

# **Case Farm Two**

**(North-East Victoria)**

Part of the report

**An economic analysis of native pasture in the  
hills and tablelands of south-eastern Australia**

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## **1. Nature of the case study**

This farm is located on plateau country about 50km east of Wodonga, near Tallangatta. The farm is one of two case farms in North-East Victoria. The other case farm is located near Wangaratta.

The questions to be addressed in this case study are the same as in the first case study. In summary, the contribution of native pasture to the whole farm business under current and alternative forms of management is examined. The characteristics of each pasture type and its contribution to feed supply are outlined as the basis for the economic analysis.

The current farm business situation is clarified before examining possible changes. A range of investments on native pasture paddocks and elsewhere are considered.

The economic consequences of resting native pasture in spring and of totally destocking areas of native pasture is also investigated.

As with the first case farm, part of the farm is sown to introduced pasture and the native pasture is on more difficult country - much of it would require aerial sowing.

## **2. The current farming system**

### **2.1 Background to the farm**

The farm area is 361 ha comprising the main farm of 231ha and a second block of 130ha known as the Run-off block. The home block of this farm is located on a small plateau about 50km east of Wodonga, near Tallangatta. The other part of the farm is located on relatively steep country, some 30 minutes travelling time away from the home block.

Land is undulating to very hilly, with some creek flats. Most soils are very erosive. Rainfall is between 760 to 800mm. Some 80 per cent of the total pasture area in the district is native pastures, with 95 per cent of the native pasture having sub-clovers and superphosphate added. Main native pasture species are *Microlaena*, Red Grass, Kangaroo Grass, Windmill Grass, Wallaby Grass, Spear Grass and Common Wheat Grass.

The main farm has large areas of native pasture on steep hill country as well as areas that are said by the owner to be 50 per cent native which are used for the dairy herd, along with 100 per cent introduced pasture and supplementary feed. The Run-off block is native pasture, part of which is probably a natural clearing - it has higher conservation values than the rest of the property.

The main enterprise is dairying with 100 dairy cows which occupies 150 ha of the home farm. Historically, sheep have been run on the property. Sheep have been gradually phased out in favour of beef cattle, while dairying began 10 years ago. Dry dairy stock are run for part of the year on other areas. Beef cattle are run on the remaining area of the home farm and on the Run-off block - about 45 breeding cows with a few other stock.

The breeding stock and dry sheep equivalents are shown in Table 2-1.

**Table 2-1 Stocking - total and per hectare**

	Number
Beef cattle	895
Dairy cattle	1,575
Total	2,470
DSE/ha	6.8

Table 2-2 gives the size of each block, the number of paddocks and an overview of the pasture status.

**Table 2-2. Characteristics of each block on the property**

Block	Size (hectares)	No. paddocks	Area (%) with significant native grass
South of Creek	90	5	50
North of Creek	141	2	90
Run-off	130	1	100
Total	361		

## **2.2 Conservation overview**

The native pastures on the home farm are unlikely to be of conservation significance. They are secondary grasslands created when the original woodland on the property was cleared. Where there are native grasses, the other species are almost always introduced annual grasses, legumes and broad-leaved plants. Two native forbs were found - both of which have been identified as colonisers of disturbed areas (P. Foreman pers comm). It is possible that other species would be found in areas of the Back paddock that were not inspected.

The Run-off block does have a range of species indicating the block may have local conservation value. Several native forbs were found. Fairies apron, billy button and scaly button are indicative of light disturbance only (P.Foreman pers comm). Several other native forbs were also found.

Erosion is a problem in the district given the nature of the soils and the steepness of the hills.

### **2.3 Farmer goals**

The farm supports two adults in their fifties. All children have left home to work or study over the last few years.

The goals of the family are to obtain sufficient income to meet their needs, as well as to manage the land within its capability. The owners are very active in the local Landcare group, and were instrumental in producing a catchment management plan for the district.

Some of the specific factors influencing their farm management, apart from income needs, include:

- Limited options for hillslopes and ridges
- Range of feed for stock to choose from
- Past experience and observation in the area with land slips
- Past experience and observation in the area with sowing pastures
- Previous contact with researchers and extension officers with an interest in the value of native grasses.

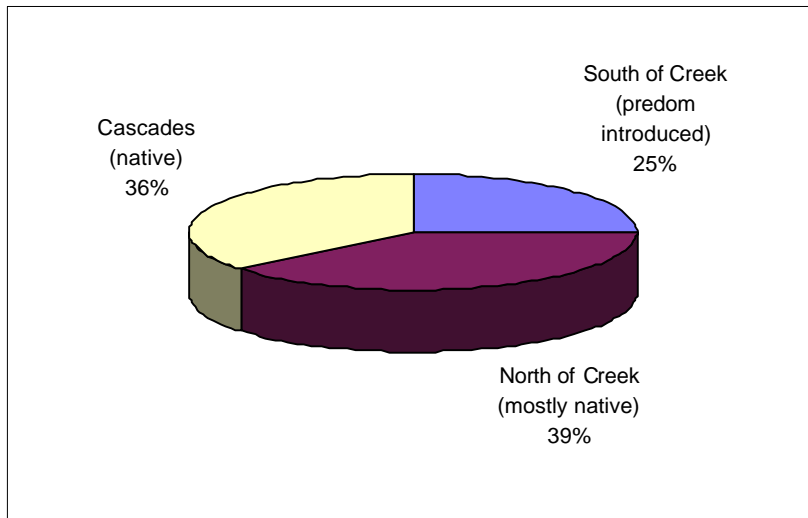
### 3. The place of native pasture

The farm is predominantly native pasture as Figure 1 illustrates.

The pasture characteristics were determined during an inspection on 10 November 1997 by Jo Millar (formerly Department of Natural Resources and Environment, Wodonga) and Meredith Mitchell (Department of Natural Resources and Environment, Rutherglen). There were 19 sites surveyed in seven paddocks. The assessment method is outlined in the Hills report.

