

The following activity illustrates an example of the science behind farming and is based around research conducted by Professor Derrick Moot and colleagues in the Faculty of Agriculture and Life Sciences at Lincoln University.

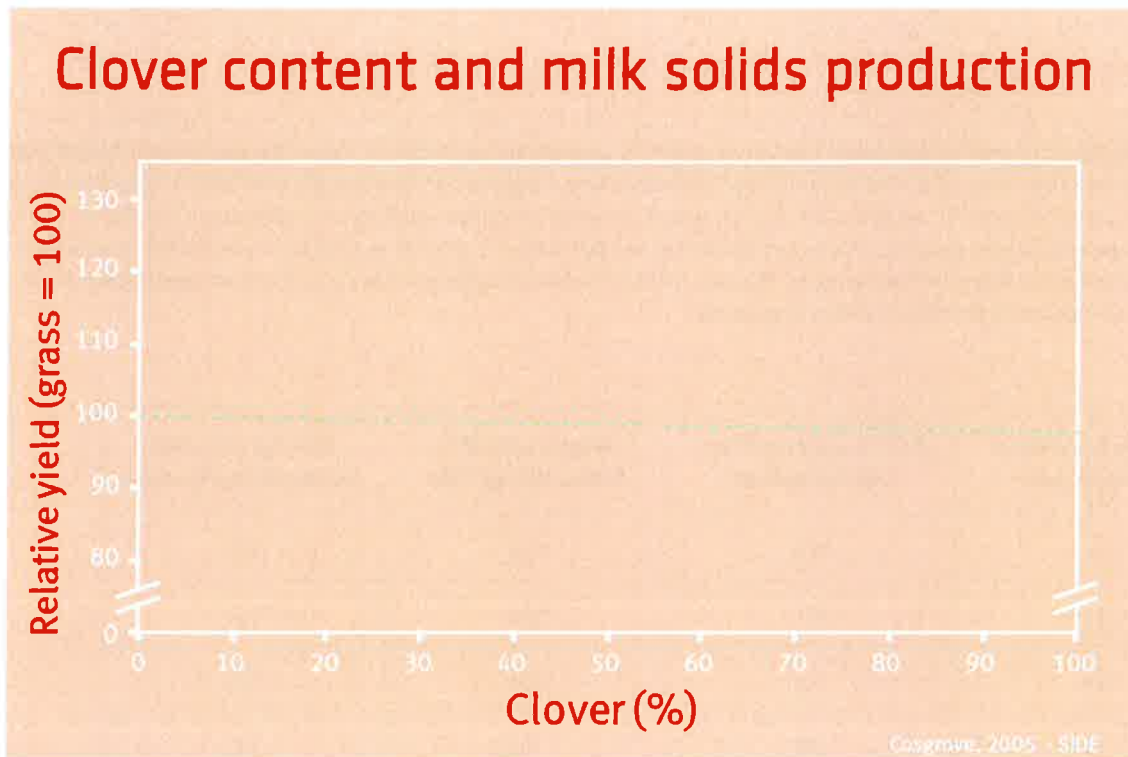
## Pasture manipulation – more money in the farmer's pocket!

New Zealand dairy pastures are traditionally based on perennial ryegrass and white clover. These two species complement each other in the timing and amount of pasture produced. Clover also fixes nitrogen from the atmosphere which can be utilised by the grass as it is cycled through the animal, plant and soil system. However, most New Zealand pastures contain less clover than is ideal for animal production. Farmers can use a range of pasture establishment, grazing management and fertilizer practices to increase the content of clover in their pastures. The data in the table below highlights how pasture and animal production are affected by an increase in the clover content of pastures.

Clover as % content of pasture (x-axis)	Relative yield Dry Mass, DM (kg/hectare)	Relative yield Milk Solids, MS (kg/cow)	Relative yield Milk Solids, MS (kg/hectare)
0	100	100	100
10	99	102	104
20	97	104	108
30	95	105	111
40	93	110	118
50	92	115	128
60	91	118	130
70	90	116	131
80	88	110	131
90	87	108	131
100	85	105	131

For this exercise you are asked to:

- 1) Produce a graph from the numbers in the table to show how relative pasture dry mass in kg/hectare (y-axis) and milk solid production, both per cow and per hectare (y-axis), are affected by the clover content (x-axis).



- 2) From this graph determine the optimum clover content required to maximise milk solid production per cow AND per hectare.

