

**ECONOMIC MODELLING OF THE REPORT ON THE  
CONCEPT OF LARGE SCALE MILK PRODUCTION ON THE  
BASSENDEAN SANDS  
IN HARVEY/WAROONA SHIRES**

**(Part Two of a Two Part Series on the Production and  
Economics of Large Scale Milk Production on the Bassendean  
Sands)**

**For DEPARTMENT OF AGRICULTURE AND FOOD,  
WESTERN AUSTRALIA**

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PCS has prepared this report for the use of DAFWA in accordance with the usual care and thoroughness of the consulting profession. It is based on generally accepted practices and standards at the time it was prepared. It is prepared in accordance with the above scope of work.

This report was prepared in February 2008 and is based on the conditions and information reviewed at the time. Budget pricing and costings, however, reflect longer-term trends within the industry.

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## 1. SCOPE OF WORK

The Department of Agriculture and Food, Western Australia (DAFWA) engaged Primary Consulting Services Pty Ltd (PCS) to:

Develop 1 or 2 dairy farm models that may be able to operate in the Bassendean sands region detailing:

- approximate land area required for (a) pasture production system and (b) milk production system;
- capital costing;
- budgeted returns;
- assumptions;
- critical success factors that require further investigation/clarification.

PCS reported to Dr Brad Plunkett, A/Project Manager, Agri-Industry Opportunities.

This is the second part of a two part series on dairy production on the Bassendean sands. Part one of this series deals with the production system concept modelled in this report.

## 2. EXECUTIVE SUMMARY

The Bassendean sands region is attractive for future dairy development given its proximity to the existing dairying regions of Waroona, Harvey and Brunswick, its favourable climatic conditions and traditionally lower land values.

Our analysis found that return on capital invested is, however, reduced by the inherent low fertility and low water-holding capacity of the land. These characteristics result in (a) higher operating costs (fertiliser and irrigation) than on other soil types and (b) higher capital costs in land area and water required (irrigation rate/ha and frequency of irrigation) to achieve pasture production.

Return on capital for a 400-cow dairy located on a 200-ha property with 80 ha of irrigated pastures at the current milk price of 45¢/L:

Landowner	2.90%	]	Assuming a 50:50 Sharemilking (SM) agreement
Sharemilker	27.00%	]	
or owner/operator	5.22%		

Return on capital for a 1000-cow dairy located on a 400-ha property with 200 ha of irrigated pastures at a milk price of 45¢/L:

Landowner	5.05%	]	Assuming a 50:50 SM agreement
Sharemilker	44.16%	]	
or owner/operator	9.35%		

It is only with the economies of scale achieved at the 1000-cow herd that return on capital (ROC) would support investment in the current economic climate—and then probably only for an owner/operator. However, sensitivity analyses showed substantially higher returns with milk prices at 55–60¢/L which may alter investment decisions for both models.

While it was concluded that access to irrigation water and three-phase power deserves further research to potentially reduce capital costs, the greatest gain in attracting investment into milk supply in this area (and others) may come from innovative ownership structures that separate land, dairy development and dairy operations among different entities with different ROC expectations.

*For example:* An existing landowner achieving little or no return from running beef on a farm may welcome a return of \$100–250/ha from leasing the farm to a dairy development company. Without the capital cost of the land, the development company could then achieve say 17–23 per cent return on capital development funds amortised over a 20-year lease period. Further, the dairy developer may then divide his or her return with a sharemilker, thus transferring the obligations of day-to-day farm management plus a portion of the capital cost.

The major milk processors in WA are short on milk supply and worsening conditions are forecast. A strategic position to guarantee supply into the future through a passive investment in the milk supply chain should be attractive, even if financial returns just covered the cost of funds.

### 3. MILK PRODUCTION MODELS

Sustainable milk production models are determined by a matrix of factors such as feed production systems, milk harvesting techniques, labour availability, management expertise on-farm, and milk prices, input costs, climate and a range of other off-farm factors.

The number of milking cows, cow breed/type and calving pattern become the most critical decisions flowing from the above on- and off-farm factors.

#### 1000 cow model

Attributes:

- sufficient scale to attract corporate investors
- economies of scale reduces farm operating costs (FOC)
- 7 million litre output gains milk price premiums
- can be achieved on a 400-ha 'milking platform'
- high farm labour efficiency—5 full-time equivalent (FTE) requirement
- high milking efficiency—3 persons/milking
- suits 60-stand rotary dairy—low capital cost
- suits irrigated perennial pasture system—low cost of production.

#### 400 cow model

Attributes:

- scale is attractive to existing farming families within the region
- some economies of scale reducing FOC
- 2.8 million litre output gains mid-range milk price premiums
- can be achieved on a 200-ha 'milking platform'
- family + 1 employee—3 FTE requirement
- high milking efficiency—1 to 2 persons/milking
- suits 20 aside h/b dairy—low capital cost
- suits irrigated perennial pasture system—low cost of production.

Financial forecasts for both of these models have been presented on the basis of a land owner with a 50:50 sharemilker operating the farm. Income and costs are split in line with the standard agreements common in New Zealand (NZ), Victoria and Tasmania. The advantage to this structure is that it opens farm ownership to individuals, families or corporates without the obligation of day-to-day farm management. It also allows young dairy farmers with limited capital to commence their own farming enterprise without the burden/detraction of having to find the capital cost of the farm and improvements.

Under a profit-sharing arrangement, both parties stand to benefit from the other's input—that is, the owner's capital and development and the sharemilker's management expertise and daily efforts.

The division of capital, effort, costs and income under a 50:50 sharemilking agreement is detailed below. Note that financial forecasts also show the total income/costs which reflects the more common owner/operator system.

**Table 1** The 50:50 sharemilking system

	<b>Landowners</b>	<b>Sharemilkers</b>
Supply land and improvements	100%	
Supply livestock		100%
Supply labour		100%
Milk income	50%	50%
Cattle sales		100%
Other farm income	100% (if derived from land)	100% (if from labour/cattle/machinery)
Fertiliser	All fertiliser less 50% N	50% N and spread
Seed	100%	Reseeding
Grain	50%	50%
Hay/silage	50%	50%
Fuel and oil		100\$
Irrigation power		100%
Sprays	100%	Spraying
Fodder conservation		100%
Dairy repairs	100%	
Dairy power and consumables		100%
Herd costs		100%
Labour costs		100%
Repairs and maintenance	100%	Supply labour
Rates	100%	
Insurance	Improvements and public liability	Stock, equipment, workers, pub. liab.
Telephone/electricity/gas		100%
Professional services	Own	Own

## 4. MILK PRODUCTION SYSTEMS

Western Australian milk prices essentially reflect global milk prices plus a premium or minus a discount for domestic supply/demand imbalances. These domestic influences have created a summer (Jan–May) premium milk price that is 80–100 per cent higher than winter (June–December) prices.

The global nature of the milk market means that the Western Australian dairy industry must be internationally competitive with its cost of production on a cents per litre basis or more importantly on a \$/kg milk solids (\$/kg ms) basis. As the greatest proportion of cost of production (COP) is represented by feed costs, the farmer must strive to reduce feed costs through:

- sourcing the lowest cost feed;
- ensuring feed quality meets cow requirements;
- maximising feed conversion to kg ms efficiency;
- keeping the feeding system simple so as not to introduce further costs such as extra labour and machinery.