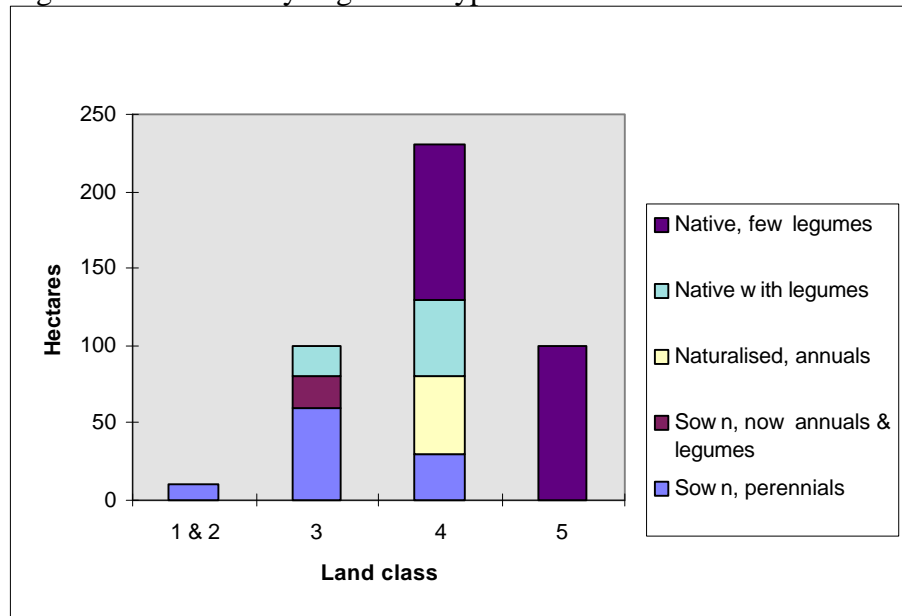
Pasture survey results are included in Table 12-5 and Table 12-6 in the appendices.

**Figure 1 Area of the farm by pasture type**



Although a dairy farm, this property has very little flat arable land. The dairying areas are mainly gullies, and gentle and moderate slopes. Estimates of the types of pasture in each land class are shown in Figure 2.

Figure 2 Land class by vegetation type



A most notable feature of the pastures was the diversity within paddocks. In part this reflects the changing aspect and undulating and steep topography within paddocks.

### 3.1 The contribution of native pasture to the feed supply

Use of native pastures varies across the farm. The beef enterprise is largely run on the North of Creek block, with Run-off block providing feed for some animals for some months of the year. The dairy enterprise is mostly run South of the Creek. Here most accessible, have been sown to introduced species, though native grasses are also found. The high level of concentrates that are fed to the dairy herd mean that the contribution of the native grasses is further reduced. The dairy cows are partly run on one paddock in North of Creek which is predominantly native pasture - this paddock is used both as a day and a night paddock. Dry dairy stock are also run North of the Creek and on the Run-off block.

Introduced perennial grasses comprised more than 20 per cent of the pastures on two sites. Native perennial grasses comprised more than 50 per cent of the pasture at nine sites; these were in three paddocks one of which is used by the dairy cows. Both warm-season and cool-season grasses were important in these paddocks. At another five sites in three other paddocks, native perennial grasses made up more than 10 per cent of the vegetation. Only cool-season grasses were found at these sites. Two of these paddocks were used solely by the dairy enterprise.

Several native grasses were common or abundant on one or more sites. The last four are warm-season grasses.

- Weeping Grass - in two dairy paddocks and two beef paddocks
- Wallaby Grass - in two beef paddocks, only found occasionally in one dairy paddock

- Spear grass - in one beef paddock
- Kangaroo Grass - in one beef paddock
- Common Wheat Grass - in one beef paddock, only occasional in one dairy paddock
- Red Grass - in two dairy paddocks and two beef paddocks

Legume content was found to be over 20 per cent at six sites in four dairy paddocks. Legume content was five per cent or below at 12 sites. Estimates of legume content may be low because of the very dry season combined with the lateness of the survey. Only introduced legumes were found.

Naturalised annual grasses comprised 50 per cent or more of the vegetation at only three of the sites, and more than 30 per cent at two more sites.

Broad-leaved weeds are scattered across nearly all sites, comprising less than 10 per cent of the vegetation at only three sites, and 15 per cent or more on eight sites (spread across all paddocks).

### **3.2 Characteristics of each block and the stock it runs**

#### **3.2.1.1 South of Creek**

Overview - The area south of the creek has five paddocks totalling 90 ha. Pastures were assessed in four of the five paddocks. The dairy herd is mostly run on this area.

##### *Silver paddock (10 ha)*

A creek bisects this paddock and aspect is both southerly and northerly. Topography ranges from gently to moderately undulating. All three sites inspected were on the south facing slope; one of them in a drainage line.

Soils are a grey loam. Fertility was assessed as being relatively low. Soil structure and organic matter was considered satisfactory. The presence of weeping grass and sorrel indicate soils may be acid.

Parts of this paddock have been sown to rye grass and clover several times. At the time of survey, the paddock was being strip grazed.

Weeping grass is localised on a south slope, adjacent to an area that has been cultivated, and on creek banks. The presence of dandelion and the small clover size suggest deficiency in potash and phosphorus.

Apart from a consistently high legume content, pasture composition varied greatly across the three sites surveyed in this paddock. Annual grasses exceeded an estimated 30 per cent on the south facing ungrazed site, but were estimated to comprise five per cent or less at the other two. Introduced perennial grasses were an estimated 40 per cent of cover in the gully, but less than five per cent elsewhere. Weeping grass was the

only native perennial grass found; it comprised an estimated 30 per cent of the vegetation but only on the south facing slope that was then ungrazed. Weeping grass was also noticed on the creek banks.

#### *Harant paddock* (20 ha)

The paddock is near the dairy, and is heavily grazed. Aspect is mostly westerly and northerly. Topography ranges from gently to moderately undulating.

Pasture condition indicated fertility was relatively low. Soil structure appeared good, though there may be some compaction.

