EverGraze
More livestock from perennials

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Pasture Improvement Calculator

The Pasture Improvement Calculator is designed to work out the value of spending money now to resow or oversow a pasture and the dollar value over the next 10-15 years discounted to current values. The program uses the discounted cash flow technique to evaluate both the economic profitability and financial feasibility of a proposed investment in pasture improvement. It will also show the cash flow over this period and the break even year (when the additional returns are greater than the initial costs plus interest).

DATA INPUT

Pasture Establishment Costs

Paddock Development (incl. fencing, levelling, water supply etc)			Price		Cost $/Ha
Fencing		kilometres		per Km	$0
Pipes		metres		per metre	$0
Levelling		hectares		per Ha	$0
Troughs		troughs		per trough	$0
Other infrastructure				per Ha	$0
					$0
Type	**Rate**				
Cultivation					
		passes		per Ha	$0
		passes		per Ha	$0
					$0
Lime/Gypsum Application					
Lime applied year prior to sowing	2.5	T/ha @	$30.00	per tonne	$75
		T/ha @		per tonne	$0
Cartage and Spreading (if not already included)			$13.00	per Ha	$13
					$88
Seed					
Phalaris	4.0	kg/ha @	$20.00	per kg	$80
Sub clover	8.0	kg/ha @	$8.00	per kg	$64
		kg/ha @		per kg	$0
		kg/ha @		per kg	$0
Contract sowing cost			$70.00	per Ha	$70
					$214
Fertiliser (incl. cartage)					
MAP (spread with drill at sowing)	100	kg/ha @	$0.80	per kg	$80
		kg/ha @		per kg	$0
		kg/ha @		per kg	$0
Spreading (if not already incl.)				per Ha	$0
					$80
Spring spraying (year before establishment)					
Barley grass spray topped year prior to sowing	1.0	L/ha @	$6.00	per L	$6
		L/ha @		per L	$0
Application costs			$22	per Ha	$22
Pre-sow spraying					
Knockdown herbicide	2.0	L/ha @	$6.00	per L	$12
		L/ha @		per L	$0
		L/ha @		per L	$0
Application costs			$22	per Ha	$22
Post-sow spraying					
Red-legged earthmite spray	0.1	L/ha @	$40.00	per L	$4
Broadleaf spray	1.0	L/ha @	$17.00	per L	$17
Application costs			$22	per Ha	$22
					$105
TOTAL ESTABLISHMENT COST PER HA					$487

Additional Annual Pasture Maintenance Costs

Type	Rate		Price		Cost $/ha
Fertiliser Application (incl. Cartage)					
Phosphorus at 0.8 kg/extra DSE/ha = 9 DSE/ha * 0.8 kg * 8.8% in single super phosphate	81	kg/ha @	$0.40	per kg	$32
		kg/ha @		per kg	$0
		kg/ha @		per kg	$0
Spreading (if not already included)				per Ha	$0
					$32
Herbicides/Pesticides					
Assumed no additional herbicides		L/ha @		per L	$0
		L/ha @		per L	$0
		L/ha @		per L	$0
Application cost				per Ha	$0
					$0
Additional Livestock Labour			$0.50	Per DSE	$8
TOTAL ADDITIONAL ANNUAL MAINTENANCE COST PER HA					$40

General Assumptions

Paddock and Pasture Production Values	
Area improved (ha)	1
Expected pasture life (4-20 Years)	20
Chance of pasture failure (%)	10%
Av. stocking rate before improvement (DSE/ha)	6.5
Peak stocking rate after improvement (DSE/ha)	15.5
Time to reach peak stocking rate (1-5 years)	1.0
Year when stocking rate begins to decline	9.0
Stocking rate at end of pasture life (DSE/ha)	11.0
No. weeks pasture grazed in year of sowing	11.0
Average area cut for hay before improvement (Ha)	0.0
Average area cut for hay after improvement (Ha)	0.0
Period locked up for hay (weeks)	0.0
Economic and Financial Values	
Agistment cost ($ per DSE per week)	$0.50
Gross margin before improvement ($/DSE)	$22.00
Gross margin at peak stocking rate ($/DSE)	$26.00
Capital cost of livestock ($ per DSE)	$55
Average hay gross margin before improvement ($/Ha)	$0
Average hay gross margin after improvement ($/Ha)	$0
Opportunity cost of invested capital	5.0%
Expected Annual Inflation Rate	3.5%
Marginal Tax Rate	20%
Interest on borrowed funds	8.0%
Interest on investment funds	5.0%
Residual Pasture Values	
Residual value of the seed and sprays ($/ha)	
Residual value of the lime/gypsum ($/ha)	
Residual value of the fertiliser ($/ha)	$182
Residual value of soil N (higher legume content) ($/ha)	$240
Residual value of paddock development ($/Ha)	
Total residual value of improved pasture ($/ha)	$422
Estimated Environmental Benefits	
Annual environmental benefit of improved pasture ($/Ha)	

Euroa Producer Demonstration Site case study

The Euroa Grazing Group has established phalaris as one of five species being trialled on their Producer Demonstration Site. They are monitoring the grazing days and live-weight gain of weaner cattle as part of the trial. They are comparing the new pastures which are grazed by weaner cattle to the other half the paddock which is an unimproved control grazed with cows and calves.

Production figures on Euroa Grazing Group Producer Demonstration Site for the period January – December 2010 20102010:

Treatment	Gross margin	Stocking rate
Phalaris weaner cattle	$26/DSE	15.5 DSE/ha
Control cows and calves	$22/DSE	6.5 DSE/ha

Pasture costs

The first step is to input the pasture establishment costs including preparation the year prior to sowing. In the Euroa example, a lime application and spray-topping was undertaken the year prior to direct drilling the pasture. Follow-up sprays for broadleaf weeds and red-legged earth mites were undertaken after sowing. The calculator allows for paddock development including fencing and water points, but these were not required in the Euroa example shown in table to left.

