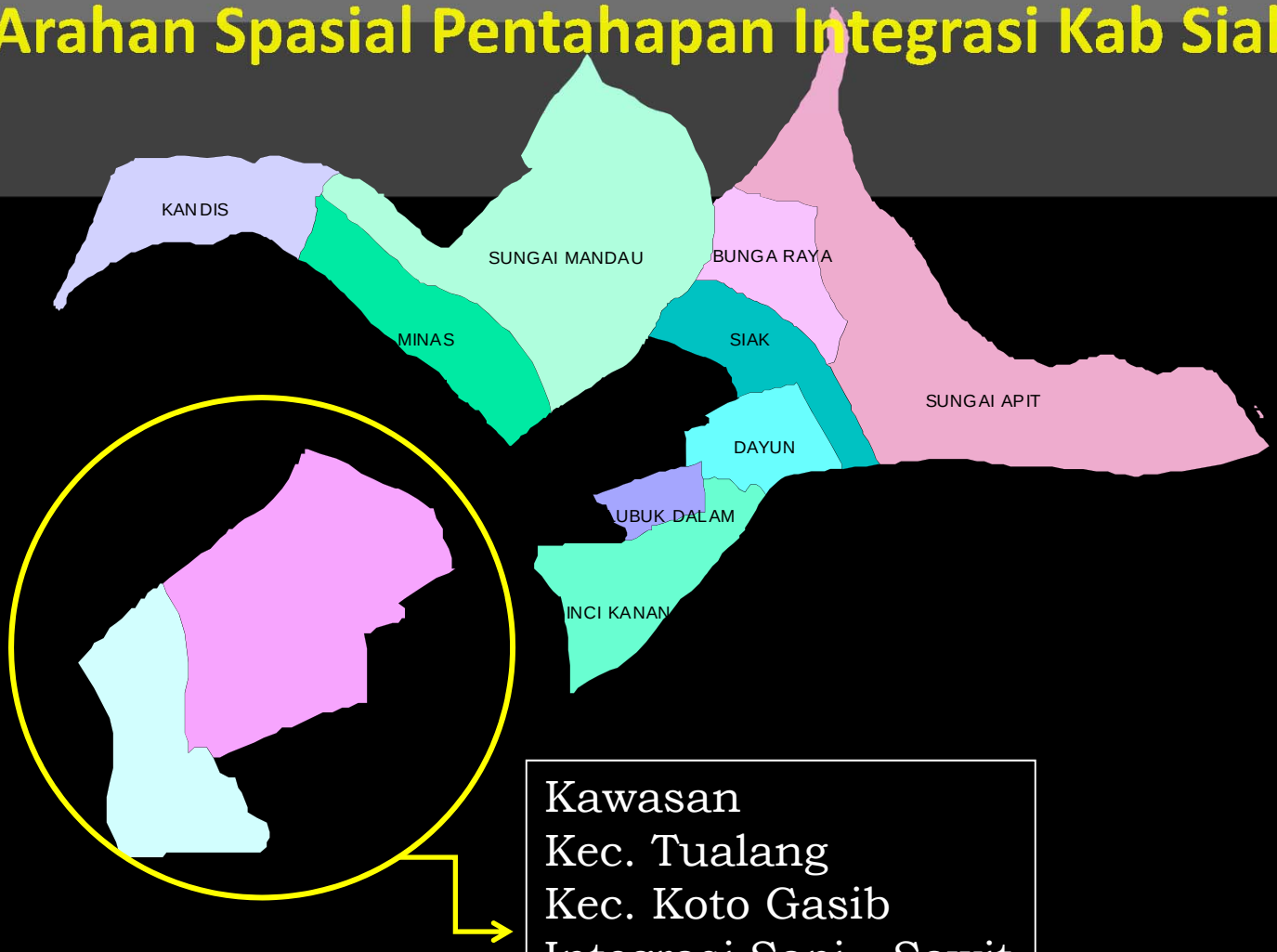
Arahan Spasial SIS-PA

Arahan Spasial Pentahapan Integrasi Kab Siak



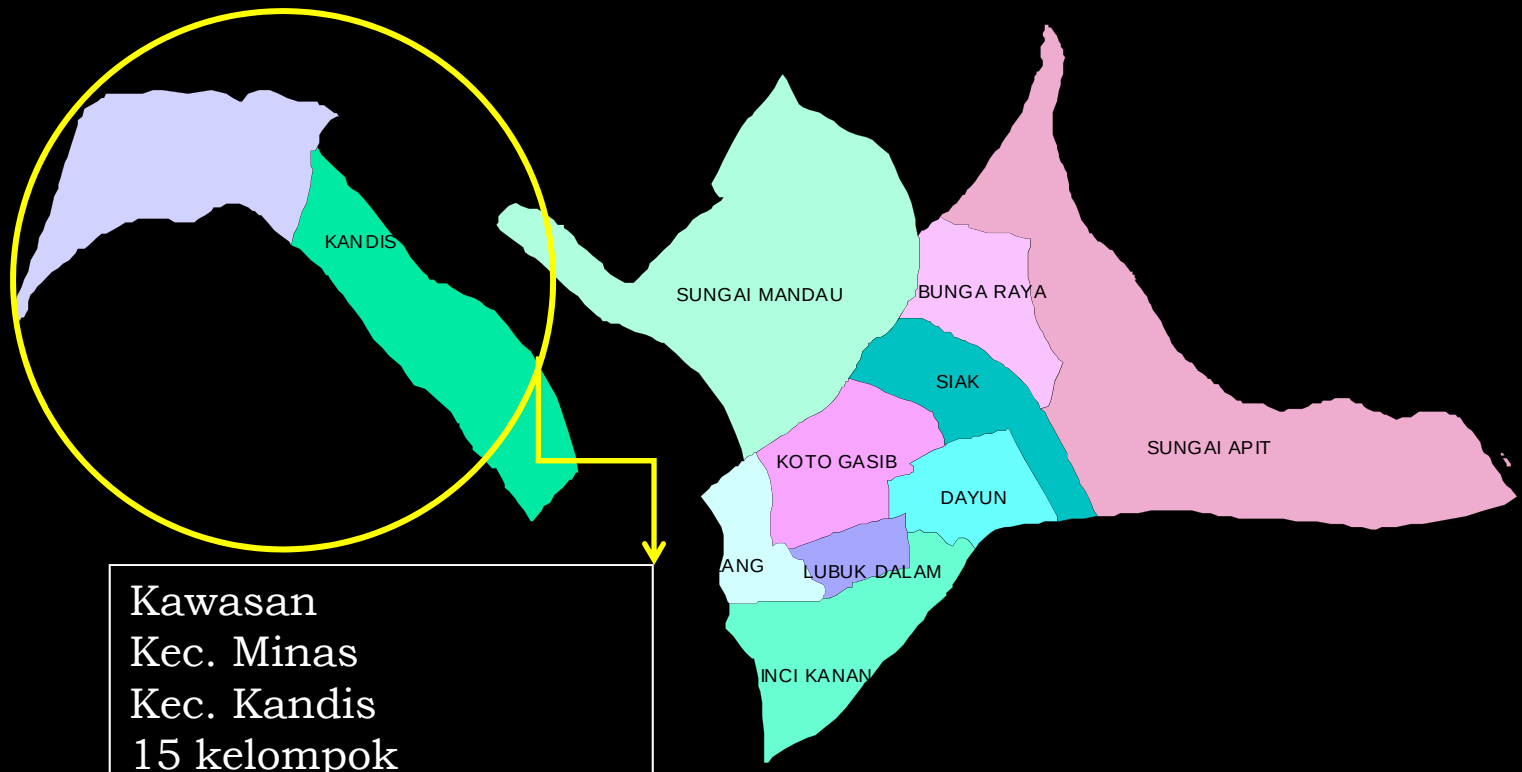
Kawasan
Kec. Kerinci Kanan
Kec. Lb Dalam
Kec. Dayun
15 kelompok
Tahap II 2013