Sites inspected were on a north facing mid-slope, a gentle west facing slope and flatter areas. Abundance estimates were made for all sites, but a species list made for only the first site.

Clover was abundant (an estimated 50 per cent of cover) on the flatter areas, common on the gentle slopes, and scattered on the steeper areas. Annual grasses were an estimated 70 per cent on the steeper slope, but 10 per cent or below at the other two. Introduced perennial grasses were only found on the flatter areas where they were estimated to make up 10 per cent of vegetative cover. Red grass was estimated at 15 per cent of cover on the north facing slope, and weeping grass 10 per cent in the other areas. Broad-leaf weeds were particularly thick on the gentle slope where they comprised an estimated 70 per cent of the cover.

#### Options for management of Harant paddock

- Sow phalaris or cocksfoot. The paddock would be hard to lock up during pasture establishment given its proximity to the dairy. Acidity may be a problem
- Deep rip
- Sod-seed ryegrass
- Sub and super - after a soil test
- Sub-divide - to allow spelling, look after north-facing slopes and use other areas more intensively

#### *Bottom paddock* (32 ha)

Aspect is mostly northerly, with east and west slopes off a creek running to the north. Topography ranges from gently to moderately undulating. It is rocky in parts. Land slips were noted in the top of gullies.

Fertility was assessed as being very low, given the poor clover and the presence of silver grass and flat weed. The soil may be low in potash and also acid. Soil structure appeared moderately good.

Sites inspected were on a north facing and a west facing mid-slope. Abundance estimates and species lists were made for both sites.

Clover was an estimated 20 per cent of cover on the west facing slope and five per cent on the other. Annual grasses were estimated to be over 50 per cent of cover on both sites. Introduced perennial grasses were estimated at five per cent on one site;

they were thicker in the gullies. Weeping grass made up an estimated 10 per cent of vegetative cover on the west facing slope. Broad-leaved weeds comprised 10 per cent on the west facing slope and 20 per cent on the north facing slope.

#### Options for management of Bottom paddock

- Fertilise and sow sub clover, rye grass and possibly cocksfoot if soils are acid. Sow phalaris if soils are not acid.
- Direct drill

A five year program could involve spray topping, building up fertility, adding sub clover and direct drilling grasses. Stock would need to be kept off the grasses as they established.

The paddock is seen as having the greatest potential out of those inspected. It is close to the dairy, has lost the most productivity, and the remaining native grasses could be kept with careful management.

#### *Dairy paddock (9 ha)*

The paddock is close to the dairy. Aspect is mostly northerly. Topography is gentle. Soils are granity. Fertility is low.

One site was inspected. Abundance estimates and species lists were made.

Clover was an estimated 40 per cent of cover. No annual grasses or native perennial grasses were noted. Introduced perennial grasses were estimated at 20 per cent. Broad-leaved weeds comprised an estimated 40 per cent of vegetative cover.

#### Options for management of Dairy paddock

- Fertilise with possibly super, lime, potash and molybdenum. All the species are there for a response
- Strip graze

### 3.2.1.2 North of Creek

Overview - There are two paddocks totalling 138 ha. Pastures were assessed in both paddocks.

The beef cattle are mostly run on the Back paddock, while Mull paddock is used for the dairy herd. Young dairy stock and dry dairy cows are also run on the Back paddock.

#### *Mull paddock (45 ha)*

This paddock ranges from gully areas to ridge tops. 50 per cent is estimated to be south facing slope, 20 per cent east facing slope, 20 per cent north facing slope and 10 per cent gully.

Soils are derived from gneissic granite. Fertility is low. Soil structure is good.

Sites inspected were a) low on an east facing moderate slope, b) mid-slope on a south facing slope and c) high on the west side of a ridge. Abundance estimates and a species list were made for all sites.

Pasture composition varied greatly across the three sites surveyed in this paddock. Annual grasses exceeded an estimated 90 per cent on the west facing ridge, but comprised five per cent or less at the other two sites. Introduced perennial grasses were estimated to comprise five per cent or less at all sites, but were noted as important in the gullies. Weeping grass, a cool-season native grass, comprised an estimated 90 per cent of the vegetation on the south-facing slope and 40 per cent on an east facing slope where red grass, a summer-grower, also comprised an estimated 40 per cent of the vegetation. Wallaby grass and common wheat grass were also occasionally found.

Fog grass and dandelion provide valuable feed, but could smother native grasses if not managed well. Bracken and St Johns Wort are present in some areas.

Phalaris and clover has been spread by hand in the gullies and on ridges. Proportions appear similar to the gullies in the Silver paddock. Carex is also present in the gullies.

#### Options for management of Mull paddock

- Retain large paddock. Feed variety provides cows with a good pick at different times of the year. Heifers roam and get exercise in the large paddock.
- Sub-divide into four paddocks based on land class. This risks increased erosion with cattle following fence lines as they come into milk.
- Spray and aerially sow. There have been few successes in North-East Victoria.
- Sow clover. There is enough already in the gullies and sheep camps.

#### *Back paddock (93 ha)*

This paddock has steep slopes, ridge tops and gullies. Four sites were inspected, these were in the south end of the paddock. Sites inspected were a) a north facing slope, b) a west facing slope, c) a steep north facing slope and d) a south facing slope. Abundance estimates and a species list were made for all sites.

Soils are derived from gneissic granite or pure granite. Fertility is low. Soil structure is also poor, with soils caked hard. Mosses were noted on the soil surface.

The paddock has been stocked lighter than Mull paddock with the lack of silver grass suggesting little baring off in summer. However, there have been slips in the tops of some gullies where there is a lack of tree cover..

Annual grasses comprised an estimated 30 per cent of the vegetation on the south facing slope, and more than 10 per cent on the north and west facing slopes. Introduced perennial grasses were not found. Native perennial grasses dominated the vegetation - with both cool-season and warm-season grasses abundant at each site. The one exception was the low proportion of cool-season species on the steep north facing slope. Common or abundant native grasses included weeping grass and wallaby grass (cool-season) and red grass, common wheat grass and spear grass (warm-

season). Broad-leafed weeds were estimated to comprise more than 15 per cent of the vegetation on all but the north facing slope.