Maintenance fertiliser and sprays

Additional maintenance fertiliser costs are added in to account for the extra stock or hay cut off the paddock. In the Euroa example, stocking rate was increased by 9 DSE/ha. At 0.8 kg/ extra DSE, this results in an additional 81 kg/ha single super required/ha/year. The calculator also allows for extra sprays to be added, which were not required in the Euroa example.

Paddock and pasture production values

In this section the user needs to estimate the life of the pasture and the probability that it will fail in establishment. In the Euroa example, the life of the phalaris is estimated at 20 years and the probability of it failing is 10% (1 in 10 attempts). The production values are added in terms of stocking rate in DSE/ha before and after improvement. The time the animals spend off the pasture is also considered in an agistment cost. A new function allowing for hay to be cut off the paddock has also been added.

Economic and financial values

The economic values account for changes in gross margin per DSE, the capital costs of purchasing livestock, opportunity costs, tax, inflation and interest.

Residual values

The residual values account for the improvement in the productivity of the pasture at the end of its life compared to before the improvement. In the Euroa example, it is estimated that Olsen P will be lifted from 10 mg/kg to 15 mg/kg during the 20 years. At 8 kg phosphorus required per unit of P increase, this equates to 40 units of phosphorus or 455 kg/ha, valued at $182/ha.

If the resowing program increases the legume content of the pasture, it will increase soil N by 25 kg/tonne extra legume grown. This will especially benefit any subsequent grain crops sown in the paddock. In this example, assuming 30 % legume compared to 15% legume in the control for 10 years for a pasture growing 8 t/yr. Extra N = 8t/yr * 0.15 = 1.2 t/ha/yr additional legume which provides 30 kg/ha additional N/yr valued at about $0.80/ kg = $240 over 10 years.

Results and payback period

The results output is provided in the table to the right.

Cost/benefit comparison of using lime or no lime

The calculator provides a function for comparing different scenarios. In this example, lime has been taken out of the paddock preparation to reduce the establishment costs, but the probability of establishment failure has been increased to 50%. The results of this scenario are provided in the table and graph to the right. The scenario analysis is most useful for demonstrating how little difference it makes to the pay-back period if shortcuts are made, and that having a failure is a much bigger risk.

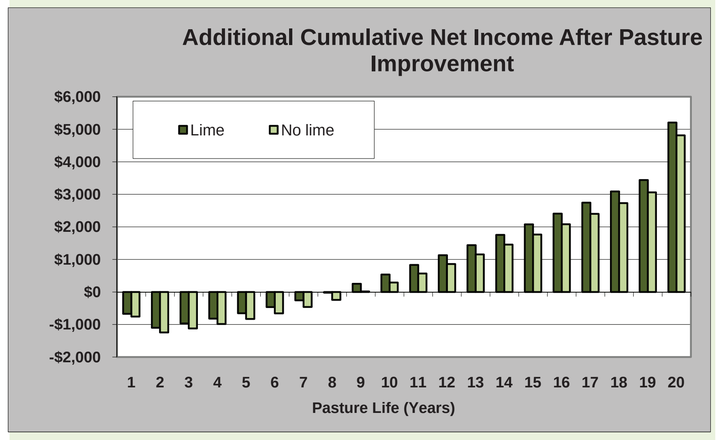
The Pasture Improvement Calculator was developed by Geoff Saul in consultation with Lee Beattie. Improvements to the calculator are on-going and feedback is gratefully received. Download the calculator at www.evergraze.com.au

RESULTS

	Lime		
Measurement	**Value**	**Definition of Term**	**Decision Criterion**
Net Present Value (NPV)	$1,989	The net sum of the discounted values of the future income and costs associated with the pasture improvement. Represents the amount of extra money you would have in current dollar terms above what you earned at your required rate of return, at the end of the investment period.	Undertake pasture improvement if NPV is greater than zero at the required discount rate
Internal Rate of Return (IRR)	20.6%	The discount rate that sets the NPV of the investment to zero ie. the breakeven discount rate for the investment. If all money for the investment was borrowed, the IRR would represent the maximum interest rate the investor could afford to pay on the loan without losing money.	Undertake pasture improvement if the IRR is greater than or equal to your specified discount rate.
Peak Debt **Year of Peak Debt**	-$1,099 2	The highest level of cumulative debt during the life of the investment and the year in which it occurs.	Can you cover this negative cash flow with equity or borrowed funds (and cover interest payments)?
Break Even Year	9	The year in which cumulative cash flow for the investment becomes positive.	Can you cover a negative cash flow for this length of time?
Break Even Peak Stocking Rate (DSE/Ha)	7.7	The peak stocking rate required to just break even at your chosen discount rate ie. all costs are covered but there is no profit.	Is this a realistic/achieveable figure for the pasture after allowing for risk?
Break Even Peak Gross Margin ($/DSE)	$30.98	The peak gross margin per DSE required to just breakeven at your chosen discount rate ie. all costs are covered but there is no profit.	Is this a realistic/achieveable figure for the pasture after allowing for risk?

SCENARIO ANALYSIS

RESULTS	Lime	No lime
Net Present Value	$1,989	$1,872
Internal Rate of Return	20.6%	18.4%
Peak Debt	-$1,099	-$1,243
Year of Peak Debt	2	2
Break Even Year	9	9



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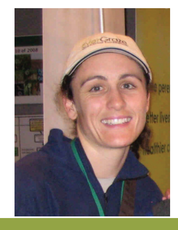

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EverGraze is a Future Farm Industries CRC, MLA and AWI research and delivery partnership

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