Pilot Project Integrasi APBN
PTP N V dan PT Asian Agri

Arahan Spasial Pentahapan Integrasi Kab Siak



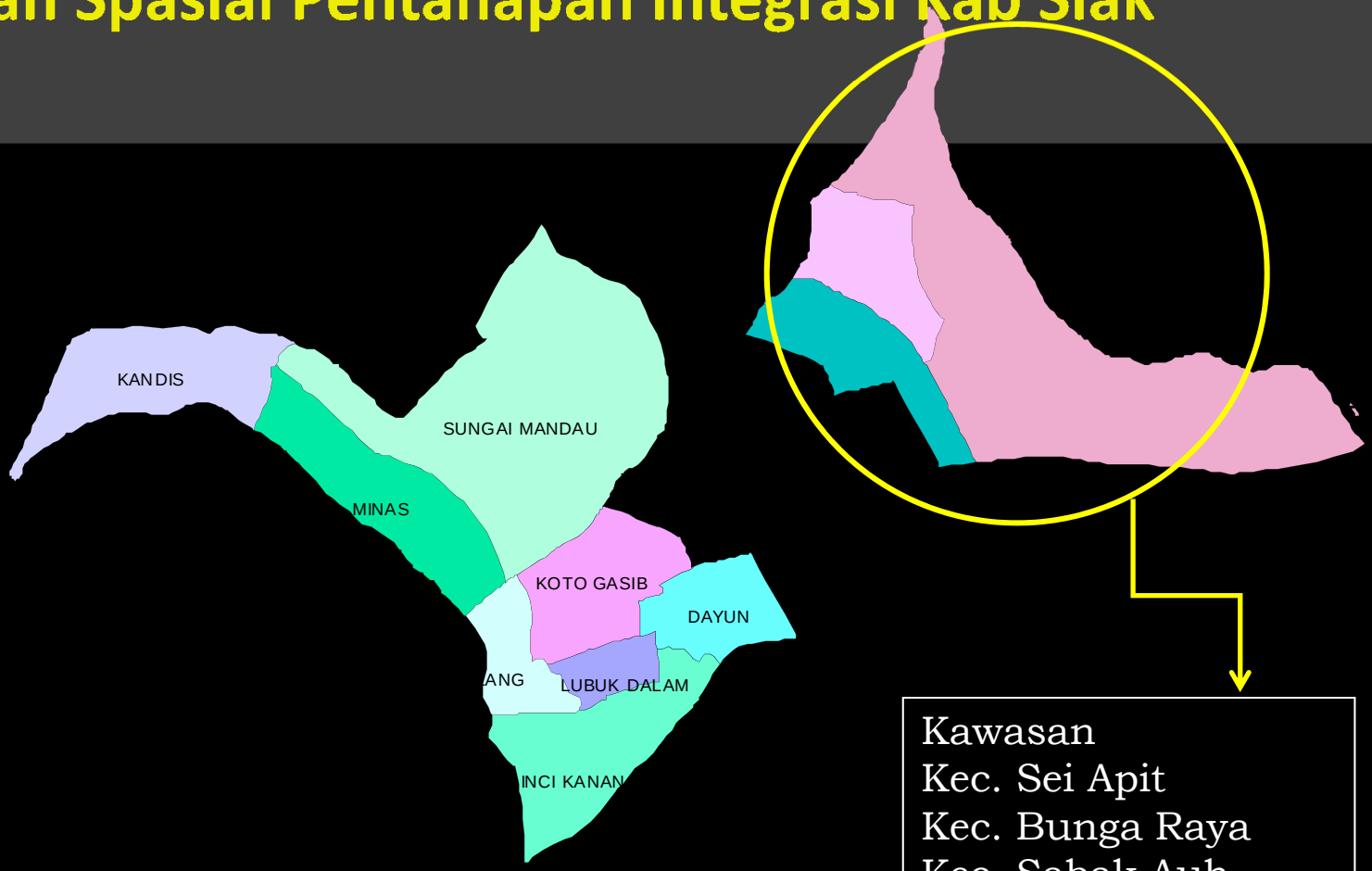
Kawasan
Kec. Tualang
Kec. Koto Gasib
Integrasi Sapi - Sawit
Tahap II, 2014

