Establishing pastures – the trade-off between crop and livestock

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A recent survey by the EverCrop™ project indicates that 83% of farmers within the mixed farming zone of southern NSW, regularly under-sow their pastures. In other words they use a cover crop. This practice goes against traditional research and extension advice which recommends pastures to be sown without a cover crop (straight sown), because under-sown pasture is at greater risk of poor establishment and less productive over the pasture phase. However, most previous research focused primarily on pasture density and biomass production. It did not quantify the financial implications of the cover crop or the potential effect on livestock productivity.

The DST operates under the premise that a pasture is to be sown in a particular paddock the next year. The user is able to consider the costs and income from grain and livestock production during the pasture phase.

The underlying calculation for the DST is the net income from under-sowing (US) pasture minus the net income from straight-sowing (SS) pasture for the length of the pasture phase:

Net income = (Crop income + US livestock income - US variable cost) - (SS livestock income – SS variable cost)

An important component of the model is the capacity for the user to change a range of inputs to match their enterprise. The inputs in the DST include expected grain price, grain yield, stocking rate and livestock gross margin ($/DSE), establishment costs, the length of the pasture phase and relative effect that under-sowing has on pasture production (Figure 1).

Livestock Gross Margin has been derived from NSW DPI budgets and is the net income from livestock and includes costs for stock and pasture management. The length of the pasture phase is the length of the intended pasture phase minus the establishment year when grazing is limited. The DST does not calculate pasture production *per se* but instead calculates the differences in stocking rates for the different establishment options, which we assume is related to pasture production. The user is asked to estimate on the basis of their experience the under-sowing relative effect, which is the proportion of production from an under-sown pasture relative to a straight sown pasture. For example, 0.5 being half the production of the straight-sown method.

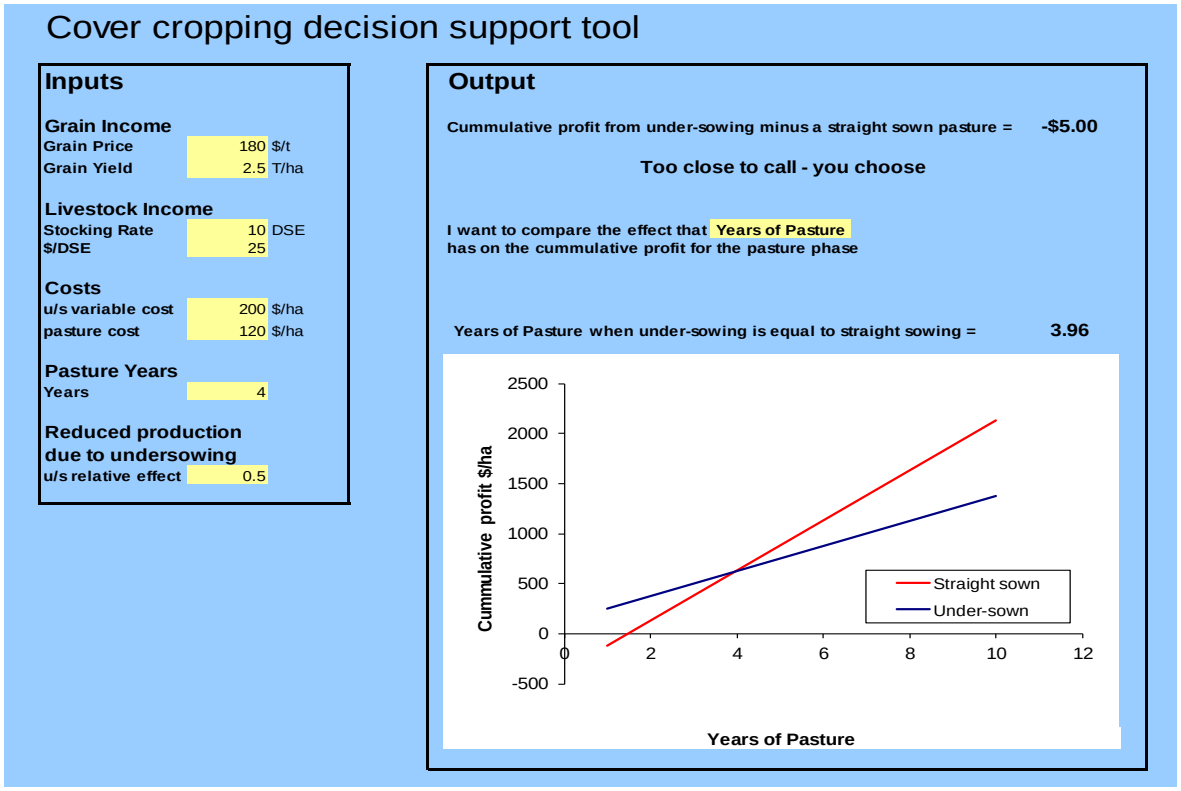

Figure 1. Interface of the prototype decision support tool, using the input data (Table 1).