The farmers' main feed alternatives are:

- annual pasture—low cost at \$60–90/t dry matter (dm) but reliant on seasonal conditions and only available May–November;
- irrigated perennial pasture—\$90–100/t dm, far less reliant on seasonal conditions and still harvested by the cows;
- conserved feeds—hay at \$120/t dm, pasture silage \$140–160/t dm requiring feed-out equipment and extra labour;
- fodder crops—variable results, costs at \$140–180/t dm and higher feed-out costs;
- grain—high cost and rising at \$350–450/t dm. Useful in balancing energy and protein requirements in the cow but can create digestive challenges when fed at high rates.

The domestic premiums for summer milk reflect the processors' shortage of milk supply in the January–May period. These incentives are aimed at overcoming the additional costs of milk production outside of the traditional rainfed annual pasture season.

The combination of the above factors supports a milk production system based upon:

- irrigated perennial pastures supplying 80–100 kg dm/ha/day in spring–summer and from 10–40 kg dm/ha/day in autumn–winter;
- rainfed annual pastures supplying 30–50 kg in winter and 100 kg dm/ha/day in spring;
- seventy-five per cent of the herd calving in September–November so that perennial pasture production matches the herd's feed demand **and** that most of the lactation is within the premium milk price months of January–May. Dry off is May with cows removed from the farm before trafficability and feed issues arise;
- twenty-five per cent of the herd calving in February–March to again make the most of high milk prices and perennial pastures, and with a relatively low number to milk through winter. This also allows for a second herd for cows not making the 365-day calving interval in the spring calving herd. Western Australian cows have not been selected for this trait and culling percentages would otherwise be high;

- grain is fed to increase milk production in early-mid lactation while under premium pricing but is not a year round input;
- grazing spring calvers off farm for 8–10 weeks in winter and contract rearing of heifers reduces the total land area required and hence the total capital requirement. This also reduces the workload on farmer/sharemilkers allowing them to concentrate on milk production rather than other distracting activities.

The large-scale dairies established in WA over the past seven years have all followed the principles detailed above with some variance in individual implementation.

## LAND AREA REQUIREMENTS

### 1000 cow model

Assuming a stocking rate of 5 cows/ha on irrigated perennial pastures in summer, the peak herd of 1000 cows would require 200 ha. Fenced into 4-ha paddocks this would provide a 25-day grazing rotation for 2 x 500 cow herds (three-leaf stage). Heifers and young stock are used to maintain residuals at say 5 cm.

The most efficient and reliable irrigation system is centre pivot irrigators as discussed later in this study. Forty-hectare centre pivots are a workable size. At 355 m radius, they can provide 10 x 4 ha paddocks accessed by one central laneway. Larger machines, at greater 80 ha (500 m diameter) and greater, have lower capital costs, but higher operating costs. They also have less uniformity due to the speed of the outer towers. Machines that are smaller than 40 ha increase capital cost per hectare dramatically.

Allowing for 5 x 40-ha centre pivot sites generally requires a total farm size of 400 ha or greater, given the usual topographical challenges. A 400-ha farm also matches winter feed requirements using both perennial and annual pastures.

A rectangular 400-ha lot with a width of 1.2–1.4 km is ideal.

It is very important that the dairy be centrally located on a farm of this size to minimise walking distance for the milkers. Laneway design and construction is critical.

### 400 cow model

Again assuming a stocking rate of 5 cows/ha on irrigated perennial pastures in summer, the peak herd of 400 cows would require 80 ha. Fenced into 3-ha paddocks this would provide a 27-day grazing rotation for the herd (three-leaf stage). Heifers and young stock are used to maintain residuals at say 5 cm.

Two 40-hectare centre-pivot sites would generally be recommended for the same reasons as the 1000-cow system. Again, similar planning suggests a total farm size around 200 ha. A 200-ha farm also matches winter feed requirements using both perennial and annual pastures.

A rectangular or square 200-ha lot is preferred.

It is very important that the dairy be centrally located between the two centre-pivot sites to minimise walking distance for the milkers. Again, laneway design and construction is critical.

## PASTURE PRODUCTION AND USE

Pasture production is limited by the infertile soils of the Bassendean sands and their low water-holding capacity.

In Part 1 of this study, it was calculated that the following pasture production and use rates could be achieved with best practice management, pasture species and cultivars currently available, and assuming average climatic conditions.

Pasture	Annual production	Utilisation
Perennial ryegrass and clover sprinkler irrigated	17 t dm/ha	85%
Annual ryegrass and subclover/ <i>balansa</i>	5 t dm/ha	75%

Perennial pastures would be grazed at three-leaf stage then fertilised with a compound fertiliser like CSBP's Grazeburst delivering around 5.5 kg P, 40 kg N, 9 S and 11 K per hectare. Grazing rotation in spring–summer is 24–28 days and in winter 40–50 days. A spring and autumn top-up of additional P and K would also be required to boost clover growth.

Annual pastures would be *balansa* dominant in wet swampy areas receiving spring and autumn P and K dressings (1:1 and 4:1) with ryegrass dominant sandy paddocks top-dressed with compound fertilisers (Grazeburst and Autumnburst). Spring surpluses could be conserved but this has not been relied upon in budget forecasts.

Use of perennials should be higher due to a longer, flatter growth curve and stability of herd numbers through the spring–summer.

Hay is purchased to top up feed availability in late summer, autumn and winter when pasture production will be inadequate.

## DAIRY HERD COMPOSITION

Western Australian dairy farmers have long favoured Holstein Friesian genetics, specifically the large cow types from Canada and North America, for their milk production volumes and ability to produce bull calves suited to growing out in related beef enterprises.

However, while these animals are well suited to feedlot type enterprises, their high feed requirements for maintenance and movement due to +650 kg liveweights and only average grazing abilities make them only mediocre converters of pasture to milk solids in a grazing-based system. With milk prices now based on milk solids produced and not on litres, milk composition—particularly milk protein percentage and conversion rates—are all-important.

Jersey and JxFr crosses, popular in New Zealand for their high feed-to-milk conversion rates, are becoming accepted into WA dairying in limited numbers. The negatives are almost valueless Jersey-cross bull calves and low value cull cows, both important factors to milk producers who run beef enterprises in conjunction with the dairy.

For both models we have therefore arbitrarily adopted a Friesian herd which has been mated to NZ Holsteins to reduce size and body weight to say 550 kg while still producing black and white calves.

Given that most WA herds have been year-round calving and are just now converting to batch calving, it may take three to four years to achieve fully seasonal spring-autumn calving patterns in the model herd.

## 5. CAPITAL COSTING

**1000 cow model** A detailed capital costing is provided in Appendix 1.

This model assumes a 400-ha bare farm developed with all necessary infrastructure including dairy, houses and irrigation but with three-phase power and a Harvey Water outlet close to the farm-gate.

