Case Study Financial Analysis
Saltland Pastures
Boorowa River Catchment

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Sustainable Grazing on Saline Lands

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Contents

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Introduction

Landholders in the Boorowa area of NSW have increasingly adopted sown saltland pastures on their farms in response to growing environmental concerns of dryland salinity, soil loss, reduction in ground cover and loss of biodiversity. Some farmers have reported increases in their farm productivity as a result of this action. This work was undertaken in response to the Sustainable Grazing on Saline Lands (SGSL) Producer Network Committee's request for a farm level evaluation of the investment in sown saltland pasture.

The Producer Committee wished to determine the following:

(i) whether the investment in sown saltland pasture yielded a positive financial return;
(ii) whether these returns were of significant magnitude to warrant the promotion of investment in saltland pastures and;
(iii) to devise a methodology that would aid landholder decision making in evaluating salt affected land, and the impacts on their whole farm grazing system.

Methodology

Two case study farms were examined in this analysis. Landholders were selected from those who had a long history (up to 20 years) experience in the establishment of sown saltland pastures on their properties. Interviews were conducted to gain data on enterprises, pastures, stocking rate, grazing management, estimates of risk, etc., under their current grazing system incorporating sown saltland pasture ie., the 'with' situation. Landholders were also questioned about their system prior to the adoption of sown saltland pasture, i.e., the 'without' situation. Using landholder data, both the with and without case study situations where then evaluated and compared.

Whole farm gross margin, partial budgeting and discounted cashflow analyses were the methods used to compare the alternative grazing systems of each property in a financial analysis. In line with national standards for the SGSL Program, the cashflow analysis was taken over ten years using a 7% discount rate. Establishment costs were incurred in year 1, full stocking rate was achieved in year 3 and salvage values were assumed for the capital items (excluding land values) and extra livestock in year 10.

In this analysis the investment in saltland pasture was funded from internal sources and 100% equity assumed. This analysis examines the comparison between sown and volunteer salt pasture on each property. No direct comparison should be made between Farm A and Farm B; each property has different enterprise mix and production systems.

Summary of Results

Stocking Rate

Both case study farms showed an increase in stocking rate (using landholder estimates) from the establishment of sown saltland pasture. The proportion of these increases in stocking rate varied considerably between the case study farms. Farm A landholder estimated a stocking rate on sown saltland pasture (13 dse/ha) well in excess of improved pasture (9 dse/ha) on the rest of the property. The Farm B landholder estimated sown saltland pasture to be carrying the same level of stock as other improved pasture (7 dse/ha) on the property.

The proportion of total farm carrying capacity contributed by saline pasture area increased significantly on both case study farms following the establishment of sown saltland pasture (up from 9% to 18% for Farm A and from 5% to 7% for Farm B).

Gross Margins

Increases in enterprise gross margin from the area of improved saltland pasture area and at the whole farm level were achieved on both farms. On the saline area the gross margin for Farm A increased by 142%, while the increase in gross margin for Farm B was 53%. At the whole farm level the establishment of sown saltland pasture resulted in gross margin increases of 18% for Farm A and 6.5% for Farm B.

Capital Costs

Pasture establishment costs were the largest capital costs, these included: seed, fertiliser, chemical, application and machinery costs. Establishment costs for Farm A were $252 per hectare and $204 per hectare for Farm B. Farm A also included a mixture of non saltland pasture species in the species used, which accounts for the difference in costs. Other capital costs include the cost of extra fencing, watering points and the cost of extra livestock. Total capital costs of establishing sown saltland pasture were calculated as $664 per hectare for Farm A and $349 per hectare for Farm B. The large difference in capital expenses reflects Farm A's higher saltland pasture costs and the significant investment in extra livestock.

Initial partial budget analysis indicated that the establishment of sown saltland pasture on both farms yielded a positive return on extra capital, (40% for Farm A and 14% for Farm B), an adequate return which warrants further appraisal via a detailed cashflow budget taking into account the effects of time on the value of the investment, (Malcolm 2005).