Arahan Spasial Pentahapan Integrasi Kab Siak



Kawasan
Kec. Minas
Kec. Kandis
15 kelompok
Tahap III 2014-2015
Kawasan HTI dan Sawit

Arahan Spasial Pentahapan Integrasi Kab Siak



Kawasan
Kec. Sei Apit
Kec. Bunga Raya
Kec. Sabak Auh
Tahap III 2014-2015
Kawasan Sentra Padi
Kebun Kelapa Sawit
CSR Perusahaan,

XIII. Rancangan alokasi ternak menurut sumber pembiayaan

No.	Kabupaten	Rencana ekor		RENCANA ALOKASI TERNAK MENURUT PROPORSI				
				APBN,20%	APBDPRO,20%	APBDKAB,30%	PERUSH,15%	BANK,15%
1	Siak	17,000	ekor	3,400	3,400.00	5,100.00	2,550	2,550
2	Bengkalis	5,000	ekor	1,000	1,000.00	1,500.00	750	750
3	Pelalawan	12,000	ekor	2,400	2,400.00	3,600.00	1,800	1,800
4	Rohul	15,000	ekor	3,000	3,000.00	4,500.00	2,250	2,250
5	Kampar	12,000	ekor	2,400	2,400.00	3,600.00	1,800	1,800
6	Inhil	6,000	ekor	1,200	1,200.00	1,800.00	900	900
7	Inhu	14,000	ekor	2,800	2,800.00	4,200.00	2,100	2,100
8	Kuansing	10,000	ekor	2,000	2,000.00	3,000.00	1,500	1,500
9	Rohil	7,000	ekor	1,400	1,400.00	2,100.00	1,050	1,050
10	Dumai	2,000	ekor	400	400.00	600.00	300	300
	Jumlah Riau	100,000	ekor	20,000	20,000.00	30,000.00	15,000	15,000

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RENCANA ANGGARAN BIAYA (RAB)
KEGIATAN INTEGRASI SAPI-SAWIT PER KELOMPOK (100 EKOR SAPI)

No.	URAIAN	Volume	Sat.	Harga Satuan (Rp.)	TOTAL (RP.)
1	**Penyebaran sapi SISKA**	**100**	**ekor**		700,000,000
	a. Betina	80	ekor	7,000,000	560,000,000
	b. Jantan	20	ekor	7,000,000	140,000,000
2	Pengadaan Obat-obatan	100	ekor	100,000	10,000,000
3	Mineral Suplemen	100	ekor	20,000	2,000,000
4	Pendampingan Peternak	3.60	ob	1,500,000	5,400,000
6	Operasional Penyebaran	100	ekor	100,000	10,000,000
7	Kandang Koloni	1	unit	65,000,000	65,000,000
8	Lumbung pakan (Alsin pakan)	1	unit	120,000,000	120,000,000
9	Rumah Kompos	1	unit	100,000,000	100,000,000
10	Biogas	1	unit	25,000,000	25,000,000
11	Mikrochip dan Kartu Rekording	100	buah	100,000	10,000,000
12	Operasional Recorder	12	OB	500,000	6,000,000
13	Honor Tim Teknis	3	OP	5,000,000	15,000,000
14	Konsultan	3	OB	3,000,000	9,000,000
15	Biaya Seleksi petani	20	org	150,000	3,000,000
16	Biaya Administrasi	1	kali	3,000,000	3,000,000
17	Koordinasi ke Pusat	1	OK	5,000,000	5,000,000
18	Monitoring dan Evaluasi	2	OK	1,500,000	3,000,000
		JUMLAH ANGGARAN			**1,091,400,000**

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Rencana Anggaran Biaya (RAB) Kegiatan Intregrasi sapi -sawit selama 5 tahun

