PASTURES FROM SPACE® – PREDICTION OF FEED-ON-OFFER IN INTENSIVELY-GRAZED DAIRY PASTURES

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The accurate assessment of available pasture is critical in the dairy industry to permit producers to allocate feed on a per head basis as part of the intensive management of grazing rotations. Fulkerson *et al.* (2005) showed that precise daily allocation of feed to milking cows grazing perennial pastures could lead to about a 10% increase in milk production and deliver significant financial benefits to producers. However, very few producers invest the time or resources necessary to monitor pastures on a regular basis in a way that would allow them to accurately budget feed resources. Edirisinghe *et al.* (2000) described the Feed-On-Offer (FOO) model for predicting pasture biomass of extensively-grazed annual pastures from satellite-derived Normalised Difference Vegetation Index (NDVI) data. Edirisinghe *et al.* (2004) reviewed the accuracy of the predictions from the FOO model and concluded that paddocks-scale predictions of FOO for annual pastures in Western Australia were of sufficient accuracy to meet farmers' requirements for general feed budgeting decision-making.

This paper presents preliminary results of analyses of the accuracy of FOO predicted for intensively-grazed pastures. Validation of FOO predictions was carried out at 3 sites between July and September 2005; Vasse RS, W.A. (annual ryegrass), Ellinbank RS, Victoria (perennial ryegrass) and Camden, N.S.W. (perennial ryegrass). Satellite NDVI data were obtained from 2 high-resolution sensors; Ikonos (4m pixels) and SPOT-5 (10m pixels). NDVI is calculated as ((red band – NIR band) / (red band + NIR band)), where 'red band' and 'NIR band' are the reflectance values of the red and near-infrared (NIR) spectral bands of the satellite imagery. Ground data were collected using a rising plate meter (RPM) and pasture cuts to ground level, and the data were analysed in a GIS environment.

Table 1. Analysis of the relationship between NDVI and FOO (kg DM/ha) for intensively-grazed dairy pastures at 2 times and at 3 sites.

	July 2005			September 2005		
	R^2	RSE	P	R^2	RSE	P
Vasse, W.A.	0.59	152	0.01	0.93	448	0.05
RPM at Vasse	0.75	362	-	0.75	335	-
Ellinbank, Vic.	0.87	287	0.001	0.71	273	0.001
Camden, N.S.W.	0.73	313	0.01	0.75	355	0.001

RSE = Residual Standard Error (kg DM/ha). P = Probability of significance of the relationship

Table 1 presents the R^2 of the relationship between NDVI and biomass (kg DM/ha), the residual standard error and the probability of significance of the relationships. Strong relationships were identified between NDVI and biomass for each time period at all sites. In W.A., the results are consistent with those previously observed for extensively-grazed pastures (Edirisinghe *et al.* 2004). The analysis of data from the W.A. intensively-grazed pastures suggests the possibility of pooling data across the growing season to create a single relationship for annual dairy pastures. In eastern Australia, the relationship between NDVI and biomass suggests that data could be pooled for individual months across geographical regions. Where sufficient independent data were available to asses the accuracy of current technologies, the accuracy of Pastures from Space® predictions appeared to be at least as good as, that of current technologies. Extensive fieldwork in 2006 will further develop our understanding of the relationship between NDVI and biomass for dryland and irrigated dairy pastures at 3 sites in Victoria.

Work to date suggests Pastures from Space® could provide remotely-sensed pasture biomass figures to the dairy industry in near real-time for incorporation into feed allocation management decisions.

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