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Evaluating enterprise change and capital investments:

partial and break-even budgets

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INTRODUCTION

To maximise returns, most farmers should adapt production activities to influences such as changing market requirements and production costs. To answer the question 'Will I be better or worse off if I do something which I am not doing now?' the farmer needs some detailed planning and an accurate assessment of benefits and costs involved.

If you want to achieve the best balance of enterprises or replace an old machine, you must assess the relative merits of your proposed changes in the context of overall farm structure. Two useful techniques for such an evaluation are partial and breakeven budgets. In this Agfact we shall discuss the ways in which you can use these techniques.

PARTIAL BUDGETING

There are many factors to consider when evaluating alternative plans, such as whether they are physically and technically feasible, cash flow differences, risks involved, taxation and relative profitability. This Agfact will only deal with the changes in profitability and returns.

A partial budget is a method of assessing the likely value of introducing a new activity by comparing it with the existing situation. Put simply, you are comparing the extra costs and returns of the new activity with those of the present activity. The net returns or losses can then be expressed as a percentage return on extra (or marginal) capital, providing a preliminary basis for comparison with other alternatives.

The first step when preparing a budget is to list all physical and technical items that will be involved in the change, and apply appropriate values to them. They are then incorporated into the budget. Make sure that all items are accounted for to ensure accurate results. Neither capital costs involved in setting up the activity nor permanent labour are included, unless extra labour needs to be employed.

The best way to understand this concept is through an example. We will look at two plans that Jack Strap, a primary producer from Scrubby Creek, is considering. The first plan involves changing the mix of enterprises to boost his overall income, and the second plan involves investing in new machinery to become more efficient.

Firstly, Jack believes he could be using paddocks (which presently carry 600 self-replacing merino ewes) more profitably by running 60 self-replacing beef cows. Secondly, he believes selling the old header and buying a new header will make his harvesting operation more efficient, reducing the risk of weather-damaged grain.

BOX 1
PHYSICAL AND TECHNICAL ITEMS: CHANGING LIVESTOCK ENTERPRISES

Present merino ewe enterprise per year:

Income –	Wool sales 21micron	$14,306
	Surplus stock sales	$12,797
	(incl. CFA ewes, wether weaners, ewe hoggets)	
Costs –	Stock health costs	$2,600
	Shearing and selling costs	$4,784
	Livestock selling costs	$1,293
	Ram replacements	$1,800

Proposed beef cattle enterprise per year:

Income	57 yearlings @ $500/head	$28,500
	Culls	$5,900
Costs –	Stock health costs	$750
	Livestock selling costs	$1,450
	Bull replacement @ $3,300 every two years	$1650/year

Capital Purchases

Cattle yards and Crush	$6,000

Jack sets about preparing a partial budget and itemises all his present costs and returns, plus those of each plan under consideration.

He consults the gross margin budgets at www.agric.nsw.gov.au/econ/budget to get the recent price and income estimate for each enterprise.

The first plan is now considered. Box 1 contains all the physical and technical information for the proposed change. The costs and returns for the proposed plan are calculated for when it is in full operation.

As Jack is not currently running any cattle elsewhere on the property, cattle yards and a crush will have to be purchased, at a cost of $6,000.

Once all the physical changes have been isolated and values applied to them, a partial budget can then be drawn up. Box 2 presents the partial budget calculations.

When the plan is in full operation, it will generate an extra $13,960 per year above the existing enterprise for a capital outlay of $32,750 (see Box 2). Jack must determine if this is a satisfactory return on marginal (extra) capital.

The return on marginal capital is a useful screening device. If the percentage is high compared to alternative uses of capital, then the development warrants further study by way of a cash flow budget. If it is low it can usually be rejected.

