

The economics of phosphorus use in pasture systems



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We all know pastures need phosphorus (P) to grow. Investing in phosphorus fertiliser has been the cornerstone of healthy, productive and profitable pastures in southern Australia for well over half a century.

Current soil science and pasture nutrition knowledge don't offer any substitutes for phosphorus when it comes to maintaining productive pastures. Phosphorus is one of the key drivers of production and that's not likely to change any time soon.

So, the role of phosphorus in pasture production is important and its impact on productivity is generally well understood, due to the knowledge built over decades of industry research and large-scale commercial demonstration projects such as the Triple P (Paired Paddock Program).

What perhaps is not quite so well understood is the economics of phosphorus use within commercial grazing businesses.

We track the price fluctuations of fertiliser from season to season, but what about the returns it generates to a grazing business through increased productivity resulting from maintenance or capital applications?

Let's look at capital P applications.

Results from the Triple P program involving over 1000 commercial grazing sites in south eastern Australia have been used to calculate a potential Stocking Rate Formula (SRF) based on Olsen P level and length of growing season for a grazing enterprise (Saul & Kearney, 2002).

The SRF can be used to predict the likely increases in stocking rate achieved with capital P applications at a paddock or whole-farm level.

Current stocking rate can be assessed and the cost to correct macronutrient deficiencies (including P) can be determined with soil test results.

By combining these associated costs with the likely increase in stocking rate (based on the SRF), we can predict the likely returns on the capital fertiliser invested.

What's interesting about doing these calculations is the strong shift in the economics that we've seen in recent times.

The return on capital P investment is generally much greater than it was three, five or ten years ago. A couple of factors are driving this - livestock gross margins and fertiliser price.

The following table provides a worked example of predicted Internal Rates of Return (IRR) for a specific pasture production system.

| | Enterprise Gross Margin \$25/DSE | Enterprise Gross Margin \$50/DSE |
|-----------------------------|-------------------------------------|-------------------------------------|
| Single Super \$350/t spread | 17% | 37% |
| Single Super \$500/t spread | 15% | 34% |

**Specific assumptions for IRR calculations detailed in this table include:*

- Average length of growing season 8 months
- Starting Olsen P 8 lifted to 15 over 3 years
- Initial stocking rate 10 DSE/ha lifted to 17.5 over same period
- Capital P required 62 kg P/ha
- Annual P required for maintenance 0.8 kg/DSE
- P identified as only limiting macronutrient to achieve SRF (adequate K levels)
- Soil PBI 100
- Capital cost of additional livestock \$100/DSE

Important! Be aware that the IRR values presented in the table cannot be used generically across grazing situations as a change to any one of the listed assumptions will alter forecast values.

What does it mean?

The IRR is the annualised effective compound return rate earned on the invested capital, i.e. the yield of the investment.

An investment delivering an IRR of 10% is essentially an investment returning an average annual profit of 10% on the investment with profits reinvested (i.e. compounding) annually.

It's important to note that the IRR values presented in the table have all been calculated over a 10-year period.

The additional capital invested in capital P fertiliser (in this case 62 kgP/ha) and capital livestock to raise the stocking rate all occur in the first three years. The remaining seven years capture the additional income generated by a higher stocking rate system, less the higher annual P maintenance costs.

What does this tell us from an economic perspective?

Firstly, it suggests that capital P is profitable.

The forecast IRR for the four scenarios are all positive. Even the 15% IRR would look good against most share portfolios and it's a country mile ahead of current bank cash rates.

What's really interesting is the influence of enterprise gross margins.

Not so long ago, gross margins of \$20-25/DSE were common for wool, lamb and beef enterprises in southern Australia. In the past 12-24 months, these same enterprises have typically performed in the \$40-\$50/DSE range (Victorian Livestock Farm Monitor Project).

The impact on fertiliser economics is clearly shown in the table, where a doubling in the per DSE gross margin more than doubles the forecast IRR.

Combining a knowledge of the relationship between soil fertility, per hectare productivity and livestock gross margins allows the assessment of the likely economic gains from capital fertiliser application for different scenarios.

The soil science hasn't changed! But livestock enterprise profitability certainly has and it is making the investment look very attractive!

The economic gains from capital fertiliser application will of course vary substantially from case to case. The main factors driving the outcome are listed in the assumptions below the table.

An interesting fact is that the commercial pastures used by Saul & Kearney to develop their potential SRF were a total mixed bag.

They included improved perennial pastures, annual pastures and a small portion were even native. This means we can have confidence that capital fertiliser investment works across a wide range of pastures and pasture systems.

In many cases, livestock productivity can be lifted substantially through an investment in soil fertility. Improved pasture species offer additional benefits, but aren't essential.

Now is a great time to have a serious look at a capital fertiliser investment.

Livestock enterprises are making solid profits and farmers are (and should be!) looking to reinvest into areas that will deliver long-term impacts on future business productivity and profit.

Raising soil fertility is most definitely one of these areas and offers huge potential in many livestock businesses.

For more information or to discuss this issue further, please contact me on 0428 374 046 or email jwhale@meridian-ag.com.au.



incitecpivotfertilisers.com.au
nutrientadvantage.com.au

References:

Saul, G.R. and Kearney, G.A. (2002). Potential carrying capacity of grazed paddocks in southern Australia. *Wool Tech. Sheep Breed.* 50 (3), 492-498.

Livestock Farm Monitor Project, Agriculture Victoria
<http://agriculture.vic.gov.au/agriculture/livestock/farm-monitor-project>