Item	Description	Cost
Farm purchase	400-ha lot or combination of lots purchased at \$12 400/ha (\$5000/ac) as cleared and pastured but essentially bare land. Associated costs of stamp duty, settlement and other fees are added	\$5 302 500
Earthworks	Road works, dairy pad, drainage and levelling, laneways	\$550 000
Paddock preparation	Fencing along laneways, paddocks of 4 ha, stock water to all paddocks, initial capital dressing of 2.5 t/ha lime, fertiliser and reseeding	\$422 000
Dairy	60-stand rotary shed on flat floor with 500 cow yards, floodwash, mid-range milking machine, platform and 30 000 litre vat. Basic feed system suited to pellets or mash	\$1 165 000
Houses	Owner residence and 2 worker houses included at \$175 000 each	\$525 000
Power	Allow \$100 000 to reticulate 3-phase power to dairy—highly variable	\$100 000
Irrigation	5 x 40 ha CPs @ \$105 000 each Mainlines and power to CPs Assumed Harvey Water available but reticulation cost to farm may be significant. 2000 ML water entitlement from Harvey Water @ \$1000 ML	\$2 937 500
Project management and contingency	Contingency fund to \$500 000 allowed with project manager's fee included	\$500 000
Initial working capital	Highly dependent upon time of year at start-up and initial herd numbers o/h	\$250 000
<b>Subtotal</b>	<b>Owners cost if developed upon 50:50 sharemilking agreement</b>	<b>\$11 752 000</b>
Cattle	Assume initial purchase 1000 cows @ \$1000/hd	\$1 000 000
Machinery	General farm equipment – highly variable and dependent upon operator	\$452 000
<b>Total</b>	<b>Owner + sharemilker or owner/operator</b>	<b>\$13 204 000</b>

Development costs at \$16 123/ha are slightly greater than land acquisition costs of \$13 256/ha in this region.

Overall capital cost efficiency is benchmarked on \$/kg ms produced at full stocking. Assuming an annual production of 497 000 kg ms, capital cost to the land owner is \$23.65/kg ms or to owner + sharemilker \$26.57/kg ms.

These figures are competitive with NZ establishment costs which now generally exceed \$40/kg and range as high as \$60/kg ms. Added to this the NZ farmer must purchase one share in Fonterra for every 1.0 kg ms to be delivered. Fonterra shares have risen to \$6.80 per share since the fair value system was introduced, adding a further \$3.37 million to the NZ capital cost.

400 cow model      A detailed capital costing is provided in Appendix 2.

This model assumes a 200-ha bare farm developed with all necessary infrastructure including dairy, houses and irrigation but with three-phase power and a Harvey Water outlet close to the farm-gate.

Item	Description	Cost
Farm purchase	200-ha lot or combination of lots purchased at \$14 826/ha (\$6000/acre) as cleared and pastured but essentially bare land. Associated costs of stamp duty, settlement and other fees are added	\$3 179 000
Earthworks	Road works, dairy pad, drainage and levelling, laneways	\$280 000
Paddock preparation	Fencing along laneways, paddocks of 3 ha, stock water to all paddocks, initial capital dressing of 2.5 t/ha lime, fertiliser and reseedling	\$221 000
Dairy	20-aside 90-degree doubled-up dairy with cup removers, 400 cow yard, floodwash, mid-range milking machine and 15 000 litre vat. Basic feed system suited to pellets or mash	\$848 500
Houses	Owner residence and 1 worker house included at \$175 000 each	\$350 000
Power	Allow \$100 000 to reticulate 3-phase power to dairy – highly variable	\$100 000
Irrigation	2 x 40 ha CPs @ \$105 000 each Mainlines and power to CPs Assumed Harvey Water available but reticulation cost to farm may be significant. 800 ML water entitlement from Harvey Water @ \$1000 ML	\$1 245 000
Project management and contingency	Contingency fund to \$275 000 allowed with project manager's fee included	\$275 000
Initial working capital	Highly dependent upon time of year at start-up and initial herd numbers o/h	\$150 000
<b>Subtotal</b>	<b>Owners cost if developed upon 50:50 sharemilking agreement</b>	<b>\$6 648 500</b>
Cattle	Assume initial purchase 400 cows @ \$1000/hd	\$400 000
Machinery	General farm equipment – highly variable and dependent upon operator	\$307 000
<b>Total</b>	<b>Owner + sharemilker or owner/operator</b>	<b>\$7 355 500</b>

Development costs at \$17 347/ha are slightly greater than land acquisition costs of \$15 895/ha in this region. Land prices are higher than the 1000-cow model given smaller lot sizes and increased competition from other buyers.

Overall capital cost efficiency is benchmarked on \$/kg ms produced at full stocking.

Assuming an annual production of 198 800 kg ms, capital cost to the land owner is \$33.44/kg ms or to owner + sharemilker \$37/kg ms.

While these figures are still competitive with NZ establishment costs they highlight the capital cost efficiencies gained in the 1000 cow model.

**Overall, we believe that both models offer investors an internationally competitive cost of establishment when benchmarked against a large milk exporting nation such as New Zealand.**

While Fonterra is now attempting to establish milk production at lower than WA capital costs, it is being forced into third-world countries where a range of issues are arising. As John Young, past chairman of Kiwi Dairies, once said of his research on overseas expansion:

*If you can't drink the water, can't speak the language and can't trust the government, perhaps you just shouldn't be producing milk there ...*

(John Young now heads the largest milk producing group in WA after rationalising his NZ farming interests.)

## 6. FARM AND FINANCIAL FORECASTS

### 1000 cow model

A detailed farm operating budget provided in Appendix 3 includes supporting tables showing herd dynamics, milk production, feed calculator, fertiliser schedule and a machinery (depreciation) schedule.

Item	Owner	Sharemilker	Total	¢/L	\$/kg ms
Milk sales 1000 cows @ 7000 L/cow @ 45¢/L	\$1 575 000	\$1 575 000	\$3 150 000	45.00	6.34
Cattle sales		\$211 175	\$211 175	3.02	0.42
<b>Total income</b>	<b>\$1 575 000</b>	<b>\$1 786 175</b>	<b>\$3 361 175</b>	<b>48.02</b>	<b>6.76</b>
Feed expenses	\$811 870	\$669 297	\$1 481 167	21.16	2.98
Shed expenses	\$10 000	\$50 000	\$60 000	0.86	0.12
Herd expenses		\$75 000	\$75 000	1.07	0.15
Fixed expenses	\$69 000	\$304 012	\$373 012	5.33	1.29
<b>Farm operating costs</b>	<b>\$890 870</b>	<b>\$1 098 309</b>	<b>\$1 989 179</b>	<b>28.42</b>	<b>4.00</b>
<b>Operating surplus</b>	<b>\$684 130</b>	<b>\$687 866</b>	<b>\$1 371 996</b>	<b>19.6</b>	<b>2.76</b>
Depreciation	\$90 667	\$44 700	\$135 367	1.93	0.27
<b>Total costs</b>	<b>\$982 037</b>	<b>\$1 143 509</b>	<b>\$2 125 546</b>	<b>30.36</b>	<b>4.28</b>
<b>EBIT + drawings</b>	<b>\$592 963</b>	<b>\$642 666</b>	<b>\$1 235 629</b>	<b>17.46</b>	<b>2.49</b>
<b>ROC</b>	<b>5.05%</b>	<b>44.16%</b>	<b>9.35%</b>		

The model generates a FOC that is 59.1 per cent of farm income. FOC below 60 per cent is considered to reflect good farm efficiency.

The split of costs between owner and sharemilker is 45/55 whereas the NZ model aims at a 40/60 split. Higher fertiliser inputs appear to load the owner's costs and some re-evaluation on cost-sharing may be necessary.