Financial results

As Table 1 shows, the financial results varied considerably between case study farms. The peak debt from the sown saltland pasture investment on saline areas on Farm A occurs in year 1. Cumulative cashflow (CCF) results indicate that the initial investment in sown saltland pasture is paid back by year 4. CCF is the running balance from the investment. CCF from sown saltland pastures exceeds the CCF

from the volunteer saltland pasture in year 6 and all subsequent years. These results are within reasonable bounds for this type of investment, (Dayananda 2002).

Table 1. *Key results from analysis*

	Farm A	Farm B
Stocking rate	13 dse/ha	7dse/ha
Investment period	10 years	10 years
Year of peak debt	1st year	1st year
Year investment is paid back	4th year	5th year
NPV /ha sown pasture (saline areas)	$1,373	$ 577
NPV/ha volunteer pasture (saline areas)	$ 753	$ 653
Change in NPV from investment (saline areas)	82%	- 12%
Change in NPV from investment (whole enterprise)	15%	4%

The net present value, (NPV), for sown saltland pasture on the saline area of Farm A was 82% higher than the NPV for the volunteer saltland pasture. NPV is the total net cashflow over the life of the investment expressed in present day value. Generally the option with the highest NPV would be chosen, i.e., the investment which adds most value to the business, (Dayananda 2002).

On a whole farm basis, NPV on Farm A is 15% higher from the grazing system incorporating sown saltland pasture than from the grazing system with volunteer saltland pasture. This reinforces sown saltland pasture as the best option.

The result on Farm B is not as clear cut. Capital costs of pasture establishment, fencing, etc., and zero stocking in year 1 result in negative annual net cashflow from the area of sown saltland pasture in that year. This is common to both farms and investments in general. Yearly net cashflow measures the income less expenses from the investment for each year. Although net cashflow is positive in year 2 and subsequent years it is not until year 4 that annual net cashflow from sown saltland pasture exceeds that from the volunteer pasture option. Subsequently on Farm B, at the estimated stocking rate, the NPV measuring the total net cashflow over the investment period, (10 years), discounted to present dollar values, is 12% less than for the volunteer pasture option on saline areas.

Peak debt from investment in sown saltland pasture on Farm B is in year 1 and the investment in paid back in year 5. The CCF or the running balance from the investment for sown saltland pasture remains below the CCF for volunteer saltland pasture throughout the investment period.

When incorporated into the whole farm, supplementary feed costs saved from extra feed available to the whole enterprise in dryer periods on Farm B result in higher annual net cashflows helping to cover the establishment costs and making the investment more attractive. At the whole farm level, NPV from the grazing system incorporating sown saltland pasture on Farm B is 4% higher than for the volunteer saltland pasture option.

The improvement in stocking rate from establishment of sown saltland pasture on Farm B of 2 dse per hectare would appear conservative. With the use of sensitivity analysis, which measures the effect of varying key investment parameters (Malcolm 2005), an improvement in stocking rate of 3 dse per hectare from the sown saltland

pasture would give a higher NPV than the volunteer saltland pasture at both the marginal and whole farm level.

Management only approach

The main basis to this study is the financial comparison between sown saltland pasture and volunteer pasture on saline areas. The results outlined above suggest the sown pasture option to be better for the farm business. However Farm B landholder considers significant environmental benefit (without loss of productivity) can be gained at low cost by simply changing grazing management on saline areas.

Some saline sites on Farm B have not been sown to saltland pastures. These areas have been managed differently using a planned grazing process with grazing limited to between 6 and 10 days per year. Results of this management change are improved species diversity, with more native grass species on these areas than on other parts of the farm, and large improvement in ground cover. Productivity is also improved, with previously bare ground and scald areas now providing feed value. Some fencing and water infrastructure costs may be incurred.

More detail of individual case study farms and analysis results are given in Appendices 1 and 2.

A positive return on investment

In general the results in Table 1 indicate that the financial analysis has demonstrated a positive return on investment from the changed management for saline land on these case studies. This relates to the first term of reference (above) asked by the Producer Committee.

The second question from the Committee was whether the returns were of significant (or sufficient) magnitude to warrant the promotion of investment in saltland pastures. The answer to this question depends on what individual landholders with such land might require in terms of financial (a return on capital invested) and non-financial (perhaps a feeling that they have contributed to environmental improvement) issues.