#### Options for management of Back paddock

- Graze the summer-growing grasses more lightly during their active growing period
- Fence parts of the paddock off
- Thicken the red grass via spelling (fencing needed)
- Put out sub and super - at the risk of clover smothering the red grass

#### 3.2.1.3 Run-off block

The Run-off block is a block of 130ha, 30 kilometres from the home farm, at a high elevation on a plateau. It was once treed, probably with small natural clearings. Some bush remains. Trees are mainly red gum.

Some areas are very wet, and are dominated by rushes, carex and sedge.

The soil fertility is low, with grey loam soils derived from sedimentary rock. There is white clay underneath. Drainage is poor. Organic content of the soil is high.

The area has a relatively high diversity of plants. Stocking is relatively low, and the block is rested for a long period from late autumn until early spring.

Sites inspected were a) a north facing gentle lower slope, b) a north facing higher rocky slope, c) a south facing area near the creek. Abundance estimates and a species list were made for all sites.

Annual grasses were estimated to vary between 10 per cent and 20 per cent of the vegetative cover. Introduced perennial grasses were not found. Native perennial grasses were found to be the main form of vegetation - warm-season grasses comprising over 50 per cent of cover at each site, and cool-season grasses also being found on the north facing higher rocky slope. Common or abundant native grasses were weeping grass and wallaby grass (cool-season) and kangaroo grass and red grass (warm-season). Broad-leafed weeds were estimated to comprise between 10 per cent and 15 per cent of the vegetation at each site.

#### Pasture management options for Run-off block

- Burning - could help reduce silver grass
- Fence off the lower flat areas, fertilise and introduce sub clover - though the species present are not so responsive to super
- Manage for conservation and summer feed for stock
- Harvest seed

#### 4. Economic and financial state of the current farm business

Total farm capital is estimated at \$845,933 of which \$668,385 is land value.

Equity is estimated at 85 per cent.

Table 4-1 Gross margins by enterprise

	\$'000	%
Beef cattle	7	11
Dairy	54	89
Total	61	100

The activity gross margins per dry sheep equivalent (GM/DSE) and capital value per DSE are shown in Table 10-1 and Table 10-2 in the appendices.

Expected operating profit after tax and return to capital are shown in Table 4-2. Overhead costs are small, apart from operator's allowance which is costed at \$30,000. Expected annual return to capital is under one per cent.

Table 4-2 (Estimated) Profit and Loss statement

	\$'000
Income	98
Activity costs	37
Whole farm variable costs	18
Overheads incl labour & depreciation	37
Total costs	92
Operating profit before tax	6
Estimated tax payable	4
Operating profit after tax	2

Net cash flow is shown in Table 4-3.<sup>1</sup> This is based on a family consumption allowance of \$30,000. Net cash flow does not include equipment replacement or investment out of cash flow for farm development.

Table 4-3 Estimated Uses of Cash Statement

	\$'000
<b>Cash in</b>	
Sales	98
<b>Cash out</b>	
Activity variable costs	37
Whole farm variable costs	18
Cash overheads	7
Income tax	4
Interest	10
Principal on loan	8
Consumption	30
Total	114
<b>Net cash flow</b>	<b>-16</b>

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<sup>1</sup> Estimated tax payable is high relative to expected operating profit because it is based on total income less deductions which include variable costs, overheads, estimated interest payable, livestock purchase costs and depreciation on equipment aged 10 years and less.

## **5. The future - current plans and other opportunities**

Major changes will be needed for this farm to be viable in the long-term. Operating profit after tax is low, and consequently return to capital is low. The farm has to support one couple. Profitability may not be an issue provided cash flow is sufficient to provide for their needs. However, the farm has to pay off a bank loan. The size of the negative cash flow is of concern, as being unable to fund loan repayments and consumption out of cash surpluses on the farm will push it deeper and deeper into debt.

The financial position makes investment choices difficult.

It is estimated that the farm needs to generate extra net profit after tax of approximately \$16,000 to meet loan obligations and provide a consumption allowance of \$30,000.

It is possible that these requirements are over-estimated due to the derivation of some important variables. Estimates of interest and principal repayments are based on debt levels, derived from capital value estimates and information provided by the owner as to equity level, and an interest rate of eight per cent on a long-term loan of 15 years.

The gross margins per head of stock are considerably lower than regional averages for both the dairy and beef cattle. In part this is likely to be due to the more difficult nature of the land under management on this farm compared to others. Nevertheless, there is likely to be scope to increase returns per cow in both enterprises. Considering each enterprise separately, this is likely to be more profitable in the short-term than increasing numbers of stock. Taking both enterprises together, an investment that allows one more dairy cow to be carried will be much more profitable than an equivalent investment which increases the number of beef cows by two or three (at the current gross margins per head). Unless there are other constraints (eg. capacity of milking shed, available labour), the dairy enterprise should have priority.

### **5.1 The owner's plans**

The owners are seeking to increase income mainly through higher fertiliser applications. Based on advice received through the FarmSmart program they have begun applying much more fertiliser to dairy pastures than previously. Fertilising the Run-off block has also been mentioned. A long-term goal is to again sub-divide the Back paddock where the fence has fallen into disrepair. A range of options for most paddocks on the farm was discussed with the owner after the pasture surveys were completed.

## **5.2 Options chosen for analysis**

There are two options for increasing production on the main dairy pastures, two for native pasture areas and two conservation management options.