ROC to the owner is marginal in this model at 5.05 per cent although the upward pressure on milk prices may increase returns over the next two to three years.

ROC to the sharemilker is acceptable, even if reduced marginally by renegotiation of the cost split-up with the owner.

ROC at 9.36 per cent to an owner/operator is considered attractive. However, the opportunity to gear the enterprise with borrowed capital will be limited with current interest rates between 9.0 per cent and 9.5 per cent for a five-year fixed term.

Note that additional capital costs to gain power or water may reduce ROC. Every additional \$500 000 capital cost reduces ROC by 0.5 per cent. (ROC calculated before interest and tax.)

## 400 cow model

A detailed farm operating budget provided in Appendix 4 includes supporting tables showing herd dynamics, milk production, feed calculator, fertiliser schedule and machinery (depreciation) schedule.

Item	Owner	Sharemilker	Total	¢/L	\$/kg ms
Milk sales 400 cows @ 7000 L/cow @ 45¢/L	\$630 000	\$630 000	\$1 260 000	45.00	6.34
Cattle sales		\$84 275	\$84 275	3.01	0.42
<b>Total income</b>	<b>\$630 000</b>	<b>\$714 275</b>	<b>\$1 344 275</b>	<b>48.01</b>	<b>6.76</b>
Feed expenses	\$334 417	\$316 273	\$650 689	23.24	3.27
Shed expenses	\$6 000	\$23 600	\$29 600	1.06	0.15
Herd expenses		\$30 000	\$30 000	1.07	0.15
Fixed expenses	\$36 000	\$123 268	\$159 268	5.69	0.80
<b>Farm operating costs</b>	<b>\$376 417</b>	<b>\$493 141</b>	<b>\$869 557</b>	<b>31.06</b>	<b>4.37</b>
<b>Operating surplus</b>	<b>\$253 583</b>	<b>\$221 134</b>	<b>\$474 718</b>	<b>16.95</b>	<b>2.39</b>
Depreciation	\$60 008	\$28 233	\$88 242	3.15	0.44
<b>Total costs</b>	<b>\$436 925</b>	<b>\$521 874</b>	<b>\$958 799</b>	<b>34.24</b>	<b>4.82</b>
<b>EBIT + drawings</b>	<b>\$193 075</b>	<b>\$192 401</b>	<b>\$385 476</b>	<b>13.77</b>	<b>1.94</b>
<b>ROC</b>	<b>2.90%</b>	<b>27.00%</b>	<b>5.22%</b>		

The model generates a FOC that is 64.7 per cent of farm income. FOC is above the larger farm model and lacks the economies of scale generated with greater herd numbers.

The split of costs between the owner and sharemilker is 43/57 whereas the NZ model aims at a 40/60 split—slightly more balanced than the larger model but again higher fertiliser inputs appear to load the owner's costs and some re-evaluation on cost-sharing may be necessary.

ROC to the owner is poor in this model at 2.90 per cent.

ROC to the sharemilker is also short of the traditional 30 per cent generally sought.

ROC at 5.24 per cent to an owner/operator is not considered attractive. Also, the opportunity to gear the enterprise with borrowed capital does not exist with ROC being less than the cost of bank funds. (ROC calculated before interest and tax.)

## 7. KEY ASSUMPTIONS

1. Land suitable for conversion available at \$12 300–15 000/ha.
2. Three-phase power available within say 500 m of farm boundary.
3. Harvey Water irrigation supply available near farm boundary.
4. Capital development cost below \$27/kg ms for 1000 cows or \$37/kg ms for 400 cows.
5. Pasture production systems including irrigation requirements are supported by findings in Part A of the project report:
  - irrigated pasture achieving 17 t dm/ha at 85 per cent utilisation
  - annual pastures achieving 5 t dm/ha at 75 per cent utilisation
  - irrigation rate of 10 ML/ha
  - fertiliser input no more than 3.8 ¢/L or \$0.54/kg ms.
6. Cleared land areas or areas able to be cleared that allow CP irrigation systems.
7. Dairy herd:
  - availability of initial stock
  - 7000 L lactation over 280 days
  - 365-day calving interval in both herds
  - 20 per cent culling rate in cows
  - 5 per cent death rate in cows
  - 16.6 per cent cull rate in < 1 year old heifers
  - 90 per cent calving rate
  - agist spring calvers off-farm 10 weeks in winter
  - contract rear heifers off-farm
  - using milk substitute pellets in place of liquid milk for calves.
8. FOC at < 60 per cent of farm income.
9. Farm-gate milk price 45 ¢/L or \$6.34/kg ms for all milk produced.
10. Adequate labour.
11. Adequate support services:
  - farm advisory
  - agistment
  - fertiliser/lime
  - grain/fodder
  - service/repairers—dairy, farm, irrigation
  - animal services—vet, AI, HT, cartage

## **8. FURTHER WORK TO SUPPORT A POSITIVE OUTCOME**

### **1. Structural**

- a. Innovative profit-sharing and leasing models that would have existing (non-dairy) landholders retain ownership of the land but with a 'tenant' developing the dairy infrastructure with a suitably long tenure on the farm. The landowner would receive increased farm returns with the tenant or dairy developer reducing his or her capital cost by around 50 per cent in not having to pay the initial capital cost of the land, thereby increasing ROC.
- b. Incorporating the processing sector into the scenario outlined above as capital providers that would accept a low return on their capital input in exchange for increased milk supply. This would allow increased returns to flow through to landowners and sharemilkers thus making the total package more attractive.
- c. Ownership models for corporate investors allowing not only profits but also tax advantages to flow through to investors.

### **2. Off-farm**

- a. Access to and extension of the Harvey Water pipeline scheme into the area.
- b. Incentives and grants available to farmers developing highly efficient sprinkler irrigation systems for milk production for scenario a. above and farm irrigation systems.
- c. Availability of significant volumes of irrigation water (1–2 gigalitres) from Harvey Water via the auction system or by private treaty.
- d. Potential for regional headworks grants in the region to offset power extension/reticulation costs.

### **3. On-farm**

- a. The ability to mix farm soil types along the eastern boundary of the Bassendean sands with the more productive Pinjarra series to achieve a lower capital cost but with some highly productive areas.
- b. Cost savings in relocating dairy equipment from sheds no longer in use in nearby shires of Murray, Waroona, Harvey, Dardanup and Capel versus new equipment.