Comments in regard to answering the second question are that in financial terms the money invested in saltland pastures and other capital must be either borrowed (at a direct financial cost) or taken from other investments (with an associated opportunity cost). In either case the cost of capital is an important financial consideration. With regard to investments in new farm management methods, CIMMYT (1998) proposes the rule of a 100% return on investment before landholders are likely to make a management change involving spending money. This implies that if spending $1 the required return is $2 ($1 to repay the loan and $1 as the 100% return on investment). This is sometimes called the ‘2 for 1’ rule. If the cost of working capital is 8% then the returns on extra capital in this analysis (40% and 14%) are relatively healthy, although under this rule the Farm B result is marginal. However, it is up to individual farmers to decide what expected return they are likely to require in each situation.

Discussion

This analysis demonstrates that investment in sown saltland pastures, in addition to the environmental benefits of saline area amelioration, may have significant financial benefits for the farm business.

Sown saltland pasture has the potential to transform a poor performing area of the property, contributing very little to whole farm profit, into an important component of total farm productivity.

Increases in the net cashflow must be sufficient to cover the capital costs of pasture establishment, extra water and fencing infrastructure; and the purchase of additional livestock. There is a risk of pasture establishment failure on saline soils. The degree of establishment failure depends upon a number of physical and management factors and can result in additional pasture renovation costs and less than optimal livestock performance. This risk needs to be considered in the decision making process. Future net cashflows from the investment need to substantially exceed those generated from the volunteer saltland pasture option to make the investment attractive and allow for risk of pasture failure.

More work is needed to quantify the feed benefits from sown saltland pasture in times of feed deficit. However, it is reasonable to conclude that pastures that provide a positive contribution to the whole farm enterprise through the provision of feed during dryer periods or that result in savings in supplementary feed costs are a worthwhile investment. Bathgate (2003) maintains that the marginal value of feed supplied during times of shortage, are more valuable than that produced during periods of plenty. Careful grazing management is required to maximise these feed benefits.

Although this analysis shows sown saltland pasture provides higher financial benefit to the farm business than volunteer saltland pasture, the landholders consider significant environmental and productivity outcomes can also be achieved by simply changing grazing management on saline areas. By carefully managing stock access, native and introduced perennial grasses are allowed to recolonise bare areas, providing increased ground cover and enhanced biodiversity. Importantly, these outcomes are possible at a relatively low cost and minimal risk to the landholder.

Although outside the scope of this analysis, it is reasonable to conclude the environmental outcomes stemming from both the establishment of sown saltland pastures and changes to grazing management on saline areas of farms in the Boorowa district can have positive catchment wide implications for land and water resource quality.

Finally, the third question of the Producer Committee (relating to a methodology to aid landholder decision making) can be answered by using the methods described here. The budgeting and financial returns analyses described here are standard methods, and they are described in the references. However, growers may not feel confident in conducting such analyses themselves and may need to consult a trained person for analysis of their own situations.

APPENDIX 1

Case Study
FARM A

Total farm area: 1189 ha
Total pasture area: approx. 925 ha
Area affected by salt: approx 120 ha (13% of total pasture area)

Enterprise:

Self replacing merino ewe flock incorporating retained wether flock

Pasture mix

Saltland pasture: strawberry clover, balansa clover, fine leaf white clover, puccinellia, tall wheat grass, quantum tall fescue, rye grass, phalaris, sub clover

Non salt pasture: cocksfoot, phalaris, white & sub clovers, rye grass, fescue (in better areas)

Current Grazing Management

Rotational grazing frequency on Farm A is usually around 14 days per paddock with rest periods of about 60 days, resulting in each paddock grazed an average of 30 days per year. In order to reach sale weights, cfa stock are placed first in the rotation when necessary. Careful management of the tall wheat grass is necessary to prevent it becoming overgrown and unpalatable to the stock. Wethers in the rotation grazing system are considered essential by the landholder to prevent tall wheat grass dominating the salt area pasture. Alternative control measures include slashing and chemical application. Landholder observation, suggests that saltland pastures last longer in dry times than other pastures. This supports the view that saltland pasture systems have some feed gap benefits. He has estimated there is a saving in feed costs provided by the saltland pastures equivalent to about half the weaners' required feed ration. This equates to an estimated saving of 500grams of grain per weaner per week for 8 weeks. It must be stressed this is the landholders estimate and no quantitative measurements of the relative feed values have been made.