1. **Renovate pasture.** Two paddocks totalling 30 ha and with 25 ha of arable land will be direct drilled, removing stock for most of the first year.
2. **Fertilise all South of Creek block each year.** 60 ha will be fertilised at an average 250 kg/ha.
3. **Sub-divide, spread sub-clover by air and regularly fertilise native pasture** - this option is tested on a 93 ha paddock in North of Creek block which could be fertilised by air.
4. **Sub-divide and fertilise a native pasture utilised by the dairy herd.** This paddock is now 45 ha in size, at least half would have to be fertilised by air.
5. **Manage part of the Run-off block for conservation by totally removing stock for 6-12 weeks a year** -some of the stock are now removed. This option will test the effect of removing them all on 30 ha.
6. **Retire part of the Run-off block from production** - retiring 15 ha of the Run-off block from production to enhance conservation values will be examined to identify the income foregone to the owner by doing so.

## **5.3 General assumptions**

Fertiliser costs \$250/tonne when spread by ground and \$280/tonne when spread by air.

Each investment is funded with an overdraft at 12 per cent. Once debt is paid off, cumulative cash surpluses are invested at five per cent.

An inflation rate of three per cent is assumed for the financial analysis of each investment option. The economic analysis is based on current prices ie. real dollars.

Further explanation of the methodology is given in the main report.

## **5.4 Increasing production from introduced species pasture**

Several paddocks are to be fertilised at the rate of 250 kg/ha superphosphate every year. The owner has indicated milk production has increased by 20 per cent already in response to application of these levels of fertiliser this year. The fertiliser is estimated to cost \$250/ha spread.

The paddock to be sown is on fertile soils on gentle to moderate slopes along a creek. It is estimated that stocking rate would increase by five DSE/ha from the second year if 25 ha of previously sown dairy pasture is to be direct drilled with introduced grass seed and clovers after spraying out Broadleaved weeds and undesirable annual grasses.

Gross margin per dairy cow is over \$30/DSE, with the feed requirements of a dairy cow rated at around 18-20 DSE.

***Other assumptions for the sowing pasture option***

- Pasture development costs are estimated at \$180/ha.
- In the first year stock graze the pasture for only three months and are then removed before the pasture is sown.
- Possible establishment failure is accounted for by assuming a 20 per cent chance of failure and therefore including in the second year costs 20 per cent of the initial development cost, except for the fertiliser.
- Superphosphate is applied each year at 250kg/ha and at a cost of \$250 spread.
- Other pasture management activities are costed at an average \$15/ha every year.
- Pasture decline starts in year 12 at the rate of 10 per cent decline in carrying capacity per year. The shorter the life of the pasture, the shorter also the contribution to whole farm operating profit

Results (Table 5-1) show that both strategies are expected to be profitable. The expected contribution of the investments to whole farm annual operating profit (after tax) once peak production is achieved is over \$8,000 and \$3,000 per year respectively.

The fertiliser program can be financed out of the current year's earnings. The sowing program pays for itself over six years.

Sensitivity of the strategies has been tested. The fertiliser option is expected to break even provided milk production increases by approximately 220 litres per cow. The direct drilling option has been tested in the following ways:

- it can produce a 15 per cent real rate of return provided stocking rate increase is 3.5 DSE/ha or higher - but the pay-back period becomes unacceptably long.
- if milk price falls to 22 c/litre, rate of return will be 19 per cent real but payback is at least nine years.
- if milk production per cow increases by the 600 litres sought with the fertiliser option, the annual rate of return on the investment jumps significantly and pay-back period is reduced to four years.

Table 5-1 Profitability of fertilising 90 ha and sowing 25 ha of dairy pasture

	Fertilise	Direct Drill
<b>Economic analysis</b>		
NPV at a discount rate of:		
5% real	\$87,172	\$20,924
10% real	\$63,753	\$11,333
15% real	\$48,984	\$5,867
Initial investment (yr 1 only)	\$0	\$507
Internal rate of return	n.a.	27%
Steady state year	2	3
Extra operating profit in steady state	\$8,447	\$3,433
<b>Financial analysis</b>		
Years of debt	-	6
Maximum debt	\$0	\$12,030
Year of peak debt	-	-
Cum net cash flow yr 7	\$79,391	\$2,652
Cum net cash flow yr 15	\$239,127	\$41,286
Salvage value yr 15	\$4,050	\$12,182

## **6. Investing in native pasture**

Options are to:

1. sub-divide and aerially spread clover onto 93 ha of native pasture which runs beef cattle and which will then be fertilised every three years
2. sub-divide and annually fertilise 45 ha native pasture utilised by the dairy herd

For the option of fertilising native pastures utilised by the dairy cattle it is expected that stocking rate will increase by three DSE/ha over 10 years.

For the aerial sowing option, the stocking rate is expected to increase from 3.0 DSE/ha to 7.0 DSE/ha over 10 years. An initial increase of 1.0 DSE/ha is expected; this is associated with the better grazing control made possible by the sub-division. Thereafter, an annual increase of 0.4 DSE/ha is expected .

Other assumptions are:

- for both options, fertiliser is applied at 100kg/ha and costs \$280/tonne which includes aerial spreading costs.
- Fencing costs \$1,500/km for 1.5 km of fencing for the sub-divisions.

### **6.1 Economic and financial results**

Discounted cash flow budgets have been prepared to show the extra contribution to the farm for the two sub-divisions. The results are shown in Table 6-1 and Figure 3.

Sub-division and fertilising the dairy pasture is expected to be profitable, though its contribution to expected annual net profit after tax is an expected \$5,000 once the steady state stocking rate is reached. The development would commit the owners to extra debt, but the debt is expected to be paid off in three years. The expected increase in stocking rate is relatively small, but the running the dairy enterprise on these paddocks means that the gross margin for the extra stock is high.