## 9. ACKNOWLEDGMENTS

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Mark Metternick-Jones, NAB – finance

Ben Charnaud, Charnaud – attracting investment/investment criteria

WA dairy farmer clients/friends

## APPENDIX 1. 1000-cow model

Large-scale dairy on Bassendean sands				Year In Year Out (YIYO)			Feb 2008			
				Owner	Sharemilker	Total	¢/L	\$/kg ms	Range	
<b>Batch calving November and February on 400 ha</b>										
<b>REVENUE</b>										
Milk income				1 575 000	1 575 000	3 150 000	45.00	6.34	10%	
Cattle sales				0	211 175	211 175	3.02	0.42	30%	
Other sales						0	0.00	0.00		
Off-farm income						0	0.00	0.00		
Sundry income						0	0.00	0.00		
Total revenue				1 575 000	1 786 175	3 361 175	48.02	6.76		
<b>EXPENDITURE</b>										
<b>Feed expenses</b>										
Agistment/leases	328 hd @	80 ¢/day	365 dats	50%	47 888	47 888	95 776	1.37	0.19	10%
Fertiliser – Irrigation mix	0 ha @	0 kg/ha @	0 \$/t	Refer schedule	196 107	48 209	244 316	3.49	0.49	25%
Fertiliser – lime	125 ha @	2500 kg/ha @	22 \$/t	Supply and cart	6 875		6 875	0.10	0.01	10%
Seed	100 ha @	20 kg/ha @	5 \$/t	Supply only	10 000		10 000	0.14	0.02	10%
Grain	1000 No @	2.1 t/ha @	400 \$/t	50%	420 000	420 000	840 000	12.00	1.69	35%
Grain calves on MSP	300 No @	35 kg/hd	3.2 \$/kg	50%	16 800	16 800	33 600	0.48	0.07	25%
Grain springers	1000 No @	0.04 t/hd @	500 \$/t	50%	10 000	10 000	20 000	0.29	0.04	25%
Hay	1000 tonnes		120 \$/t	50%	60 000	60 000	120 000	1.71	0.24	25%
Hay	rolls		\$/roll				0	0.00	0.00	
Hay	0 rolls		40 \$/roll				0	0.00	0.00	
Straw	0 tonnes		18 \$/t				0	0.00	0.00	
Straw							0	0.00	0.00	
Fuel	1000 No @	25 \$/hd		SM		25 000	25 000	0.36	0.05	20%
Sprays	400 ha @	7 \$/ha		Spray only	2 800		2 800	0.04	0.01	25%
Fodder contractors	0 rolls		20 \$/roll		0		0	0.00	0.00	
Fodder contractors					0		0	0.00	0.00	
Silage	tDM		20 \$/t	50%	0	0	0	0.00	0.00	
Silage	0 tDM		20 \$/t		0	0	0	0.00	0.00	
Irrigation charges	2 000 ML	41.4 \$/ML		50%	41 400	41 400	82 800	1.18	0.17	15%
<b>Total feed expenses</b>					811 870	669 297	1 481 167	21.16	2.98	
<b>Shed expenses</b>										
P & R Dairy				Split	10 000	6 000	16 000	0.23	0.03	20%
Electricity dairy	0.4 ¢/L			SM	0	20 000	20 000	0.29	0.04	15%
Dairy requisites	0.5 ¢/L			SM	0	24 000	24 000	0.34	0.05	15%
<b>Total shed expenses</b>					10 000	50 000	60 000	0.86	0.12	

## APPENDIX 1. Continued

Large-scale dairy on Bassendean sands					Year In Year Out (YIYO)			Feb 2008				
Batch calving November and February on 400 ha					Owner	Sharemilker	Total	¢/L	\$/kg ms	Range		
<b>Herd expenses</b>												
Dairy A.I.	1000 No @	\$25/cow	***	SM	0	25 000	25 000	0.36	0.05	25%		
Herd recording	1000 No @	\$15/cow		SM	0	15 000	15 000	0.21	0.03	25%		
Cattle requisites	1000 No @	\$10/cow	***	SM	0	10 000	10 000	0.14	0.02	25%		
Veterinary	1000 No @	\$25/cow	***	SM	0	25 000	25 000	0.36	0.05	30%		
<b>Total herd expenses</b>					0	75 000	75 000	1.07	0.15			
<b>Common costs</b>												
Sundries					15 000	15 000	30 000	0.43	0.06	100%		
<b>Total common costs</b>					15 000	15 000	30 000	0.43	0.06			
<b>Fixed costs</b>												
Employee super	@ 10%			SM	0	15 500	15 500	0.22	0.03	35%		
Labour	3 employees @ \$45 000 each in addition to 2 SMs			SM	0	155 000	155 000	2.21	0.31	35%		
Fuel and oil	With calf feeder at \$20 000			SM	0	28 500	28 500	0.41	0.06	25%		
Parts and repairs				Split	40 000	30 000	70 000	1.00	0.14	50%		
Lease				50%	0		0	0.00	0.00			
Memberships/subs					0	1 000	1 000	0.01	0.00	100%		
Rates – land					3 000		3 000	0.04	0.01	20%		
Motor vehicle costs				SM	0	12 000	12 000	0.17	0.02	20%		
General insurance				Split	7 500	6 000	13 500	0.19	0.03	10%		
Workers comp @ 6.4%				SM	0	10 912	10 912	0.16	0.02	35%		
Agric. consultants				Split		12 000	12 000	0.17	0.02	100%		
Accountant					3 500	3 500	7 000	0.10	0.01	25%		
Telephone				SM	0	2 400	2 400	0.03	0.00	35%		
Postage/stationery				SM	0	200	200	0.00	0.00	50%		
Electricity and gas				SM	0	12 000	12 000	0.17	0.02	50%		
<b>Total fixed costs</b>					54 000	289 012	343 012	4.90	0.69			
<b>Total operating costs</b>					<b>890 870</b>	<b>1 098 309</b>	<b>1 989 179</b>	<b>28.42</b>	<b>4.00</b>			
Farm operating surplus					<b>684 130</b>	<b>687 866</b>	<b>1 371 996</b>	<b>19.60</b>	<b>2.76</b>			
<b>Financing costs</b>												
Bank fees and charges					500	500	1 000	0.01	0.00	50%		
Bank loans					\$	Total	0	0.00	0.00			
<b>Total financing costs</b>					500	500	1 000	0.01	0.00			
<b>Capital payments</b>												
Capital expenditure					Refer depreciation schedule	Split	90 667	46 200	136 867	1.96	0.28	10%
<b>Total capital payments</b>							90 667	46 200	136 867	1.96	0.28	
<b>Personal expenditure</b>												
Personal drawings					No drawings allowed for SM family	SM	0	0	0.00	0.00		
Taxation							0	0.00	0.00			
<b>Total personal expenditure</b>							0	0.00	0.00			
<b>Total expenditure</b>							982 037	1 145 009	2 127 046	30.39	4.28	
<b>Surplus/deficit</b>							592 963	641 166	1 234 129	17.63	2.48	

## APPENDIX 1. Continued

Large-scale dairy on Bassendean sands												
Livestock schedule												
		YIYO										
	Opening number	NI	Purchase	\$/hd	\$	Sell	\$/hd	\$	Deaths	Trans In	Trans Out	Closing number
<b>ROC</b>							5.05%	44.16%	9.35%			
Milkers	760				0	200	550	110 000	50	250		750
Dry	250				0			0				250
Mtd hfs	250				0			0		250	250	250
Unmtd hfs	300				0	50	500	25 000	5	305	260	300
Beef	0				0	0	0	0		0		0
Calves	100	900	0	0	0	595	125	74 375			305	100
Bulls	5		2	1800	3600	2	900	1800		0		5
<b>Total</b>	<b>1655</b>	<b>900</b>	<b>2</b>		<b>3600</b>	<b>847</b>		<b>211 175</b>	<b>55</b>	<b>805</b>	<b>805</b>	<b>1655</b>

## APPENDIX 1. Continued

Large-scale dairy on Bassendean sands		YIYO
Milk production schedule		
1000 cows @	7000 litres net of calves milk	7 000 000 litres sold
	Kg MS equivalent @ 7.1%	497 000
	Total income @ ¢/L 45.0	3 150 000
	Sharemilker income	1 575 000
	Owner income	1 575 000