No.	URAIAN	SHARING BUDGET														
		APBN (20%)			APBD PROV (20%)			APBD KAB. (30%)			PERUSAHAAN/CSR (15%)			PERBANKAN (15%)		
		vol.	Sat.	Jumlah (Rp.)	vol.	Sat.	Jumlah (Rp.)	vol.	Sat.	Jumlah (Rp.)	vol.	Sat.	Jumlah (Rp.)	vol.	Sat.	Jumlah (Rp.)
1	**Penyebaran sapi**	**20,000**	**ek**	**140,000,000,000**	**20,000**	**ek**	**140,000,000,000**	**30,000**	**ek**	**210,000,000,000**	**15,000**	**ek**	**105,000,000,000**	**15,000**	**ek**	**105,000,000,000**
	a. Betina	16,000	ek	112,000,000,000	16,000	ek	112,000,000,000	24,000	ek	168,000,000,000	12,000	ek	84,000,000,000	12,000	ek	84,000,000,000
	b. Jantan	4,000	ek	28,000,000,000	4,000	ek	28,000,000,000	6,000	ek	42,000,000,000	3,000	ek	21,000,000,000	3,000	ek	21,000,000,000
2	Pengadaan Obat-obatan	25,000	ek	2,500,000,000	25,000	ek	2,500,000,000	35,000	ek	3,500,000,000	15,000	ek	1,500,000,000	-	-	-
3	Mineral Suplemen	25,000	ek	500,000,000	25,000	ek	500,000,000	35,000	ek	700,000,000	15,000	ek	300,000,000	-	-	-
4	Pendampingan Peternak	900	ob	1,350,000,000	900	ob	1,350,000,000	1,260	ob	1,890,000,000	540	ob	810,000,000	-	-	-
6	Operasional Penyebaran	20,000	ek	2,000,000,000	20,000	ek	2,000,000,000	30,000	ek	3,000,000,000	15,000	ek	1,500,000,000	15,000	ek	1,500,000,000
7	Kandang Koloni	200	unit	13,000,000,000	200	unit	13,000,000,000	300	unit	19,500,000,000	150	unit	9,750,000,000	150	unit	9,750,000,000
8	Lumbung pakan (Alsin pakan, bangunan, generator)	500	unit	60,000,000,000	-	-	-	-	-	-	500	unit	60,000,000,000	-	-	-
9	Rumah Kompos	500	unit	50,000,000,000	-	-	-	-	-	-	500	unit	50,000,000,000	-	-	-
10	Biogas	500	unit	12,500,000,000	-	-	-	-	-	-	500	unit	12,500,000,000	-	-	-
11	Mikrochip dan Kartu Rekording	35,000	buah	3,500,000,000	30,000	buah	3,000,000,000	35,000	buah	3,500,000,000	-	-	-	-	-	-
12	Operasional Recorder	4,200	OB	2,100,000,000	3,600	OB	1,800,000,000	4,200	OB	2,100,000,000	-	-	-	-	-	-
13	Honor Tim Teknis	1,050	OB	5,250,000,000	900	OB	4,500,000,000	1,050	OB	5,250,000,000	-	-	-	-	-	-
14	Konsultan	1,050	OB	3,150,000,000	900	OB	2,700,000,000	1,050	OB	3,150,000,000	-	-	-	-	-	-
15	Biaya Seleksi petani	7,000	OB	1,050,000,000	6,000	OB	900,000,000	7,000	OB	1,050,000,000	-	-	-	-	-	-
16	Biaya Administrasi	350	OB	1,050,000,000	300	OB	900,000,000	350	OB	1,050,000,000	-	-	-	-	-	-
17	Koordinasi ke Pusat	350	OB	1,750,000,000	300	OB	1,500,000,000	350	OB	1,750,000,000	-	-	-	-	-	-
18	Monitoring dan Evaluasi	700	OB	1,050,000,000	600	OB	900,000,000	700	OB	1,050,000,000	-	-	-	-	-	-
				300,750,000,000			**175,550,000,000**			**257,490,000,000**			**241,360,000,000**			**116,250,000,000**

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Tahapan Penyebaran Ternak, selama 5 Tahun. Menurut Kabupaten/Kota

No.	Kabupaten	Rencana	ekor	T1	T2	T3	T4	T5
1	Siak	17,000	ekor	2,000	2,500	3,000	4,500	5,000
2	Bengkalis	5,000	ekor	1,000	1,000	1,000	1,000	1,000
3	Pelalawan	12,000	ekor	1,500	2,000	2,500	3,000	3,000
4	Rohul	15,000	ekor	2,000	2,500	3,000	3,500	4,000
5	Kampar	12,000	ekor	1,500	2,000	2,500	3,000	3,000
6	Inhil	6,000	ekor	750	750	1,000	1,750	1,750
7	Inhu	14,000	ekor	2,000	2,000	3,000	3,000	4,000
8	Kuansing	10,000	ekor	1,500	1,500	2,000	2,500	2,500
9	Rohil	7,000	ekor	750	1,000	1,250	2,000	2,000
10	Dumai	2,000	ekor		500	500	500	500
	Jumlah Riau	100,000	ekor	13,000	15,750	19,750	24,750	26,750

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Proyeksi Cashflow Pengembangan Integrasi Ternak Sapi - Sawit Untuk 100 ekor selama 6 tahun (Tahun 2013 - 2018)

Rincian	2013	2014	2015	2016	2017	2018
A. PENERIMAAN						
Penerimaan Tunai						
a. Penjualan Anak Sapi	0	0	170,720,000	226,514,400	275,424,128	294,747,645
b. Penjualan Sapi Afkir	30,000,000	42,000,000	48,000,000	54,000,000	60,000,000	66,000,000
c. Penjualan Pupuk	146,000,000	205,005,000	231,991,900	258,479,902	277,415,304	298,756,998
d. Penjulan Urine cair	547,500,000	811,668,750	926,890,125	1,038,510,593	1,114,374,131	1,199,944,148
e. Manfaat Biogas	191,625,000	284,084,063	324,411,544	363,478,707	390,030,946	419,980,452
Penerimaan tidak tunai						
Nilai Inventarisir/Nilai Sisa					0	825,127,864
TOTAL PENERIMAAN	**915,125,000**	**1,342,757,813**	**1,702,013,569**	**1,940,983,602**	**2,117,244,508**	**3,104,557,107**
B. PENGELUARAN						
Pengeluaran Investasi						
a. Kandang	65,000,000	0	0	0	0	0
b. Lumbung pakan	120,000,000	0	0	0	0	0
c. Rumah Kompos	100,000,000	0	0	0	0	0
d. Biogas	25,000,000	0	0	0	0	0
e. Mikrochip/Kartu Recorder	10,000,000	0	0	0	0	0
f. Beli Ternak sapi	700,000,000	35,000,000	49,000,000	56,000,000	63,000,000	70,000,000
Jumlah Pengeluaran Investasi	1,020,000,000	35,000,000	49,000,000	56,000,000	63,000,000	70,000,000
Pengeluaran Operasional						
a. Sewa Tanah	0	0	0	0	0	0
b. Adminitrasi Kelompok	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000
c. Pendampingan	18,000,000	18,000,000	18,000,000	18,000,000	18,000,000	18,000,000
f. Biaya Pakan	730,000,000	1,082,225,000	1,235,853,500	1,384,680,790	1,485,832,174	1,599,925,531
g. Obat/Vitamin	12,000,000	17,790,000	20,315,400	22,761,876	24,424,638	26,300,146
Jumlah Pengeluaran Operasional	763,000,000	1,121,015,000	1,277,168,900	1,428,442,666	1,531,256,813	1,647,225,676
TOTAL PENGELUARAN	**1,783,000,000**	**1,156,015,000**	**1,326,168,900**	**1,484,442,666**	**1,594,256,813**	**1,717,225,676**
PENDAPATAN USAHA	**-867,875,000**	**186,742,813**	**375,844,669**	**456,540,936**	**522,987,696**	**1,387,331,431**