The landholder also believes that under his current rotational grazing system incorporating sown saltland pastures both ground cover and biodiversity are enhanced. He has seen a large increase in dung beetle activity. There has been a significant reduction in soil loss and he believes the quality of water runoff from his property has improved considerably since adopting his current grazing system. The landholder recalls, (prior to adoption of rotational grazing and sown saltland pastures), that saline areas were increasing with a subsequent reduction in farm carrying capacity.

Results:

As can be seen in Table 2, estimates of stocking rate from sown saltland pasture are significantly higher than other improved pasture, (non saline), areas and more than double that carried on the salt areas without sown saltland pasture. The proportion of

total farm carrying capacity contributed by the saline area of the farm rises from 9% to 17% of total stock carried when saline pastures are improved.

Table 2. *Stocking rate Farm A*

	Total	per ha
Stocking rate sown saltland pasture area	1560 dse	13 dse
Stocking rate volunteer saltland pasture area	720 dse	6 dse
Stocking rate sown pasture non salt area	7245 dse	9 dse
Portion dse carried on sown saltland pasture to total farm dse	17%	
Portion dse carried on volunteer saltland pasture to total farm dse	9%	

Table 3 shows gross margin results for Farm A. Gross margin results significantly favour the sown saltland pasture option. Increases in gross margin at both the marginal (saline area alone) and the whole farm level after establishment of sown saltland pastures are 142% and 18% respectively.

Table 3. *Gross margin result Farm A*

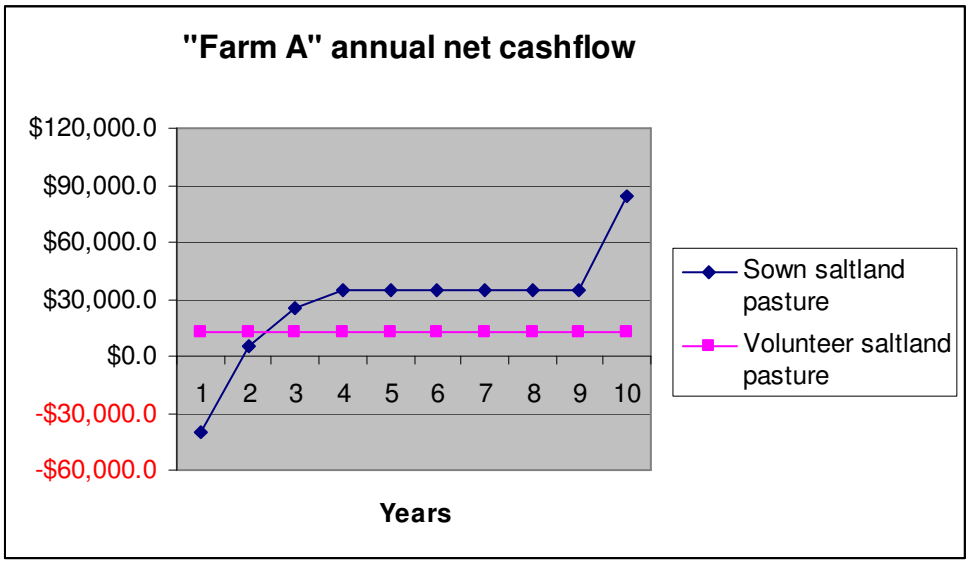
	Total	per ha
Gross margin sown saltland pasture – saline area alone	$38,993	$325
Gross margin volunteer saltland pasture – saline area alone	$16,124	$134
Gross margin sown saltland pasture system – whole pasture area	$217,466	$235
Gross margin volunteer saltland pasture system – whole pasture area	$184,707	$200