Feed requirement			
250 cows	12 months	7.00 t/cow	1750
750 cows	9 months	7.00 t/cow	3938
250 mtd Hfs	1 month	5.50 t/hf	115
300 unmted Hfs	8 months	4.00 t/hf	800
5 bulls	12 months	12.00 t/bull	60
<b>Total</b>			<b>6662</b>

Source of feed			
200 ha irrigation	17 t DM/ha	85% utilisation	2890
200 ha dry	5 t DM/ha	75% utilisation	750
Grain	2100 tDM	100%	2100
Springer P	40 tDM	100%	40
Silage	0 tDM	85%	0
Hay	1000 tDM	90%	900
<b>Total</b>			<b>6680</b>

## APPENDIX 1. Continued

Large-scale dairy on Bassendean sands Depreciation schedule						YIYO
Item	Description	Starting value \$	Closing value \$	Years	Annual depreciation \$	Comments
<b>Sharemilker</b>						
Tractor	110 hp FEL	115 000	20 000	10	9 500	
Tractor	110 hp FEL	115 000	20 000	10	9 500	
M Bike	4 W	10 000	1 000	5	1 800	
M Bike	4 W	10 000	1 000	5	1 800	
M Bike x 2	2 W	12 000	2 000	5	2 000	SM equipment
Ute		25 000	12 500	3	4 167	
Ute		25 000	12 500	3	4 167	
Hay feeder		15 000	0	10	1 500	
Multispreader	Marshall 4 t	35 000	0	10	3 500	
Harrows		8 000		10	800	
Discs		12 000		15	800	
Rippers		10 000		15	667	
Topper		10 000		10	1000	
Other		50 000		10	5 000	
<b>Subtotal</b>		<b>452 000</b>	<b>69 000</b>		<b>46 200</b>	
<b>Owner</b>						
Dairy		1 165 000	250 000	20	45 750	
5 CP irrigators		525 000	125 000	15	26 667	
Houses x 3		525 000	210 000	20	15 750	
Bores and pumps	5 HW standpipes + boost pumps	120 000	100 000	20	1 000	
Sheds		50 000	20 000	20	1 500	
<b>Subtotal</b>		<b>2 385 000</b>	<b>705 000</b>		<b>90 667</b>	

## APPENDIX 1. Continued

<b>Large-scale dairy on Bassendean sands</b>				
<b>Capital cost estimate</b>				
<b>Farm purchase</b>				
Farm	400 ha @		\$12 355/ha	4 942 000
Stamp duty	5000/acre			260 568
Fees				100 000
				5 302 568
<b>Earthworks</b>				
Initial access, dairy pad, etc.				50 000
Drainage and levelling				250 000
Laneways incl. tanker truck				250 000
				550 000
<b>Paddock preparation</b>				
	ha	units/ha	\$/unit	
Fencing				100 000
Water				120 000
Initial lime	400	2.5	22	22 000
Initial fertiliser	400	0.25	600	60 000
Seed	400	25	6	60 000
Contract operations	400	3	50	60 000
				422 000
<b>Dairy</b>				
Shed	20 x 24, milk room, 500 cow yards, concrete and 20 000 L floodwash			500 000
Plumbing	Including water cooling tower			40 000
Electrical				75 000
Sundries				30 000
Milking machine	Waikato (mid-range)			150 000
Platform	Dispatch and Garlick (NZ)			110 000
Feed style including second silo				30 000
Effluent	Floodwash, trafficable sump then ponds to sprinkler			35 000
Vat 30 000 L	Westfalia or similar			150 000
Other	Allows for shade and cooling plus other items			45 000
				1 165 000
<b>Houses</b>				
3 houses initially				525 000
				525 000
<b>Power and irrigation</b>				
3 phase to dairy and CP				100 000
5 x 40 ha CPs				525 000
Water requirement =	200 ha x 10 ML/ha = 2.0 GI	pumps and outl		120 000
Purchase	2000 MI @ 1000/MI permanent transfer	water		2 000 000
Mainlines	(4.5 km 250 mm @ \$45/m) and elec. (3.0 km \$30/m)			292 500
				3 037 500
Project management and contingency				500 000
Initial working capital				250 000
Subtotal	(Sharemilking)			11 752 068
Cows	1000/head			1 000 000
Farm equipment				452 000
Subtotal	(additional capital for owner/operator)			1 452 000
<b>TOTAL</b>				<b>13 204 068</b>

<b>CAPITAL COST is</b>	<b>\$26.57 per kg ms total</b>	<b>or</b>	<b>\$23.65 per kg ms for owner with a SM</b>
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## APPENDIX 1. Continued

Large-scale dairy on Bassendean sands Sensitivity analysis			
Milk price cents/litre	Owner	ROC* Sharemilker	Total
40	3.56%	32.11%	6.70%
45	5.05%	44.16%	9.35%
50	6.53%	56.21%	12.00%
55	8.02%	68.26%	14.65%
60	9.51%	80.31%	17.30%
* ROC calculated before interest and tax			

Large-scale dairy on Bassendean sands Fertiliser program									YIYO
Month	Area	Fertiliser	Rate	Tonnes	\$/t	\$	S/M	Nett	Timing
<b>Dryland</b>		<b>wet swamps</b>							
Sep	100	Super:Pot 1:1	200	20	453	9 060	0	9 060	Spring
Apr	100	Super:Pot 4:1	200	20	405	8 100	0	8 100	Autumn
<b>Dryland</b>		<b>dry sands</b>							
Sep	100	Grazeburst	200	20	587	11 740	2 935	8 805	Spring
May	100	Autumnburst	200	20	602	12 040	3 010	9 030	Autumn
<b>Irrigation</b>									
Jul				0		0	0	0	Winter
Aug	200	Grazeburst	160	32	587	18 784	4 696	14 088	Spring
Sep	200	Super:Pot 1:1	200	40	483	19 320	0	19 320	Spring
Oct	200	Grazeburst	160	32	587	18 784	4 696	14 088	Spring
Nov	200	Grazeburst	160	32	587	18 784	4 696	14 088	Summer
Dec	200	Grazeburst	160	32	587	18 784	4 696	14 088	Summer
Jan	200	Grazeburst	160	32	587	18 784	4 696	14 088	Summer
Feb	200	Grazeburst	160	32	587	18 784	4 696	14 088	Summer
Mar	200	Grazeburst	160	32	587	18 784	4 696	14 088	Summer
Apr	200	Grazeburst	160	32	587	18 784	4 696	14 088	Autumn
May	200	Super:Pot 4:1	200	40	375	15 000	0	15 000	Autumn
Jun	200	Grazeburst	160	32	587	18 784	4 696	14 088	Winter
<b>Total</b>				<b>448</b>		<b>244 316</b>	<b>48 209</b>	<b>196 107</b>	

Note 1: Fertiliser prices include \$14/t freight and less \$35/t discount from CSBP.

Note 2: Fertiliser prices include an extra \$30/t once a year for inclusion of trace elements 1 year in 3.