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Lampiran 13. Analisis Finansial Usaha Integrasi Ternak Sapi - Sawit untuk 100 ekor selama 6 tahun (tahun 2013 -2018)

Tahun	Cost		Total cost	Total revenue	Benefit	DF 20 %	PV Benefit	PV cost	PV revenue
	Investasi	Operasional							
2013	1,020,000,000	763,000,000	1,783,000,000	915,125,000	-867,875,000	1.0000	-867,875,000	1,783,000,000	915,125,000
2014	35,000,000	1,121,015,000	1,156,015,000	1,342,757,813	186,742,813	0.8333	155,619,010	963,345,833	1,118,964,844
2015	49,000,000	1,277,168,900	1,326,168,900	1,702,013,569	375,844,669	0.6944	261,003,242	920,950,625	1,181,953,867
2016	56,000,000	1,428,442,666	1,484,442,666	1,940,983,602	456,540,936	0.5787	264,201,930	859,052,469	1,123,254,399
2017	70,000,000	1,531,256,813	1,601,256,813	2,117,244,508	515,987,696	0.4823	248,836,659	772,211,040	1,021,047,699
2018	70,000,000	1,647,225,676	1,717,225,676	3,104,557,107	1,387,331,431	0.4019	557,537,387	690,114,485	1,247,651,872
							619,323,229	5,988,674,453	6,607,997,681
								NPV =	619,323,229
								B/C =	1.103
								IRR =	47.85%
								Kesimpulan : sangat layak	

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TERIMA KASIH

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Way Laga Manure Calculations from Matt Reed July 2013

Ross,

From the information that you provided on the composition of fertilizer used and the manure test I have broken down the elements (e.g. nitrogen) into a unit value per Kg. This has enabled me to show the comparison between the two sources of fertiliser. The composted product increases soil organic matter, improves soil structure or tilth, increases the water-holding capacity of coarse-textured sandy soils, improves drainage in fine-textured clay soils, provides a source of slow release nutrients, reduces wind and water erosion, and promotes growth of earthworms and other beneficial soil organisms. The chemical fertilisers can have quite the opposite effect, depleting element availability, changing soil structure and killing beneficial soil organisms.

Some assumption had to be made on the type of chemical fertiliser to determine percentage of element in that product. However it is usually pretty standard across the range.

	Synthetic Fertiliser. Units per kg	Manure. Units per Kg
Nitrogen (N)	0.43	0.5
Phosphorous (P)	0.09	0.05
Magnesium (Mg)	0.20	0.08
Potassium (K)	0.5	0 .26

Please note the borate is not in the chart as it is not present in the manure. However Boron needs to be added yearly if required as it is not readily available and leaches out of the soil. It is important for regulating calcium, magnesium uptake and also regulating the sap pressure in the trees.

As can be seen from the table the units per kg of N, P, Mg and K available are lower than the chemical fertilisers in Mg, P, and K and similar in N.

From the information supplied 1089.6 kg of chemical fertiliser is applied per hectare per year, each cow produces 3000kg per year of fresh manure, each cow would be producing approximately between 1500kg and 2100kg of compost per year. If we assume each cow is producing 2000kg per year of compost which is conceivable due to the one month composting and moisture content due to climate. Two applications of 1000kg per hectare would indicate the presence of 1.0 unit per kg of Nitrogen, 0.10 units per kg of Phosphorous, 0.16 units per kg of Magnesium and 0.52 units per kg of Potassium. The compost at this rate on the data provided and the assumptions made would provide double the amount of N and similar amounts of P, Mg and K to the chemical fertiliser.

Points to note before placing a $ value on the compost.

1. We need to make the assumption that the soil is balanced and the calcium/magnesium ratio is correct. However if this is not the case as chemical fertilisers have been used the soil composition and amounts of elements available to the trees will vary considerably.
2. If the cal/mag ratio is incorrect the use of feedlot manure will cause sodium to accumulate on the surface. Calcium needs to be maintained at over 60%.
3. If potassium is above 7% in the soil it will start to cause problems by blocking the uptake of minerals. However 1 calcium unit will take of 2 potassium units so lime would be needed.

4. Within 3-5 years of just using manure the soil would need to be checked and corrective action taken e.g. lime.

All these points mentioned indicate the importance of the calcium/magnesium ratio and the need to factor in the use of lime in the $ value to enable the elements available to the trees to be fully utilised for either chemical fertilisers and or manure.

There are other elements in both products not accounted for e.g. manure; trace elements and calcium in the chemical fertilisers.

From the information provided we can ascertain an estimated $ value of the compost to match what is provided by the chemical fertiliser.