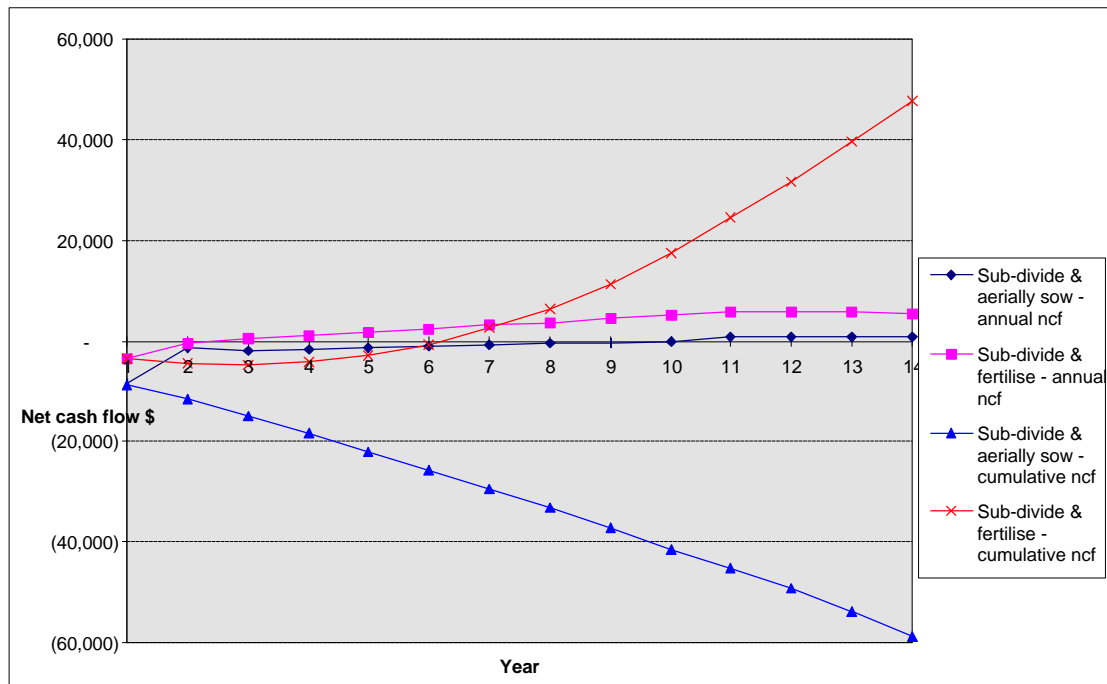
Sub-division and aerial sowing on the beef block is expected to be unprofitable, with a very low internal rate of return, and is not expected to be worth considering further unless critical variables change. The low gross margin per DSE which is expected for the beef enterprise when combined with a relatively low expected increase in stocking rate means that the investment is still carrying debt after 15 years. In order for the investment to generate a 15 per cent real annual rate of return and to have an acceptable break-even period, a much higher gross margin is needed.

Further investment on the beef paddocks, the least productive area of the farm, is unlikely to be worthwhile unless beef gross margins are increased substantially.

**Table 6-1** Profitability and financial feasibility of each option

Option	Sub-divide & sow	Sub-aerially divide & fertilise
<b>Economic analysis</b>		
NPV at a discount rate of:		
5% real	-\$7,763	\$43,759
10% real	-\$10,006	\$23,497
15% real	-\$10,548	\$12,804
Initial investment (yr 1 only)	\$9,086	\$2,969
Steady state year		
	-	11
Extra operating profit in steady state	\$0	\$5,290
<b>Financial analysis</b>		
Years of debt	15	
		6
Maximum debt	\$68,652	\$4,975
Year of peak debt		
	15	3
Cum net cash flow yr 7	-\$30,985	\$1,997
Cum net cash flow yr 15	-\$68,652	\$69,696
Salvage value yr 15	\$14,110	\$42,831

**Figure 3** Annual and cumulative net cash flow



## 7. Summary of development options

The extra net profit contributed each year by the developments once they reach a steady state is summarised in Table 7-1.

**Table 7-1 Extra net profit in steady state**

	Steady state (year)	\$'000
<b>Introduced pasture</b>		
Fertilise	2	8
Direct drill	3	3
<b>Native pasture</b>		
Sub-divide, clover, run beef	10	0
Sub-divide, run dairy	11	5
<b>Total</b>		<b>16</b>

## 8. 'Conservation management' options

There are two management options being considered:

- **Manage 30ha of the 130 ha Run-off block conservation by totally removing stock for 6-12 weeks a year.** Stocking rate is now reduced over the whole block for winter and early spring. This option would test the effect of removing all stock on part of the block.
- **Retire 15 ha of the Run-off block from production** - retiring 15 ha of the Run-off block from production will be examined to identify the income foregone to the owner by doing so.

These options are aimed at enhancing conservation value. Although management history has not been explored in detail, the presence of species which are indicative of light grazing suggests that current management practices are consistent with maintaining conservation values.

For the purposes of this analysis, it is assumed that stocking on the run-off block is three DSE/ha. The stocking rate is in fact somewhat lower. For the twelve months from December 1996 to November 1997, the block carried approximately 24 beef heifers; it also carried 35 dairy heifers and eight beef cows for nine months over this period. Other sundry stock including two bulls were carried for a shorter period.

Retiring land from production will reduce stocking from three DSE/ha to nil. Fencing out the 30 ha will be required, and fencing costs are assumed to be paid through the Land Protection Incentive Scheme.

Changes assumed with resting native pasture in spring include:

- a reduction in stocking rate from three DSE/ha to two DSE/ha
- no change in pasture composition.
- fertiliser is applied every four years as is the case now
- fencing out the 30 ha will be required, and fencing costs are assumed to be paid through the Land Protection Incentive Scheme.

For both options, the gross margin for beef cattle is based on the gross margin that is more typically found on farms in North-East Victoria, which is what this farm could reasonably expect if other developments are undertaken on the rest of the farm. This is approximately double the gross margin from the enterprise on this farm as it is currently organised.

## **8.1 Economic and financial results - 'conservation management' options**

Table 8-1 shows the foregone income associated with removing stock for 6-12 weeks.

Table 8-1 Income foregone by resting an area for 6-12 weeks

Area involved - ha	30
Estimated stocking reduction in DSE/ha	1
Gross margin/DSE	\$16
Capital value per DSE	\$22
Sale value of stock	\$659
<b>Gains</b>	
Interest earned on sale value of stock (after tax)	\$36
<b>Losses</b>	
Gross margin	\$480
<b>Net gain/loss before tax</b>	<b>-\$444</b>
less Marginal tax savings @ 15%	-\$67
<b>Net profit/loss after tax savings</b>	<b>-\$377</b>

The income foregone by retiring land from production is shown in Table 8-2.

