Nutrient regulations and dairy farm values

Carla Muller

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Nutrient regulations and dairy farm values

Carla Muller
4 February 2015
Introduction

• Councils have to improve water quality

• Nitrogen (N) & Phosphorus (P) losses from dairy farms likely to be regulated

• Mitigation will reduce operating profit

• Will this impact dairy farm land values?
Land Value

- Sales data - small samples, available after policy
- DairyBase - market valuations & detailed farm information
  - Adjust to include all land owned & leased for milking platform

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Sample</th>
<th>QVNZ- sale</th>
<th>QVNZ- sale</th>
<th>REINZ- sale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Season(s)</td>
<td>2012-13</td>
<td>2012-13</td>
<td>2011-14</td>
<td>2012-13</td>
</tr>
<tr>
<td>Mean</td>
<td>$32,846</td>
<td>$33,624</td>
<td>$31,358</td>
<td>$32,704</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>$8,233</td>
<td>$6,259</td>
<td>$8,832</td>
<td>NA</td>
</tr>
<tr>
<td>Range</td>
<td>$29,778</td>
<td>$18,339</td>
<td>$35,600</td>
<td>NA</td>
</tr>
<tr>
<td>Sample Size</td>
<td>56</td>
<td>9</td>
<td>37</td>
<td>30</td>
</tr>
</tbody>
</table>
Impact of nutrient loss reduction on operating profit

Percentage reduction in nutrient loss (kg nutrient /ha)

-50%  -40%  -30%  -20%  -10%  0%

-30%  -20%  -10%  0%  -10%  -20%  -30%

Percentage reduction in operating profit ($/ha)

Nitrogen leaching
Phosphorus loss

DairyNZ
Impact on Land Value

\[
CV_{Total,t0} = \frac{op\pi_{t0} \cdot f(profitcapitalisation)}{r}
\]

\[
CV_{Total,t0} = CV_{Land,t0} + CV_{Cows+Mach,t0}
\]

\[
$40,613 = \frac{$2,457 \cdot f(profitcapitalisation)}{0.08}
\]

\[
E[CG] = op\pi_{t0} \cdot \left(f(profitcapitalisation) - 1\right)
\]
Impact on Land Value- Assumptions

• Expected capital gains will remain as the same proportion of operating profit

• Regulation reduces operating profit

• Values of cows & machinery are independent of regulation impact

• \[ CV_{Land,t1} = \left( \frac{op\pi_{t1} + E[CG]}{r} \right) - CV_{Cows+Mach,t1} \]
## Impact on Land Value - Results

<table>
<thead>
<tr>
<th>Target reduction in N leaching</th>
<th>Base</th>
<th>-10%</th>
<th>-20%</th>
<th>-30%</th>
<th>-40%</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of farms that could achieve reduction</td>
<td>100%</td>
<td>93%</td>
<td>76%</td>
<td>29%</td>
<td></td>
</tr>
<tr>
<td>Impact on operating profit</td>
<td>-8%</td>
<td>-14%</td>
<td>-20%</td>
<td>-28%</td>
<td></td>
</tr>
<tr>
<td>$CV_{Total/ha}$</td>
<td>$40,613</td>
<td>$37,364</td>
<td>$34,927</td>
<td>$32,490</td>
<td>$29,241</td>
</tr>
<tr>
<td>$CV_{Land/ha}$</td>
<td>$32,846</td>
<td>$29,597</td>
<td>$27,160</td>
<td>$24,723</td>
<td>$21,474</td>
</tr>
<tr>
<td>Reduction in $CV_{Land/ha}$</td>
<td>-10%</td>
<td>-17%</td>
<td>-25%</td>
<td>-35%</td>
<td></td>
</tr>
</tbody>
</table>
Impact of nitrogen leaching reduction on operating profit and land value

Percentage reduction in nitrogen leaching (kg N/ha)

Reduction in operating profit (Nitrogen)  
Reduction in land value (Nitrogen)
Limitations

• Pre-policy
  – No sales data
  – No policy to test

• Dairy only- no land use change

• Models don’t capture most P loss

• Pre and post scenario- no transition period

• Sensitivity analyses
Conclusions

• Nutrient regulations will impact on farm systems with current technology

• Dairy farms land value closely tied to productive capacity

• PVM used to analyse impact of reducing nutrient loss on dairy farm values

• Negative impact on dairy farm values

• Potential inter-regional differences