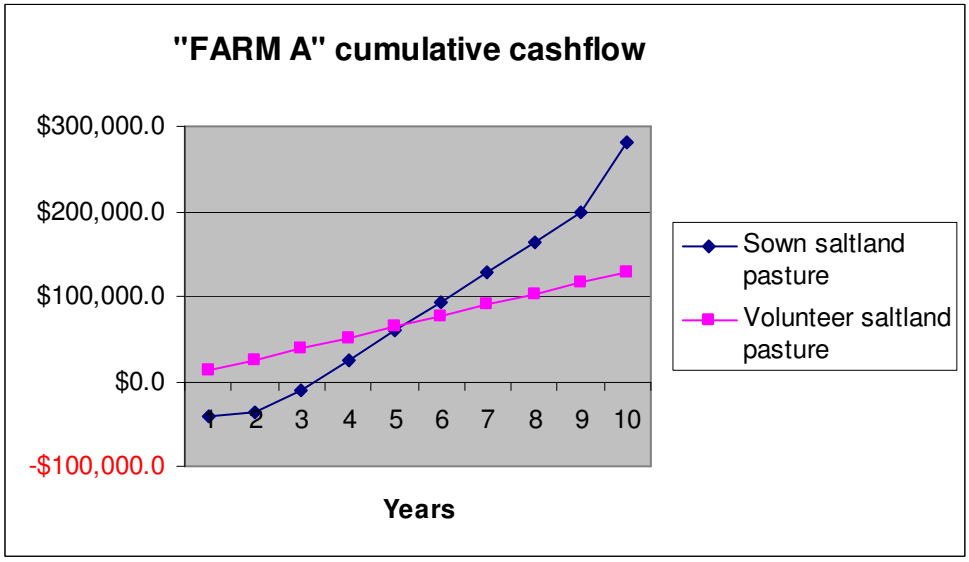
The return to extra capital invested in sown saltland pasture, calculated at around 40%, is shown in Table 4, a favourable result (Malcolm 2005). NPV for sown saltland pasture is 82% higher than for volunteer pasture on the saline area alone, and on the whole farm system basis the increase in NPV is around 15%. Peak debt of $37,794 occurs in year 1 with the large capital costs of establishment and zero income from the sown pasture. This is $49,810 behind the net cashflow from the volunteer saltland pasture in that year. The investment is paid back in the 4th year when the net benefits of the extra stock carried become evident. This is illustrated in graphical form in Figure 1. Although the investment becomes positive in year 4, it takes until year 7 before the CCF, or running balance from the investment, overtakes the volunteer saltland pasture on the saline areas alone. The rise in net cashflow in year 10 is the effect of including salvage values, (residual value at end of the investment period), of capital items in the final year of the analysis.

Table 4. Capital and cashflow results Farm A

	Total	per ha
Return to extra capital from investment in sown saltland pasture	40%	
NPV sown saltland pasture – saline area alone	$164,736	$1,373
NPV volunteer saltland pasture – saline area alone	$90,302	$735
NPV sown saltland pasture system – whole farm pasture area	$1,256,911	$1,359
NPV volunteer saltland pasture system – whole farm pasture area	$1,089,407	$1,178
Peak debt from investment occurs in year	year 1	
Investment is paid back in year	year 4	

Figure 1. Annual net cashflow and cumulative cashflow on saline areas of Farm A





There is generally a perceived higher risk of failure of establishing sown saltland pasture than improved pasture on non saline areas. In some years excess waterlogging and timeliness of sowing operations can be problems. Farm A landholder estimates the risk of failure of pasture sown on saline areas to be about 30% compared to 10% for non saline pastures. Less than ideal pasture establishment has implications of reduced carrying capacity and costly renovation.

APPENDIX 2

Case Study
FARM B

Total farm area:	814 ha
Conservation area:	approx 57 ha
Total pasture area:	approx 757 ha
Total pasture area wethers:	approx 567 ha
Total pasture area cattle:	approx 190 ha
Area affected by salt:	approx 40 ha (7% of wether pasture area)

Enterprises:

Merino wethers
Steer backgrounding for feedlot

Pasture mix

Saltland pasture: strawberry clover, balansa clover, puccinellia, tall wheat grass
Non salt pasture: cocksfoot, phalaris, clovers, lucerne,

Current grazing management

The wethers and cattle are usually run on separate parts of the property with a grazing rotation plan developed separately for each. The cattle enterprise is assumed to be run on a non saline area of the property and hence is not considered in this analysis.