Table 8-2 Income foregone by retiring land from production

Area involved - ha	15
Estimated stocking reduction in DSE/ha	3
Gross margin/DSE	\$16
Capital value per DSE	\$22
Sale value of stock	\$988
<b>Gains</b>	
Interest earned on sale value of stock (after tax)	\$55
Saved fertiliser costs (one in four years)	\$113
Total savings	\$167
<b>Losses</b>	
Gross margin	\$720
<b>Net gains/loss before tax</b>	<b>-\$553</b>
less Marginal tax savings @ 15%	-\$83
<b>Net profit/loss after tax savings</b>	<b>-\$470</b>

## 9. Changes to the whole farm business

Farm income needs to increase in order to meet family needs, to pay off debt and to generate an adequate return to capital.

### 9.1 *The proposed actions to increase farm income*

The combination of actions proposed for the new farm strategy are:

1. **Renovate pasture.** Two paddocks totalling 30 ha and with 25 ha of arable land will be direct drilled, removing stock for most of the first year.
2. **Fertilise all South of Creek block each year.** 60 ha will be fertilised at an average 250 kg/ha.
3. **Sub-divide and fertilise a native pasture utilised by the dairy herd.** This paddock is now 45 ha in size, at least half would have to be fertilised by air.

These investments will all pay back within a short period, which is a critical factor given the current level of indebtedness. The option of sub-dividing and spreading sub-clover by air onto pastures utilised by beef cattle is not included in the plan - the plan is unprofitable on the current gross margins for the beef enterprise, and may even be if gross margins were doubled.

The issues about this plan are:

- will it increase income sufficiently?
- can the farm afford to wait for the slow response of native pastures to fertiliser?
- can the farm afford the conservation management options?

Results from the combination of actions are shown in Table 9-1. The results are expressed in terms of how the current farm system will look in the future compared to a different farm system which incorporates the above activities.

The two options for introduced dairy pastures are expected to produce a large lift in net profit after tax within a couple of years. The income will still be insufficient to both meet financial requirements and provide \$30,000 for family consumption. By year 10, the investment on native pasture utilised by dairy cows is expected to further lift net profit after tax to the level that is necessary to meet immediate income requirements. Return to capital will still be below 3 per cent.

The conservation management options are not affordable at present. In 10 years time, the farm may be able to support them.

**Table 9-1 Snapshots into the future - current and new farm plans**

	Expected Annual Net Operating Profit after Tax			
	now	5	10	14
	\$	\$	\$	\$
<b>Farm without investments</b>	1,805	1,805	1,805	1,805
<b>Investments - native pasture</b>				
Sub-divide & aerially sow				
Sub-divide & fertilise		1,431	4,814	5,165
<b>Investments - rest of farm</b>				
Fertilise		8,334	8,077	7,812
Direct Drill		3,226	2,802	2,354
<b>Farm with investments</b>	1,805	14,796	17,498	17,137
<b>Conservation management options</b>				
Rest land		-470	-470	-470
Retire land		-377	-377	-377
<b>Farm with investments and conservation options</b>	1,805	13,949	16,651	16,290

## 10. Appendices

### 10.1 *The farming calendar*

Beef cattle

- Calving is in August
- Progeny are sold in June
- Cattle are taken to the Run-off block in mid-spring & brought home in April

Dairy herd

- Calve most cows in mid-April onwards

### 10.2 *Gross margins per DSE*

**Table 10-1Gross margins - beef enterprise**

Total DSE carried	895
INCOME :	
Stock trading profit/loss	\$7,941
COSTS :	
Animal health	\$528
Supplementary feed	
Freight	\$470
Stock selling expenses	\$499
Total Costs	\$998
ENTERPRISE GROSS MARGIN	\$6,943
* Gross margin per DSE	\$8
* Capital Value per DSE	\$22

**Table 10-2 Gross margins - dairy enterprise**

	\$
INCOME :	
Milk production	81,072
Stock trading profit/loss	8,585
Total Income	89,657
COSTS :	
AI	1,700
Herd test	900
Health	3,200
Calf rearing	1,300
Shed costs	2,100
Dairy supplies	1,800
Fodder	4,200
Concentrates	13,300
	0
Fertiliser	2,500
Irrigation	0
Fuel & oil	4,500
Other	0
Freight	240
Stock selling expenses	344
Total Costs	35,740
ENTERPRISE GROSS MARGIN	53,917
Gross margin per cow	539.17
* Gross margin per DSE	34.23
* Capital Value per DSE	53.24

### 10.3 Stock trading schedules

The stock trading schedules for the dairy and beef enterprises are shown in Table 12-3 and Table 12-4.

**Table 10-3 Stock trading account for dairy herd**

	\$/hd	No.	Value \$		\$/hd	No.	Value
<b>Opening stock</b>							
Cows	700		70,000	<b>Sales</b>			
		100		Cows	275	19	5,225
Springing heifers	400	20	8,000	Empty heifers			0
1 yo heifers	200	22	4,360	1 yo heifers	200	0	0
Bulls	1,000	2	1,500	Bulls	500	1	500
				Bobby calves	20	68	
<b>Births</b>		99		<b>Deaths</b>		10	
<b>Purchases</b>				<b>Closing stock</b>			
Cows				Cows	700	100	70,000
Steers				Springing heifers	400	20	8,000
Wnr.Heifers				1 yo heifers	200	22	4,360
Bulls	1,500	1	1,500	Bulls	1,000	2	1,500
<b>Profit/Loss</b>			8,585				
		243	89,585			242	89,585