## APPENDIX 2. 400-cow model

400-cow dairy on Bassendean sands Batch calving November and February on 200 ha				Year In Year Out (YIYO)			Feb 2008			
				Owner	Sharemilker	Total	¢/l	\$/kg ms	Range	
<b>REVENUE</b>										
Milk income				630 000	630 000	1 260 000	45.00	6.34	10%	
Cattle sales				0	84 275	84 275	3.01	0.42	30%	
Other sales						0	0.00	0.00		
Off-farm income						0	0.00	0.00		
Sundry income						0	0.00	0.00		
<b>Total revenue</b>				<b>630 000</b>	<b>714 275</b>	<b>1 344 275</b>	<b>48.01</b>	<b>6.76</b>		
<b>EXPENDITURE</b>										
<b>Feed expenses</b>										
Agistment/leases	140 hd @	80 c/day	365 dats	50%	20 440	20 440	40 880	1.46	0.21	10%
Fertiliser – Irrigation mix	0 ha @	0 kg/ha @	0 \$/t	Refer schedule	85.442	20 473	105 914	3.78	0.53	25%
Fertiliser – lime	65 ha @	2500 kg/ha @	22 \$/t	Supply and cart	3 575		3 575	0.13	0.02	10%
Seed	40 ha @	20 kg/ha @	5 \$/t	Supply only	4 000		4 000	0.14	0.02	10%
Grain	400 No @	2.1 t/ha @	400 \$/t	50%	168 000	168 000	336 000	12.00	1.69	35%
Grain calves on MSP	125 No @	35 kg/hd	3.2 \$/kg	50%	7 000	16 800	23 800	0.85	0.12	25%
Grain springers	400 No @	0.04 t/hd @	500 \$/t	50%	4 000	4 000	8 000	0.29	0.04	25%
Hay	400 tonnes		120 \$/t	50%	24 000	60 000	84 000	3.00	0.42	25%
Hay	rolls		\$/roll				0	0.00	0.00	
Hay	0 rolls		40 \$/roll				0	0.00	0.00	
Straw	0 tonnes		18 \$/t				0	0.00	0.00	
Straw							0	0.00	0.00	
Fuel	400 No @	25 \$/hd		SM		10 000	10 000	0.36	0.05	20%
Sprays	200 ha @	7 \$/ha		Spray only	1 400		1 400	0.05	0.01	25%
Fodder contractors	0 rolls		20 \$/roll		0		0	0.00	0.00	
Fodder contractors					0		0	0.00	0.00	
Silage	tDM		20 \$/t	50%	0	0	0	0.00	0.00	
Silage	0 tDM		20 \$/t		0	0	0	0.00	0.00	
Irrigation charges	800 ML	41.4 \$/ML		50%	16 560	16 560	33 120	1.18	0.17	15%
<b>Total feed expenses</b>					<b>334 417</b>	<b>316 273</b>	<b>650 669</b>	<b>23.24</b>	<b>3.27</b>	
<b>Shed expenses</b>										
P & R Dairy				Split	6 000	3 600	9 600	0.34	0.05	20%
Electricity dairy				SM	0	8 000	8 000	0.29	0.04	15%
Dairy requisites				SM	0	12 000	12 000	0.43	0.05	15%
<b>Total shed expenses</b>					<b>6 000</b>	<b>23 600</b>	<b>29 600</b>	<b>1.06</b>	<b>0.15</b>	

## APPENDIX 2. Continued

400-cow dairy on Bassendean sands Batch calving November and February on 200 ha					Year In Year Out (YIYO)			Feb 2008		
					Owner	Sharemilker	Total	¢/l	\$/kg ms	Range
<b>Herd expenses</b>										
Dairy A.I.	400 No @	\$25/cow	***	SM	0	10 000	10 000	0.36	0.05	25%
Herd recording	400 No @	\$15/cow		SM	0	6 000	6 000	0.21	0.03	25%
Cattle requisites	400 No @	\$10/cow	***	SM	0	4 000	4 000	0.14	0.02	25%
Veterinary	400 No @	\$25/cow	***	SM	0	10 000	10 000	0.36	0.05	30%
<b>Total herd expenses</b>					0	30 000	30 000	1.07	0.15	
<b>Common costs</b>										
Sundries					5 000	5 000	10 000	0.36	0.05	100%
<b>Total common costs</b>					5 000	5 000	10 000	0.36	0.05	
<b>Fixed costs</b>										
Employee super	@ 10%			SM	0	4 500	4 500	0.16	0.02	35%
Labour	1 employee @ \$45 000 each in addition to 2 SMs			SM	0	45 000	45 000	1.61	0.23	35%
Fuel and oil				SM	0	15 000	15 000	0.54	0.08	25%
Parts and repairs				Split	20 000	15 000	35 000	1.25	0.18	50%
Lease					0		0	0.00	0.00	
Memberships/subs					0	1 000	1 000	0.04	0.01	100%
Rates – land					2 000		2 000	0.07	0.01	20%
Motor vehicle costs				SM	0	8 000	8 000	0.29	0.04	20%
General insurance				Split	5 500	3 500	9 000	0.32	0.05	10%
Workers comp @ 6.4%				SM	0	3 168	3 168	0.11	0.02	35%
Agric. consultants				Split		8 000	8 000	0.29	0.04	100%
Accountant					3 500	3 500	7 000	0.25	0.04	25%
Telephone				SM	0	2 400	2 400	0.09	0.01	35%
Postage/stationery				SM	0	200	200	0.01	0.00	50%
Electricity and gas				SM	0	9 000	9 000	0.32	0.05	50%
<b>Total fixed costs</b>					31 000	118 268	149 268	5.33	0.75	
<b>Total operating costs</b>					<b>376 417</b>	<b>493 141</b>	<b>869 557</b>	<b>31.06</b>	<b>4.47</b>	
Farm operating surplus					<b>253 583</b>	<b>221 134</b>	<b>474 718</b>	<b>16.95</b>	<b>2.39</b>	
<b>Financing costs</b>										
Bank fees and charges					500	500	1 000	0.04	0.01	50%
Bank loans	\$		Total		0		0	0.00	0.00	
<b>Total financing costs</b>					500	500	1 000	0.04	0.01	
<b>Capital payments</b>										
Capital expenditure	Refer depreciation schedule			Split	60 008	29 733	89 742	3.21	0.45	10%
<b>Total capital payments</b>					60 008	29 733	89 742	3.21	0.45	
<b>Personal expenditure</b>										
Personal drawings	No drawings allowed for SM family			SM	0		0	0.00	0.00	
Taxation					0		0	0.00	0.00	
<b>Total personal expenditure</b>					0	0	0	0.00	0.00	
<b>Total expenditure</b>					436 925	523 374	960 299	34.30	4.83	
<b>Surplus/deficit</b>					193 075	190 901	383 976	13.71	1.93	
<b>ROC</b>					2.90%	27.00%	5.22%			

## APPENDIX 2. Continued

400-cow dairy on Bassendean sands												
Livestock schedule		YIYO										
	Opening number	NI	Purchase	\$/hd	\$	Sell	\$/hd	\$	Deaths	Trans In	Trans Out	Closing number
Milkers	300				0	80	550	44 000	20	100		300
Dry	100				0			0				100
Mtd Hfs	100				0			0		100	100	100
Unmtd Hfs	120				0	20	500	10 000	5	125	100	120
Beef	0				0	0	0	0		0		0
Calves	40	360	0	0	0	235	125	29 375			125	40
Bulls	3		1	1 800	1 800	1	900	900		0		3
<b>Total</b>	<b>663</b>	<b>360</b>	<b>1</b>		<b>1 800</b>	<b>336</b>		<b>84 275</b>	<b>25</b>	<b>325</b>	<b>325</b>	<b>663</b>