Extra:

- a) Why does the relative yield of the pasture go down as the clover content increases but the milk solids production goes up?
- b) The average white clover content in New Zealand dairy pastures is about 15%. Calculate the extra milk production (%) that could be achieved per cow by doubling this to 30%.
- c) Explain why there is a difference in the lines for milk solids production per cow and per hectare.



White clover *Trifolium repens*



Ryegrass and clover

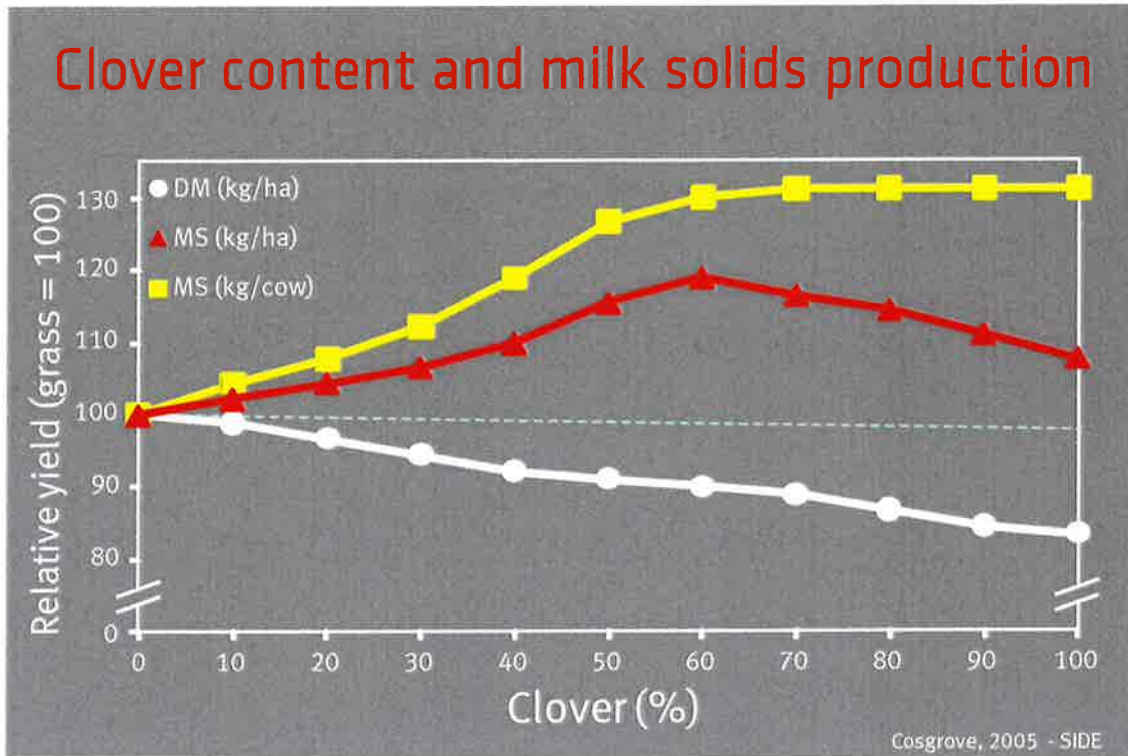


Ryegrass *Lolium multiflorum*

# Pasture manipulation answer sheet

For this exercise you are asked to:

- 1) Produce a graph from the numbers in the table to show how relative pasture dry mass in kg/hectare (y-axis) and milk solid production, both per cow and per hectare (y-axis), are affected by the clover content (x-axis).



- 2) From this graph determine the optimum clover content required to maximise milk solid production per cow AND per hectare.  
60% clover (and 40% ryegrass).
- a) Why does the relative yield of the pasture go down as the clover content increases, but the milk solids production goes up?  
Because the clover doesn't grow as much as grass in a year, but is of higher quality for animals so you get extra milk production.
- b) The average white clover content in New Zealand dairy pastures is about 15%. Calculate the extra milk production (%) that could be achieved by doubling this to 30%.  
6% per cow or 3% per hectare.
- c) Explain why there is a difference in the lines for milk solids production per cow and per hectare.  
Because as the clover content goes up the production per cow will reach a maximum and stop – but as you decrease the pasture yield beyond 60% clover, you have to decrease the stocking rate to maintain that per cow production, so the per hectare production goes down.