Grazing frequency is usually 6 to 10 days per paddock over 2 to 3 grazing rotations per year, with rest periods of between 60 to 180 days. The landholder considers the correct timing between grazing as a major factor in pasture persistence, allowing other plant species to develop, improving ground cover, and controlling the tall wheat grass which can become overgrown and unpalatable to stock. As trees reach a suitable size, stock are reintroduced into some conservation areas of the property. The landholder believes rotational grazing, with infrequent disturbance and minimal damage from stock in these areas can enhance species numbers and diversity. The requirements of all the species that inhabit these conservation areas on the property are considered when developing grazing plans.

In normal years under the rotational grazing system with sown saltland pasture the landholder does not supplementary feed his wethers. Supplementary feed would be required under the system without sown saltland pastures.

Results:

As can be seen in Table 5, landholder estimates of stocking rate from sown saltland pasture are similar to other improved pasture (non saline areas) and 2 dse per hectare

more than on the salt areas without sown saltland pasture. Carrying capacity contributed by the saline area of the farm increases from 5% to 7% of total enterprise stock after establishment of sown saltland pasture.

Table 5. *Stocking rate Farm B*

	Total	per ha
Stocking rate sown saltland pasture area	280 dse	7 dse
Stocking rate volunteer saltland pasture area	200 dse	5 dse
Stocking rate sown pasture non salt area	3689 dse	7 dse
Portion dse carried on sown saltland pasture to total farm dse	7.1%	
Portion dse carried on volunteer saltland pasture to total farm dse	5.1%	

Table 6 shows gross margin results for Farm B. These results favour the sown saltland pasture option. Increases in gross margin at both the marginal (saline area alone) and the whole farm enterprise level after establishment of sown saltland pastures are 53% and 6.4% respectively.

Table 6. *Gross margin result Farm B*

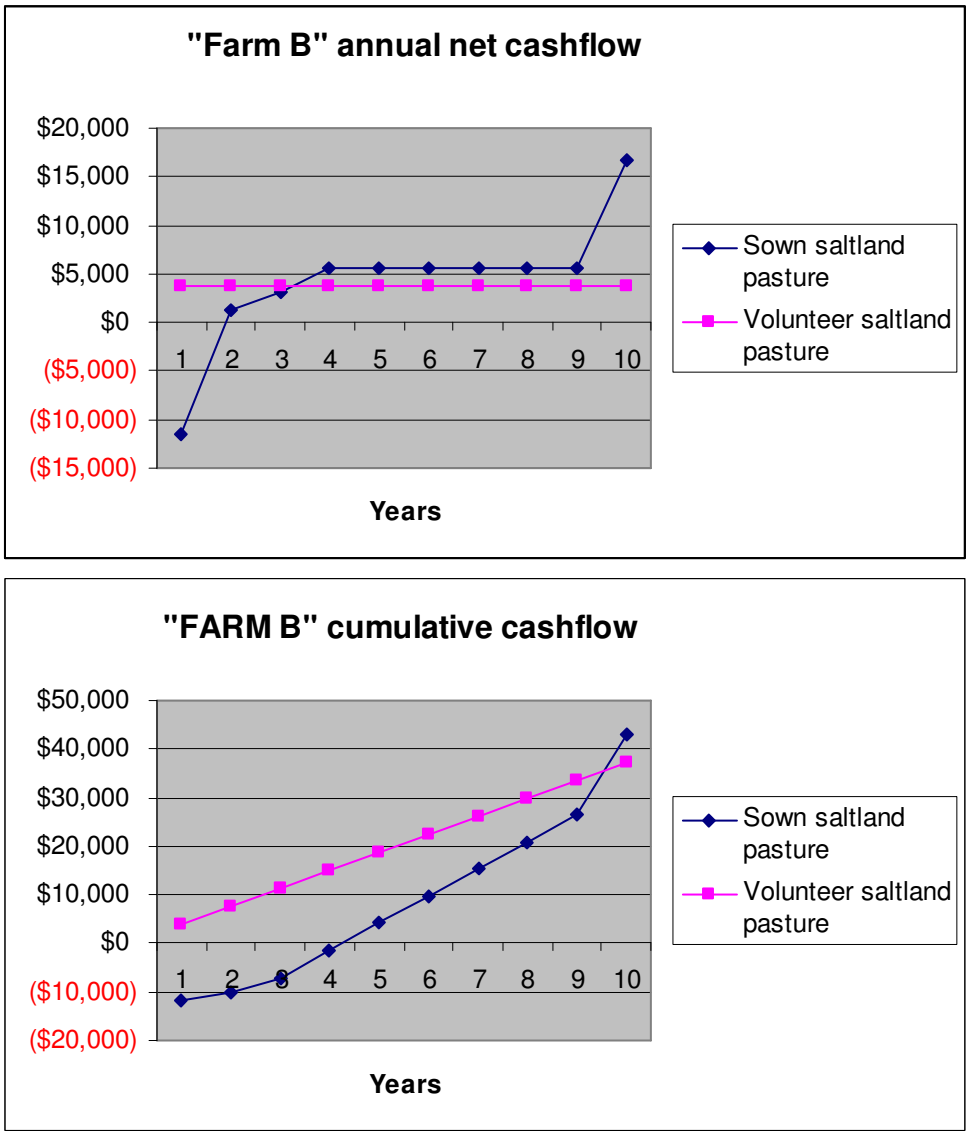
	Total	per ha
Gross margin sown saltland pasture – saline area alone	$ 5,908	$148
Gross margin volunteer saltland pasture – saline area alone	$ 3,854	$ 96
Gross margin sown saltland pasture system – whole pasture area	$ 83,511	$147
Gross margin volunteer saltland pasture system – whole pasture area	$ 78,520	$138