BOX 2

PARTIAL BUDGET: CHANGING LIVESTOCK ENTERPRISES

1. Gross Returns: present and proposed enterprises

Present merino ewe enterprise per year: (600 ewes – 21 micron)		**Proposed beef cattle enterprise per year: (60 cows – Yearling beef)**	
Annual income:		**Estimated annual income:**	
Wool	$14,300	Yearlings	$28,500
Surplus stock	$12,800	Surplus stock	$5,900
Total	$27,100	Total	$34,400
Annual variable costs:		**Estimated annual variable costs:**	
Stock health	$2,600	Stock health	$750
Shearing	$4,800	Livestock selling	$1,450
Selling costs	$1,300	Bull replacements	$1,650
Ram replacements	$1,800	Total	$3,850
Total	$10,500		
Annual returns:		**Estimate annual returns:**	
$27,100 - $10,500	**$16,600**	**$34,400 - $3,850**	**$30,550**

(A) Expected change in returns = $30,550 - $16,600 = $13,950

2. Capital Outlay: purchases less sales

	Capital Out-flow	**Capital In-flow**
Purchases:		
60 beef cows @ $650 each	$39,000	
2 bulls @ $3000 each	$6,000	
Yards and crush	$6,000	
Sales:		
Sale of 600 ewes @ $30 each		$18,000
Sale of 12 rams @ $20 each		$240
Total:	**$51,000**	**$18,240**

(B) Expected extra capital required = $51,000 - $18,240 = $32,760

3. Return to Marginal Capital:

$$\text{Return on Marginal Capital} = \frac{\text{Change in returns (A)}}{\text{Extra Capital (B)}} \times \frac{100}{1} = \frac{\$13,960}{\$32,750} \times \frac{100}{1} = 42.6\%$$

As the proposal returns 42.6%, Jack would probably be inclined to investigate the proposal further.

The second plan is now considered. The same procedure is used but the calculation is a bit more complicated. Jack consults the machinery cost information at www.agric.nsw.gov.au/econ/budget to get a starting estimate. These estimates are presented in Box 3.

As harvest takes an average of 26 days and wet weather during this period is often encountered, some grain quality damage often results. Jack estimates that he gets 50% of his harvest off before the first rain and receives top price of $150/tonne, an additional 30% of harvest is completed before the second rain and receives a price of $130/tonne and the remaining 20% receives a price of $90/tonne.

With a new header, Jack calculates harvest to take an average of 18 days. He estimates that he would get 70% of his harvest off before the first rain, with the remaining 30% harvested before the next rain.

The sale of the existing header and purchase of a new header will leave Jack outlaying $180,000 for the changeover.

Now that all the physical changes have been isolated and values applied to them, a partial budget can be drawn up as above. See Box 4.

The plan is expected to generate an extra $19,134 annually for a capital outlay of $180,000. Using the above calculation to determine the return on marginal capital, Jack can determine if the investment warrants further study.

BOX 3
PHYSICAL AND TECHNICAL ITEMS: UPGRADING TO NEW HEADER

Present harvest activity:

Area crop harvested	1000 ha
Average yield	2.5t/ha
Harvest hours per day	10 hrs
Header comb width	7.62m (25 feet)
Header speed	6.5km/hr
Harvest efficiency	80%
Total variable and overhead costs	$142.24/hour

Harvest hectares per hour = header comb width x header speed x harvest efficiency x 0.1 = 7.62 x 6.5 x 0.8 x 0.1 = 3.96 ha/hr

$$\text{Harvest duration days} = \frac{\text{area of crop harvested}}{\text{(harvest hours per day) x harvest ha/hr}} = \frac{10000}{10 \times 3.96} = 26 \text{ days (rounded up to nearest whole day)}$$

$$\text{Harvest duration hours} = \frac{\text{harvest duration days x harvest hours per day}}{\text{efficiency}} = \frac{26 \times 10}{0.8} = 325 \text{ hours}$$

Proposed harvest activity:

Area crop harvested	1000 ha	Harvest hectares per hour = 5.85 ha/hr
Average yield	2.5t/ha	
Harvest hours per day	10 hrs	Harvest duration days = 18 days
Header comb width	9.14m (30 feet)	
Header speed	8km/hr	Harvest duration hours = 225 days
Harvest efficiency	80%	
Total variable and overhead costs	$253.75/hour	

As the proposal returns 10.6%, Jack would probably be inclined to reject the idea as he believes he can achieve a higher return on this capital elsewhere. However, he also needs to consider the probability and impact of his old machine breaking down, and the tax implications of such an investment. The tax implications include the capital gain (or loss) on the sale of the old machine, Goods and Services Tax liabilities, the annual tax deductions if additional capital is sourced by increasing debt (such as interest), and any extra taxable income.