Chemical fertiliser @ 1089.6 kg per ha = $350

Manure @ 2000kg produced per year per cow and applied twice at 1000kg per ha = $350

Cost of boron = $15 per ha. Estimated price can be changed to actual if you know it.

Cost of lime which would be needed after 3 years and I would estimate immediately depending on soil test results; $ 85 per 1000kg.

Estimated $ value of Manure:

$350 - $15 (boron) = $335 (No lime application).

Lime @ 2000kg per ha (initial application) $ 335 - $170 = $160. Retest soils in 3 years.

In conclusion a straight comparison of products, the estimated $ value for the composted manure produced per cow per year would indicate a saving of $ 335 dollars per hectare per year for the facility with the addition of more available nitrogen and increased organic matter.

I would like to point out that I am not a soil scientist and the views and analysis are my own. I have obtained advice on the units per kg for the chemical fertiliser to enable a comparison. I have drawn on my own general knowledge and do not make any guarantees that the information provided is correct. Many assumptions have been made from the limited data provided.

Department of Primary Industry and Fisheries

Berrimah Veterinary Laboratories

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DELIVERY ADDRESS
29 Makagon Road
Berrimah NT 0828

20130210 FINAL Report Version: 1 Print Date: 18/03/2013

Accession number: 20130210 **Property/Location/Clinic details:** Coastal or overseas location.
BVL SAN: B46099 **Property Id Code (PIC):**
Animal Owner: Aust. Cattle Investigation in Indonesia
Date collected: 11/02/2013 **Date received:** 12/02/2013

Submitter: AUSTRALASIAN LIVESTOCK SERVICES
5 Neptuna Cres
Larrakeyah
NT 0811

Dr. Ross Ainsworth
Phone: 08 89812563
Fax: 08 89412755
Email: ainsworth.ross@gmail.com

Animal Type: CATTLE **Common name:** N/A
Breed: N/A **Scientific name:** N/A
Sex: **Age:** 0 **NLIS Tag**

Duty Pathologist for this case: Lorna Melville **Department Contact Officer:**
Reports To: Dr. Ross Ainsworth
Reports To:

Case History: 20130210

Inestigation in Australian Cattle in Indonesia. 114 Serum submitted.

Serology: 20130210

Specimen type: Serum
Number of specimens: 114

	Animal ID:	Results:	
BVD AGID			
	01	2	Positive
	05	2	Positive
	24	1	Positive
	27	1	Positive
	32	-	Negative
	33	1	Positive
	34	2	Positive
	36	1	Positive
	40	2	Positive
	46	2	Positive
	C01	2	Positive

18-Mar-2013

Serology: 20130210

Specimen type: Serum
Number of specimens: 114

Animal ID:	Results:
C05	2 Positive
C24	- Negative
C27	- Negative
C32	- Negative
C33	2 Positive
C34	? Indeterminate
C36	2 Positive
C40	2 Positive
C46	2 Positive

Brucella abortus CFT

01	Negative
02	Negative
04	Negative
05	Negative
06	Negative
07	Negative
08	Negative
09	Negative
10	Negative
11	Negative
12	Negative
13	Negative
14	Anticomplement
15	Negative
16	Negative
17	Negative
18	Negative
19	Negative
20	Negative
21	Negative
22	Negative
23	Negative
24	Negative
25	Negative
26	Negative
27	Negative
28	Negative
29	Negative
30	Negative
32	Negative
33	Negative
34	Negative
35	Negative
36	Negative
37	Negative
38	Negative
39	Negative
40	Negative
41	Negative
42	Negative
43	Negative
44	Negative
45	Negative
46	Negative
47	Negative
48	Negative
49	Negative
50	Negative

Serology: 20130210

Specimen type: Serum
Number of specimens: 114

Animal ID:	Results:
51	Negative
52	Negative
C01	Negative
C02	Negative
C04	Negative
C05	Negative
C06	Negative
C07	Negative
C08	Negative
C09	Negative
C10	Negative
C11	Negative
C12	Negative
C13	Negative
C14	Negative
C15	Negative
C16	Negative
C17	Negative
C18	Negative
C19	Negative
C20	Negative
C21	Negative
C22	Negative
C23	Negative
C24	Negative
C25	Negative
C26	Negative
C27	Negative
C28	Negative
C29	Negative
C30	Negative
C32	Negative
C33	Negative
C34	Negative
C35	Negative
C36	Negative
C37	Negative
C38	Negative
C39	Negative
C40	Negative
C41	Negative
C42	Negative
C43	Negative
C44	Negative
C45	Negative
C46	Negative
C47	Negative
C48	Negative
C49	Negative
C50	Negative
C51	Negative
C52	Negative
2122	Negative
C2155	Negative
C2163	Negative
C2173	Negative
C2242	Negative
C2270	Negative
C2353	Negative

Serology: 20130210

Specimen type: Serum
Number of specimens: 114

Animal ID:	Results:
C8154	Negative
C8277	Negative
C8288	Negative
C9259	Negative
B2119	Negative
B2123	Negative
B2120	Negative

* ***Lepto hardjo MAT***

01	<50 Negative
05	<50 Negative
24	50 Negative
27	<50 Negative
32	50 Negative
33	<50 Negative
34	50 Negative
36	<50 Negative
40	400 Positive
46	200 Equivocal
C01	<50 Negative
C05	<50 Negative
C24	<50 Negative
C27	<50 Negative
C32	<50 Negative
C33	<50 Negative
C34	<50 Negative
C36	<50 Negative
C40	100 Negative
C46	100 Negative