The DST provides a single number in the Outputs to estimate which method of pasture establishment is more profitable. If the value is positive then greater profitability is obtained from under-sowing. By contrast, if the

value is negative, straight sowing the pasture would be more profitable. The model produces sensitivity graphs to demonstrate how factors change the result, such as crop yield and grain price.

Using the values in figure 1, the DST produces a value of -$5.00/ha which indicates that straight sowing the pasture is marginally more profitable for the nominated length of the pasture phase . The DST comments that this value is "too close to call" and that under these set of conditions the decision to under-sow or not might need to be made by the user on the basis on other 'non-financial' considerations.

The DST can produce a number of sensitivity graphs, with length of the pasture phase (Figure 1) indicating that straight sown pasture is the best option (a greater cumulative profit) with phases greater than 4 years. However a minimum 6 year pasture phase is required when the under-sowing relative effect is 0.7 (Figure 2a), increases to 8 years with a grain value of $240 (2b) and 9 years with a 3.0 t/ha grain yield (2c).

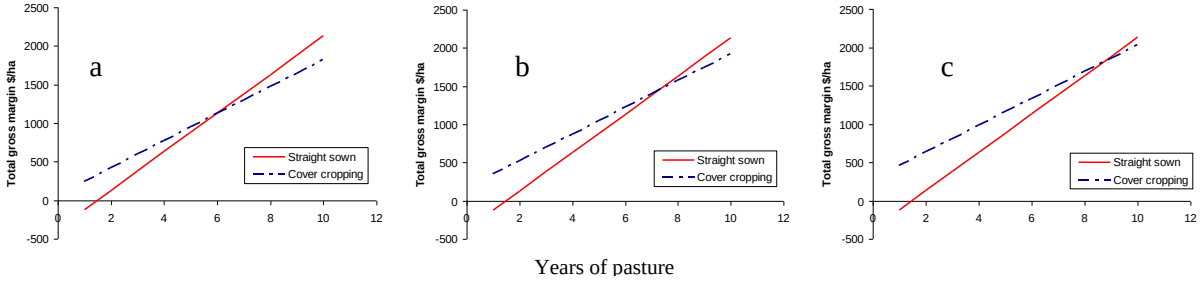

Figure 2. Sensitivity graphs produced by varying pasture inputs from figure 1:

Increases in livestock enterprise gross margin or stocking rate will favour establishment of pastures by straight sowing (Figure 3a, b). In this case an increase from $25 to $30/DSE reduces the minimum length of the pasture phase to 5 years, and when combined with a stocking rate increase to 15 DSE/ha the minimum length is 4 years. Conversely a decrease in gross margin and stocking rate to $20/DSE at 6DSE/ha increases the minimum pasture rotation using straight sowing to 11 years (figure 3c).

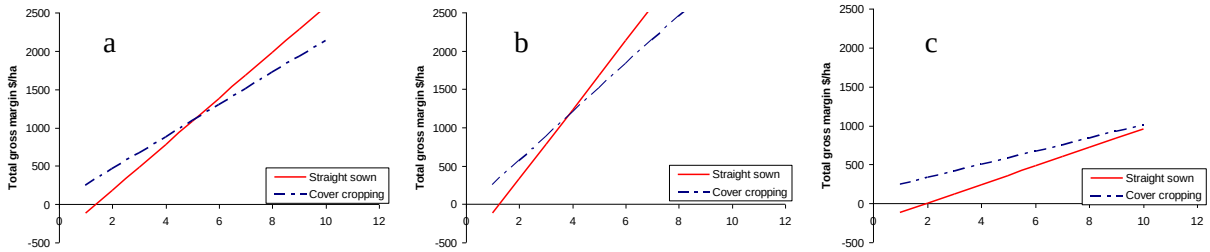

Figure 3. Sensitivity graphs produced by varying livestock inputs from Table 1:

The primary purpose of the DST is to enable users to include important inputs into the decision making process. There is limited data on the relative effect that under-sowing has on pasture production , however it is likely to fall between 0.5-0.8 in normal years. It is likely there will be different perceptions of the 'relative effect' due to differences in climate and soil. The DST relies on the users experience in establishing pastures to set their 'under-sown relative effect' and their potential crop yield.

The user should also remember that the DST does not substitute for good agronomy. A major reason for poor establishment of pastures is likely to be because many pastures that are under-sown in southern NSW are sown towards the end of the crop sowing window. Pastures should be sown earlier in the sowing window to maximize establishment to counter their poorer seedling vigour relative to most crop species. If the DST suggests it is more profitable in a given set of circumstances to establish a pasture under a cover-crop, sowing should occur earlier in the sowing window.

The EverCrop™ project team continues to test and refine this decision support tool with both advisors and farmers. The tool is compatible with most common computer systems and anyone wishing to trial it is encouraged to access the tool at **http://www.grazplan.csiro.au/CoverCrop/CoverCrop.html**