Jack considers the 100 hours saved by upgrading his header as an opportunity to do some contracting. Increasing the hours worked each year by 100 hours will increase income and spread the fixed ownership costs over 325 hours instead of 225 hours.

Therefore annual costs reduce to $186/hr, and Jack, using Agfact M2.6 *Calculating machinery costs and contract rates* (http://www.agric.nsw.gov.au), estimates he can charge $35/ha (or $205/hr). That gives him a return on marginal capital of 20.1%. With that return Jack is inspired to explore the demand for additional contractors in his region.

BOX 4
PARTIAL BUDGET: UPGRADING TO NEW HEADER

1. **Gross Returns: present and proposed enterprises**

Present Harvest Activity (1000 ha @ 2.5t/ha average)		**Proposed Harvest Activity (1000 ha @ 2.5t/ha average)**	
Annual income:		**Estimated annual income:**	
50%Grade 1 – @ $150/t	$187,500	70%Grade 1 – @ $150/t	$262,500
30%Grade 2 – @ $130/t	$97,500	30%Grade 2 – @ $130/t	$97,500
20%Grade 3 – @ $90/t	$45,000	Total income	$360,000
Total income	$330,000		
Annual costs:		**Estimated annual costs:**	
Variable and operating costs –		Variable and operating costs –	
$142.24 x 325 hrs	$46,228	$253.75 x 225 hrs	$57,094
Total cost	$46,228	Total cost	$57,094
Annual net return	**$283,772**	**Estimated annual return**	$302,906
(A) Expected change in returns = $19,134			

2. **Capital Outlay: purchases less sales**

	Capital Out-flow	**Capital In-flow**
Purchases: Cost of New Header	$330,000	
Sales: Sale of Old Header		$150,000
Total:	$330,000	$150,000
(B) Expected extra capital = $330,000 - $150,000 = $180,000		

3. **Return to Marginal Capital:**

$$\text{Return on Marginal Capital} = \frac{\text{Change in returns (A)}}{\text{Extra Capital (B)}} \times \frac{100}{1} = \frac{\$19{,}134}{\$180{,}000} \times \frac{100}{1} = 10.6\%$$

BREAKEVEN BUDGETING

Budgets can only be as reliable as the data used to construct them, and often some data may be uncertain. Breakeven budgeting is a helpful technique for isolating the uncertain factors and providing you with an idea of the risks involved.

A breakeven budget isolates the uncertain factor and represents it algebraically within the framework of the partial budget. The change in returns is assumed to be zero, so that the totals of both sides of the budget are made equal. The resulting formula is solved to determine the "breakeven" value of the uncertain factor.

In the first example, Jack is concerned that the price of yearlings could vary. A breakeven budget is constructed to determine the price of yearlings at which the enterprise will break even (that is, have the same returns) with the existing sheep enterprise. Yearling prices are designated by $x per yearling.

The break-even calculation, Box 5, shows that Jack will require at least $255 per yearling before the plan will break even with the existing enterprise. Obviously, if he has to borrow funds to purchase the stock he will require a higher return to meet the repayments.

An alternative, simpler way of calculating the breakeven point is to divide the change in returns by the constraining component, such as the number of yearlings.

This means that the price of yearlings can drop by $245 per yearling from the estimated price of $500 before it will give a zero change in returns. Therefore, the breakeven point is $255 ($500-$245).

To check that the plan is feasible you can also incorporate a minimum required rate of return into the breakeven budget. Suppose Jack decided he would not adopt a beef enterprise unless it gave him at least a 30% return on his capital, which is what he believes he would get elsewhere. What, then, would yearling prices need to be to achieve this level, if all other factors where held constant.