* ***Lepto pomona MAT***

01	<50 Negative
05	<50 Negative
24	<50 Negative
27	<50 Negative
32	<50 Negative
33	<50 Negative
34	<50 Negative
36	<50 Negative
40	50 Negative
46	<50 Negative
C01	<50 Negative
C05	<50 Negative
C24	<50 Negative
C27	<50 Negative
C32	<50 Negative
C33	<50 Negative
C34	<50 Negative
C36	<50 Negative
C40	<50 Negative
C46	<50 Negative

* ***Lepto tarassovi MAT***

01	400 Positive
05	50 Negative
24	100 Negative
27	<50 Negative
32	<50 Negative
33	<50 Negative

Serology: 20130210

Specimen type: Serum
Number of specimens: 114

Animal ID:	Results:
34	100 Negative
36	100 Negative
40	50 Negative
46	<50 Negative
C01	400 Positive
C05	<50 Negative
C24	50 Negative
C27	<50 Negative
C32	<50 Negative
C33	<50 Negative
C34	<50 Negative
C36	50 Negative
C40	<50 Negative
C46	<50 Negative

* ***Lepto topaz MAT***

01	800 Positive
05	400 Positive
24	400 Positive
27	<50 Negative
32	50 Negative
33	100 Negative
34	200 Equivocal
36	400 Positive
40	400 Positive
46	50 Negative
C01	1600 Positive
C05	100 Negative
C24	400 Positive
C27	<50 Negative
C32	50 Negative
C33	100 Negative
C34	400 Positive
C36	400 Positive
C40	200 Equivocal
C46	<50 Negative

Section Comments:

The Microscopic Agglutination Test (MAT) for leptospiral antibodies was performed at the WHO/FAO/OIE Collaborating Centre for Reference and Research on Leptospirosis - Australia and Western Pacific Region, Brisbane, QLD.

Interpretation of results in consultation with the staff at the reference laboratory: MAT titres less than 400 should be regarded as equivocal/suspect. Titres of 1600 or 3200 are highly suggestive of recent or active infection.

Results from a second sampling, if submitted, could provide data if the titres are rising or falling and provide more information on the status of infection.

Leptospira weilii serovar Topaz was first isolated from the urine of a bovine, at Far North Queensland, in 1994. A recent unpublished study examining leptospirosis in Macropods (kangaroos), found that a significant proportion of the study animals had serological titres that would indicate exposure to *L. weilii* sv. Topaz. This serovar may also produce a serological cross-reaction with members of the Tarassovi serogroup.

Further studies are required to determine what are the carriage rates and the level of disease by this serovar in Australian animal herds and wildlife. It is also unknown whether cattle that have been exposed could pose a human health risk.

Reference: Andrew T Slack *et al*.: Epidemiology of *Leptospira weilii* serovar Topaz infections in Australia. Communicable Diseases Intelligence, 2007; 31:216-222.

Dr Lorna Melville - Veterinary Pathologist

18/03/2013

Berrimah Veterinary Laboratories ***MATS***

Date Tested: 12 March 2013 Lab Ref: 13L 0064

Animal	***Spec No***	***Pomona***	***Hardjo***	***Tarassovi***	***Topaz***
Case no. 20130210					
Bovine ex Indonesia	01	<50	<50	**400**	**800**
B46099	05	<50	<50	**50**	**400**
	24	<50	**50**	**100**	**400**
	27	<50	<50	<50	<50
	32	<50	**50**	<50	**50**
	33	<50	<50	<50	**100**
	34	<50	**50**	**100**	**200**
	36	<50	<50	**100**	**400**
	40	**50**	**400**	**50**	**400**
	46	<50	**200**	<50	**50**
	C01			**400**	**1600**
	C05	<50	<50	<50	**100**
	C24	<50	<50	**50**	**400**
	C27	<50	<50	<50	<50
	C32	<50	<50	<50	**50**
	C33	<50	<50	<50	**100**
	C34	<50	<50	<50	**400**
	C36	<50	<50	**50**	**400**
	C40	<50	**100**	<50	**200**
	C46	<50	**100**	<50	<50

Samples were tested against the laboratory's routine Bovine MAT panel starting at a dilution of 1:50

Results emailed to: BVL@nt.gov.au
Berrimah Veterinary Laboratories
Department of Resources
GPO Box 3000
Darwin, NT 0801
08-8999 2024

NO	NAME	POSITION/INSTITUTION	TANDA TANGAN
1	Dr Denni Puspa Purbasari	SETWAPRES	
2	Memed Wiramihardja	Dir. Perencanaan dan Pengembangan Usaha	
3	Dadi Sunardi / Sai Hermawan	PTP N VIII	
4	Bpk. Kusumo Diwyanto	Puslitbang Peternakan	
5	Bpk. Eko Handiwirawan	Puslitbang Peternakan	
6	Rian Alisjahbana		
7	Bpk. Subhan Bila Adam	PT Bio Nusantara Teknologi	
8	Gihon	PTPN VI	
9	BUTTURAJA MANIHURUK	PTPN V	
10	Bapak Riwanto	PTPN VI	
11	Ibu Reni Devita	PTPN I	
12	Bpk. Ir. Yudi Guntara Noor	Ketua ISPI	
13	Satia Pratiwi	PT Bio Nusantara Teknologi	
14	M. Sulton	PT. Berdikari (Persero)	
15	~~Randi purnama~~ ALVIN P	PT. Berdikari (Persero)	
16	~~Soerya Sungkara~~	PT. Berdikari (Persero)	
17	Dwi Hartanto	PT. Citra Borneo Indah (CBI)	
18	dr. Harahad	PT. Citra Borneo Indah (CBI)	
19	Amir Purba	Pusat Penelitian Kelapa Sawit	
20	Ir. Sumar	Manajer Tim (RKO) PTPN IV	
21	Djoko Josef	Head Office PT Sampoerna Strategic	
22	Bambang Budianto	Sumatera 1 Region PT Sampoerna Strategic	
23	Harry Susanto	Kalimantan Region PT Sampoerna Strategic	
24	V Susilo Sugiarto	RH Corporate Affair PT Sampoerna Strategic	
25	Parluhutan Sitohang	PT Sampoerna Strategic	
26	Bpk. Yayat Adi Saputra	Direnbang PTPN VIII	
27	Irawadi Purwadi		
28	Budi Hakiman		