## APPENDIX 2. Continued

400-cow dairy on Bassendean sands		
Milk production schedule		YIYO
400 cows @	7000 litres net of calves milk	2 800 000 litres sold
	kg ms equivalent @ 7.1%	198 800
	Total income @ ¢/L 45.0	1 260 000
	Sharemilker income	630 000
	Owner income	630 000

Feed requirement			
100 cows	12 months	7.00 t/cow	700
300 cows	9 months	7.00 t/cow	1 575
100 mtd hfs	1 month	5.50 t/hf	46
120 unmtd hfs	8 months	4.00 t/hf	320
3 bulls	12 months	12.00 t/bull	36
Total			2 677

Source of feed			
80 ha irrigation	17 t DM/ha	85% utilisation	1 156
120 ha dry	5 t DM/ha	75% utilisation	450
Grain	840 tDM	100%	840
Springer P	16 tDM	100%	16
Silage	0 tDM	85%	0
Hay	400 tDM	90%	360
Total			2 822

## APPENDIX 2. Continued

400-cow dairy on Bassendean sands Depreciation schedule						YIYO
Item	Description	Starting value \$	Closing value \$	Years	Annual depreciation \$	Comments
<b>Sharemilker</b>						
Tractor	110 hp FEL	115 000	20 000	10	9 500	
Tractor (used)	70 hp FEL	45 000	15 000	10	3 000	
M Bike	4 W	10 000	1 000	5	1 800	
M Bike						
M Bike x 2	2 W	12 000	2 000	5	2 000	SM equipment
Ute		25 000	12 500	3	4 167	
Ute						
Hay feeder		15 000	0	10	1 500	
Multispreader	Marshall 4 t	35 000	0	10	3 500	
Harrows		8 000		10	800	
Discs		12 000		15	800	
Rippers		10 000		15	667	
Topper				10		
Other		20 000		10	2 000	
<b>Subtotal</b>		<b>307 000</b>	<b>50 500</b>		<b>29 733</b>	
<b>Owner</b>						
Dairy		848 500	150 000	20	34 925	
2 CP irrigators		250 000	50 000	15	13 333	
Houses x 2		350 000	140 000	20	10 500	
Bores and pumps	2 HW standpipes + boost pumps	60 000	50 000	20	500	
Sheds		30 000	15 000	20	750	
<b>Subtotal</b>		<b>1 538 500</b>	<b>405 000</b>		<b>60 008</b>	

## APPENDIX 2. Continued

400-cow dairy on Bassendean sands					
Capital cost estimate					
<b>Farm purchase</b>					
Farm	200 ha @		\$14 826/ha		2 965 200
Stamp duty			6 000/acre		153 821
Fees					60 000
					3 179 021
<b>Earthworks</b>					
Initial access, dairy pad, etc.					20 000
Drainage and levelling					130 000
Laneways incl. tanker truck					130 000
					280 000
<b>Paddock preparation</b>					
	ha		units/ha	\$/unit	
Fencing					60 000
Water					60 000
Initial lime	200		2.5	22	11 000
Initial fertiliser	200		0.25	600	30 000
Seed	200		25	6	30 000
Contract operations	200		3	50	30 000
					221 000
<b>Dairy</b>					
Shed	20-aside 90-degree doubled-up shed				365 000
Plumbing	Including water cooling tower				40 000
Electrical					55 000
Sundries	Including pto genset, etc.				30 000
Milking machine	Waikato (mid-range) 20 doubled up				130 000
Cup removers	\$1000/unit				40 000
Feed system	1 silo, cablevey and feeders (add \$32 000 for mill and 2 <sup>nd</sup> silo)				30 000
Effluent	Floodwash, trafficable sump then ponds to sprinkler				33 500
Vat 15 000 L	Westfalia or similar				100 000
Other	Allows for shade and cooling plus other items				25 000
					848 500
<b>Houses</b>					
2 houses initially					350 000
					350 000
<b>Power and irrigation</b>					
3-phase to dairy and CP					100 000
2 x 40 ha CPs					250 000
Water requirement =	80 ha x 10 ML/ha = 0.8 GI		pumps and outl		60 000
Purchase	800 MI @ 1000/MI permanent transfer		water		800 000
Mainlines	(2.0 km 250 mm @ \$45/m) and elec. (1.5 km \$30/m)				135 000
					1 345 000
Project management and contingency					275 000
Initial working capital					150 000
Subtotal	(Sharemilking)				6 648 521
Cows	400/head				400 000
Farm equipment					307 000
Subtotal	(additional capital for owner/operator)				707 000
<b>TOTAL</b>					<b>7 355 521</b>

<b>CAPITAL COST is</b>	<b>\$37.00 per kg ms total</b>	<b>or</b>	<b>\$33.44 per kg ms for owner with a SM</b>
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## APPENDIX 2. Continued

400-cow dairy on Bassendean sands Sensitivity analysis			
Milk price cents/litre	Owner	ROC* Sharemilker	Total
40	1.85%	17.10%	3.32%
45	2.90%	27.00%	5.22%
50	3.96%	36.90%	7.12%
55	5.01%	46.80%	9.03%
60	6.06%	56.70%	10.93%

\* ROC calculated before interest and tax

400-cow dairy on Bassendean sands Fertiliser program									YIYO
Month	Area	Fertiliser	Rate	Tonnes	\$/t	\$	S/M	Net	Timing
<b>Dryland</b>		<b>wet swamps</b>							
Sep	60	Super:Pot 1:1	200	12	453	5 436	0	9 060	Spring
Apr	60	Super:Pot 4:1	200	12	405	4 860	0	8 100	Autumn
<b>Dryland</b>		<b>dry sands</b>							
Sep	60	Grazeburst	200	12	587	7 044	1 761	8 805	Spring
May	60	Autumnburst	200	12	602	7 224	1 806	9 030	Autumn
<b>Irrigation</b>									
Jul				0		0	0	0	Winter
Aug	80	Grazeburst	160	12.8	587	7 514	1 878	5 635	Spring
Sep	80	Super:Pot 1:1	200	16	483	7 728	0	7 728	Spring
Oct	80	Grazeburst	160	12.8	587	7 514	1 878	5 635	Spring
Nov	80	Grazeburst	160	12.8	587	7 514	1 878	5 635	Summer
Dec	80	Grazeburst	160	12.8	587	7 514	1 878	5 635	Summer
Jan	80	Grazeburst	160	12.8	587	7 514	1 878	5 635	Summer
Feb	80	Grazeburst	160	12.8	587	7 514	1 878	5 635	Summer
Mar	80	Grazeburst	160	12.8	587	7 514	1 878	5 635	Summer
Apr	80	Grazeburst	160	12.8	587	7 514	1 878	5 635	Autumn
May	80	Super:Pot 4:1	200	16	375	6 000	0	6 000	Autumn
Jun	80	Grazeburst	160	12.8	587	7 514	1 878	5 635	Winter
<b>Total</b>				<b>195.2</b>		<b>105 914</b>	<b>20 473</b>	<b>85 442</b>	

Note 1: Fertiliser prices include \$14/t freight and less \$35/t discount from CSBP.

Note 2: Fertiliser prices include an extra \$30/t once a year for inclusion of trace elements 1 year in 3.