BOX 5
BREAK-EVEN BUDGET: CHANGING LIVESTOCK ENTERPRISES

1. Gross Returns: present and proposed enterprises

Present merino ewe enterprise per year: (600 ewes – 21 micron)		**Proposed beef cattle enterprise per year:** (60 cows – Yearling beef)	
Annual income		**Estimated annual income**	
Wool	$14,300	Yearlings (57 x $x)	$57x
Surplus stock	$12,800	Surplus stock	$5,900
Total	$27,100	**Total**	$57x + 5,900
Annual variable costs		**Estimated annual variable costs**	
Stock health	$2,600	Stock health	$750
Shearing	$4,800	Livestock selling	$1,450
Selling costs	$1,300	Bull replacements	$1,650
Ram replacements	$1,800	**Total**	$3,850
Total	$10,500		
Annual returns		**Estimate annual returns**	
$27,100 - $10,500	$16,600	$57x +$5,900 - $3,850	$57x + 2,050

2. Break-even calculations: two alternatives

Return from beef - returns from sheep = 0

$57x + $2,050 - $16,600 = 0

57x = $14,550

x = $255

OR

$$\frac{\text{Change in return (Box 2)}}{\text{Number of yearlings}} = \frac{\$13,950}{57}$$

= $245

Break-even return = $500-$245

= $255

BOX 6
BREAK-EVEN BUDGET: UPGRADING TO NEW HEADER

1. Gross Returns: present and proposed enterprises

Present Harvest Activity (1000 ha @ 2.5t/ha average)		**Proposed Harvest Activity(1000 ha @ 2.5t/ha average)**	
Annual income:		**Estimated annual income**	
50%Grade 1 – @ $150/t	$187,500	70%Grade 1 – @ $150/t	$262,500
30%Grade 2 – @ $130/t	$97,500	30%Grade 2 – @ $130/t	$97,500
20%Grade 3 – @ $90/t	$45,000	**Total income:**	**$360,000**
Total income:	**$330,000**		
Annual costs:		**Estimated annual costs:**	
Variable and operating costs –		Variable and operating costs –	
$142.24 x 325 hrs	$46,228	$z x 225 hrs	$225z
Total cost:	**$46,228**	**Total cost:**	**$225z**
Annual net return:	**$283,772**	**Estimated annual return:**	**$360,000-225z**

2. Break-even calculation

Return from the proposed activity - returns from the present activity	=	0
$360,000 - $225z - $283,772	=	0
225z	=	$76,228
z	=	$339

This is calculated in the same manner except that on the right-hand side of the break-even calculation the minimum return is $9,828 (30% x $32,760) rather than zero.

For the proposal to meet the required rate of return, yearling prices must reach $427 if all other factors remain unchanged. Jack has to then decide if that figure can be realistically attained. If the figure appears unrealistically high, he would reject the proposal.

In the second example Jack is concerned that there is a benefit in investing in the new harvest technology, but on initial examination purchasing a new machine may not provide sufficient returns to warrant the capital outlay. This prompts Jack to look at alternatives such as contracting the harvest operation as a way of taking advantage of the new technology without the capital outlay. Jack believes that the current contract rate is too high and that he can do it cheaper with his old header. As there is no capital outlay required, a partial budget return to marginal capital will be meaningless.

A breakeven budget is constructed to determine the contract rate at which he would be better off getting a contractor with a newer machine than persist with his header. See Box 6.

Jack would require rates to be less than $339/hr for a contractor using the same machine as he was considering purchasing before he would be better off using a contractor than his own machine. Based on 5.85ha/hr, the rate equates to $58/ha. As Jack can get his harvest done by contract for approximately $35/ha he is keen to look further into contracting.

The same technique can be used to look at the breakeven rate given different proportions of the crop being downgraded, for different price discounts etc..

For example, Jack uses the technique to determine the financial impact if the contractor did not arrive on time by changing the proportion of grain received for different grades to 70% grade 2 and 30% grade 3. The breakeven rate is $9/ha, well below the anticipated $35/ha. Jack can now make an informed decision about his machinery decision problem noting that the $150,000 received from the sale of his old header could be put to good use, funding his investment in beef cattle.

CONCLUSION

Partial and breakeven budgets are valuable aids to the primary producer by virtue of their simplicity. They are very easy to construct and understand, and provide a sound preliminary basis for management decisions. Proper budgeting by producers will lead to a better understanding of the farm's financial status, and, hopefully, more efficient use of the resources available.

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