**Table 10-4 Stock trading schedule for beef enterprise**

	\$/hd	No.	Value \$		\$/hd	No.	Value \$
<b>Opening stock</b>				<b>Sales</b>			
Cows	350		15,750	Cows	300	10	2,970
		45		Steers			
Steers				Vealers	180	29	5,221
Replacements	250	12	2,897	Yearlings	250	0	0
Yearlings	300	0	0	Bulls	500	0.3	125
Bulls	1,000	1	1,000	<b>Deaths</b>		3	
<b>Births</b>		42		<b>Closing stock</b>			
<b>Purchases</b>				Cows	350	45	15,750
Cows				Steers			
Steers				Replacements	250	12	2,897
Wnr.Heifers				Yearlings	300	0	0
Bulls	1500	0.3	375	Bulls	1,000	1	1,000
<b>Profit/Loss</b>			7,941				
		100	27,963			100	27,963

## 10.4 Pasture composition

Date of inspection: 10<sup>th</sup> November 1997

**Table 10-5.** Estimated % species composition by site - visual assessment - estimates of composition (not dry matter)

Paddock	Silver			Mull			Back				Harant			Bottom		Dairy	Run-off		
Block	South of Creek			North of Creek			North of Creek				South of Creek			South		South	Run-off		
Site	1	2	3	1	2	3	1	2	3	4	1	2	3	1	2	1	1	2	3
<b>Introduced annuals</b>																			
Grasses	30	2	5	5		90	14	10	30	5	70	10		50	70		15	20	10
Forbs- capeweed etc	0	1	20	0															
Legumes - clover, medics	30	27	70	5	2.5		5	5			1	10	50	20	5	40	5		
<b>Introduced perennials</b>																			
Grasses	0	40	5		5								10		5	20			
Broad-leaf weeds	20	10		10	2.5	10	1	30	15	15	14	70	30	10	20	40	15	10	15
<b>Native perennials</b>																			
cool season C3 grasses	30	0		40	90		30	25	5	20		10	10	20				20	
Warm season C4 grasses				40			50	30	50	60	15						63	50	75
Forbs																	2		
Carex		20																	
<b>Total</b>	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
<b>% annual species</b>	60	30	95	10	2.5	90	19	15	30	5	71	20	50	70	75	40	15	20	10
<b>% perennial grasses</b>	40	50	5	80	95	0	80	55	55	80	15	10	20	20	5	20	63	70	75
<b>% introduced species</b>	70	80	100	20	10	100	20	0	45	20	85	90	90	80	100	100	35	10	15
<b>% native species</b>	30	20	0	80	90	0	80	55	55	80	15	10	10	20	0	0	65	70	25

**Silver** - 1 = south slope ungrazed; 2 = gully; 3 = grazed south facing

**Mull** - 1 = east facing moderate slope; 2 = south facing slope; 3 = ridge west side

**Back** - 1 = north facing; 2 = west facing; 3 = steep north facing; 4 = south facing

**Harant** - 1 = north facing; 2 = west facing gentle slope; 3 = flatter areas

**Bottom**- 1 = west facing; 2 = north facing; **Dairy** - 1

**Run-off**- 1 = north facing gentle lower slope; 2 = north facing higher rocky slope; 3 = south facing near creek

**Table 10-6 Species abundance by site and plant characteristics**

**Species abundance category** - A = abundant; c = common; o = occasional; l = localised; r = rare

**Plant characteristics** G/F/L/S = Grass/Forb/Legume/Shrub; A/P = Annual/Perennial C/W = Cool/Warm season

Exotic	G/F/L/S	A/P	C/W	Species	Common Name	Site inspected															
						1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	G	A	C	<i>Lolium rigidum</i>	Annual ryegrass	c	c	c		A							c				
1	G	A	C	<i>Hordeum leporinum</i>	Barley grass	o				A											
1				<i>Tribulus terrestris L.</i>	Bindi Bind									o							
1				<i>Rubus fruticosus L. agg.</i>	Blackberry									o							
				<i>Pteridium esculentum</i>	Bracken		l												l		
1	F	A		<i>Arctotheca calendula</i>	Cape weed	o	o			c	o				o			o			
	F	P		<i>Carex appressa</i>	Carex			l	l		l	l		o							
1	F	A		<i>Cenaurium tenuifolius</i>	Centaury							r							r		
1	F	A		<i>Stellaria media</i>	Chickweed					o											
	F	P		<i>Dichopogon strictus</i>	Chocolate lily														o		
1	L	A	C	<i>Trifolium glomeratum</i>	Cluster clover			A	o			c				c			c		
1				<i>Sagina apetala</i>	Common pearlwort								r						c		
	G	P	C	<i>Elymus scaber</i>	Common Wheat Grass						o			A							
1	G	P	W	<i>Sorghum halepense (L.) Pers.</i>	Couch grass	o					o										
1	F	P		<i>Rumex spp</i>	Dock	o			o	o						l	o				
				<i>Utricularia dichotoma</i>	Fairies' aprons														r		
1	F	P		<i>Hypochoeris radicata</i>	Flatweed	c	c	A	o		A	A	A	A	A	c	c	A	A		
1					Flea bane (?)	o						o	o	o							
1	G	P	C	<i>Holcus lanatus</i>	Fog grass			o	A			o	o			l			o		
				<i>Myosotis sylvatica</i>	Forget-me-not				o										o		
1	G	A	C	<i>Bromus diandrus</i>	Great brome				o	A											
1	F	A		<i>Petrorhagia velutina</i>	Hairy pink							r		r							
	G	P	W	<i>Themeda triandra</i>	Kangaroo Grass										l				A		
1					Paspalum														A		
1				<i>Linaria pelisserana</i>	Pelisser's toad-flax														o		
				<i>Hydrocotyle laxiflora</i>	Pennywort														r		
1	G	A	C	<i>Lolium perenne</i>	Perennial Ryegrass	c			c							c	c	A			
1	G	A		Phalaris	Phalaris	o	A		l												
1					Pigeon grass														o		
	F	P		<i>Convolvulus euubescens</i>	Pink bindweed														r		



## **10.5 Development budgets**

Development budgets for the relevant investment options follow.