27	Bpk. Berlina Mahendra Santosa	PTPN V	
28	Bpk. Robi Agustiar	PB ISPI	
29	Bpk. Giri	PT. RNI	
30	Miranti	PT. RNI	
31	Andalusia / TK. SIAHAAN	PT. RNI	
32	Harris Lubis	PT. RNI	
33	Bpk. Benni	PUSKUD Kupang	
34	Nurhidayat	PTPN III	
35	Junaidi	PTPN III	
36	Ahmad Nasulian Arifin	Direktur Renbang	
37	Musahar	Manager Sawit Sapi	
38	Faisal Firmansyah Kurniawan	Asisten Pemeliharaan ternak Sapi	
39	Drh. Pranyata Tangguh Waskita	PT. PAECO AGUNG	
40	Bpk. H. Eddy Yusuf	PT. PAECO AGUNG	
41	Bpk. Idham K.SE	PT. PAECO AGUNG	
42	Darma	Astra Agro Lestari	
43	Adisty	Astra Agro Lestari	
44	Bpk M.Khoiri	Astra Agro Lestari	
45	Bpk Trisunu Hartono	Astra Agro Lestari	
46	Gloria Guida Manalu	HPI - Agro	
47	Dian Astari	HPI - Agro	
48	Fauzi Yusuf	Dirut PTPN V	
49	dr. Ross Ainsworth	PT. AGRO GIRI PERKASA	
50	Bpk. Greg Phankurst	PT. AGRO GIRI PERKASA	
51	Bpk. Dicky Adiwoso	PT. AGRO GIRI PERKASA	
52	dr. Nenny	JUANG JAYA ABDI ALAM	
53	Bpk. Catur	JUANG JAYA ABDI ALAM	

54 Tuciani Indah Gemilang Perkasa
55. I Gede Putu
56. Sonny Mernadi Indah Gemilang Perkasa

54	Toni	JUANG JAYA ABDI ALAM	
55	Bpk. Nyoman	JUANG JAYA ABDI ALAM	
56	~~Dick Slaney~~ JASON HATCHETT	PT. Elders	
57	Cameron McDonald	MLA	
58	Peter Watkins		
59	Malcolm Harris		
60	Malcolm Harris' dad		
61	Bruce Wallner		
62	Mick Sheey		
63	Sterling Buntine		
64	Jammie McLeod		
65	ACIAR		
66	Selvieana Aprilia	AMAN JAYA PERDANA	
67	Aman	AMAN JAYA PERDANA	
68	Ronald Wijaya	AMAN JAYA PERDANA	
69	Josephine	AMAN JAYA PERDANA	
70	Gina Zerliana	AMAN JAYA PERDANA	
71	Didik Prasetyo	Kementrian BUMN	
72	Edy Widjaya	Kementrian BUMN	
73	Giki Argadiraksa	PT. JJAA	
74	William El Bulo	PT. AGP	
75	Antonius Tandanau	PT. Tunas Baru Lampung	
76	Dwi ~~Tmi~~ Atmi Sri Pertiwi	Vettindo	
77	Febrian Santoso	PT. Gentala	
78	Riri Deasy	PT. AGP	
79	Edwin Lubis	Kementrian BUMN	
80	Edwin Lubis	Kementrian BUMN	

Raymond
Wemvi
Robi

81	Edwin Lubis	Kementrian BUMN	
82	Michael Brag		
83	Donald Nuske		
84	Iqlana Nurhaida		
85	Jisnu Adiwoso		
86	Rochadi		
87	drh. Putut		
88	Ewin nasution	PTPN IV	
89	Anastalis Hari Christyanto	AMAN JAYA PERDANA	
90	Wayan Maulana	AMAN JAYA PERDANA	
91	Amru Muhlisin	Asosiasi SMD Lampung	
92	Nurma Yudha	Asosiasi SMD Lampung	
93	Oktavia Sari	Asosiasi SMD Lampung	
94	M. Judiman Girsang	Asosiasi SMD Lampung	
95	Y. Sudaryanto	Asosiasi SMD Lampung	
96	NN	Asosiasi SMD Lampung	
97	NN	Asosiasi SMD Lampung	
98	Ir. Tantan Roswana	PTPN VII	
99	Ir. Y. Hadi Nugroho	PTPN VII	
100	Agus Budi Tjahjono	Pasific Satelit Nusantara	
101	Jan Purdy Rajagukguk	PTPN XIII	

102 Wayan

103 Gloria Manalu HPI

104 Dian Astari HPI

105. Guntur Wirawan

106. Adrian

Seminar Way Laga Projek Integrasi Sapi Sawit

Way Laga Cattle and Palm Integration Project Seminar Exit Poll
13 March 2013
Hotel Sheraton
Bandar Lampung, Indonesia

1. ***Apakah seminar presentasi dan kunjungan lapangan projek peternakan sapi di kebun sawit mendorong anda untuk melakukan penelitian lebih lanjut?*** Did the seminar presentation/field visit encourage you to further investigate breeding cattle projects in palm plantations?

    a. ***Ya***/ Yes
    b. ***Tidak***/ No
    c. ***Belum Yakin***/ not sure

2. ***Pertanyaan apa yang belum terjawab?*** Do you have any remaining questions that weren't answered?

3. ***Apa komentar anda mengenai seminar projek ini?*** Any general comments?