

VIS/NIR technology for improved nutrient use efficiency in pasture production-potential for economic benefits.

The use of VIS/NIR sensors with the capacity to detect urine patches on dairy pastures has been investigated. Agri Optics NZ Ltd. has developed a system which has the potential to selectively apply liquid fertiliser to avoid areas of a paddock which contain a urine patch.

A technology which could deliver fertiliser or other treatments selectively within the paddock has potential benefits through

1. Reducing input costs while maintaining production levels eg less fertiliser use.
2. Reducing nutrient or other losses from the system.

An analysis was undertaken to explore the potential cost savings from only applying nitrogen fertiliser to those areas of the paddock with no urine patches present. Several assumptions were necessary; urine patches were assumed to remain for 12 weeks during spring and summer and 20 weeks during autumn, only one grazing event per month was used, no overlap of urine patches, 2.5% of pasture received urine at each grazing, pasture yield was not affected by selective fertiliser application, and all fertiliser N applied to urine patches was in excess of requirements and was lost.

Conservative savings		
<i>N applied/month for 10 months</i>	<i>Reduction in fertiliser N loss /ha/yr</i>	<i>N savings @ \$6/kg N</i>
30 kg	24 kg	\$144/ha
20 kg	16 kg	\$96/ha
10 kg	8 kg	\$48/ha

The comparison is very sensitive to the duration of urine patches, and some published data suggests urine patches may respond for up to 12 months. If all urine patches responded for this time, a larger proportion of the paddock would be affected by urine at any one time, resulting in theoretical maximum N savings of:

Maximum savings		
<i>N applied/month for 10 months</i>	<i>Reduction in fertiliser N loss /ha/yr</i>	<i>N savings @ \$6/kg N</i>
30 kg	75 kg	\$450/ha
20kg	50 kg	300/ha
10 kg	25 kg	150/ha

The pattern of urine patch appearance through the year is currently poorly understood, and is affected by the seasonal climate. The actual N savings will therefore lie somewhere between the conservative and maximum figures above depending on the climatic conditions that influence urine patch appearance in the sward.