The return to extra capital invested in sown saltland pasture, calculated at around 14%, is shown in Table 7. NPV for sown saltland pasture is 11.6% lower than for volunteer pasture on the saline area alone. Conversely, on the whole farm basis, there is a small increase in NPV, of around 4%, after the establishment of sown saltland pasture. Peak debt of $10,800 occurs in year 1 with the capital costs of establishment and zero income from the sown pasture. This is $14,280 behind the net cashflow from the volunteer saltland pasture in that year. The rise in net cashflow in year 10 is the effect of including salvage values, (residual value at end of the investment period), of capital items in the final year of the analysis. The investment is paid back, (CCF becomes positive), in the 5th year when the net benefits of the extra stock carried become evident. This is illustrated in graphical form in Figure 2. Although the investment becomes positive in year 5, the CCF or running balance from the investment fails to overtake the CCF for volunteer saltland pasture over the investment period.

Table 7. Capital and cashflow results Farm B

	Total	per ha
Return to extra capital from investment in sown saltland pasture	13.8%	
NPV sown saltland pasture – saline area alone	$ 23,095	$577
NPV volunteer saltland pasture – saline area alone	$ 26,114	$653
NPV sown saltland pasture system – whole farm pasture area	$538,780	$950
NPV volunteer saltland pasture system – whole farm pasture area	$519,766	$917
Peak debt from investment occurs in year	year 1	
Investment is paid back in year	year 5	

Figure 2. Annual net cashflow and cumulative cashflow on saline areas of Farm B



Contrary to the generally perceived view, Farm B landholder estimates there is minimal risk of failure of pastures either sown on saline or non saline areas.

Management only approach

Some saline sites on Farm B have not been sown to saltland pasture. The landholder has managed these sites using a planned grazing process consistent with Holistic management principles. Stock are grazed a minimum of 6 days to a maximum of 10 days per year. Grass species are allowed to colonise bare areas during the periods free of stock. Results from this grazing management approach show, in paddocks previously with significant areas of scalding, bare ground has been revegetated and species diversity has improved to a level equal to elsewhere on the property. In particular, these areas now contain more species of native perennial grasses than are present on other areas of the farm.

This management may also increase stocking rate on these sites enhancing farm productivity and providing an improved economic result for the business. The landholder considers the main benefit from this approach is the positive environmental outcomes achieved at a relatively low cost. Increased groundcover results in significantly reduced erosion risk. Biodiversity and perenniality of grass species is increased. There may be some additional infrastructure costs such as fencing and water points associated with changing from traditional grazing management.

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