To Graze or Not to Graze is the Question

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Research scientists have developed a way of helping mixed farmers in Western Australia decide whether to graze a drought-affected cereal crop or let it go on to harvest, and they have started to adapt their findings for other parts of Australia.

The research has showed potential for using cereal crops as forage for livestock on mixed farms, although results are always dependent on the relative values for grain and livestock.

CSIRO Sustainable Ecosystems farming systems scientist Dr Lindsay Bell said the research team had found that, at long-term average prices for grain and stock, grazing the crop was rarely better than grain production in reliable rainfall zones and on good soil types in Western Australia’s Northern Agricultural Region.

But on poor soils, in low rainfall regions of that same wheat-belt, grazing a wheat crop could be a more profitable option in 70 per cent of years, suggesting planting a forage crop or pastures might be a more reliable option than planting wheat.

For the farmers "in-between" those two extremes, the message was that grain is the most profitable option in 50 to 80 per cent of years but tactically grazing the crop in low yielding years can greatly improve average returns.

The study is one of several being made by CSIRO scientists under Grain & Graze's national "Closing the Feed Gap" project.

A collaborative partnership between Meat & Livestock Australia (MLA), Australian Wool Innovation (AWI), the Grains Research and Development Corporation (GRDC) and Land & Water Australia (LWA), Grain & Graze aims to help mixed farmers increase their profitability and simultaneously better manage natural resources.

The program defines a farm’s 'feedbase' as all the sources of livestock feed grown within the property, such as permanent and ley pastures, dual-purpose crops and crop stubbles. The aim is to identify where feed gaps exist in current systems and how best to address them.

Dr Bell said the CSIRO team had begun running similar analyses - using the same computer tools - for the other eight mixed-farming regions around Australia in the Grain & Graze Program.

"Some farmers frequently make tactical decisions to graze their crops, to finish livestock as well as look for an additional benefit in weed control," Dr Bell said.

"But in 2006 drought meant low expectations of grain yield and low pasture reserves in the Northern Agricultural Region. Mixed farmers with stock and paddocks planted for grain were forced to evaluate the most appropriate use of those crops."
"Many opted to take their crops through to harvest anyway, while others chose to open the gate and let in the hungry sheep. "This prompted us to ask how often cereal crops have more value for grazing than for carrying through to grain harvest, and in what circumstances."

The CSIRO team used the Agricultural Production Simulator APSIM and 116 years of historical meteorological data to model the seasonal variability in crop biomass and grain yields:

- at four locations with different, long-term average rainfall (Badgingarra, 575 mm; Mingenew, 400 mm; Binnu, 360 mm; and Dalwallinu, 300 mm), and
- on three soils differing in water-holding capacity (PAWC): a shallow gravel with 40 mm PAWC, a yellow sand with 90 mm PAWC and a red loam with 148 mm PAWC.

APSIM allowed them to simulate the sowing of the wheat variety Wyalkatchem between May 15 and June 30 after 10 mm of rain was received over 3 days to achieve 150 plants per square metre.

High rates of nitrogen (120 kg/N at sowing and 100 kg/N at 42 days after sowing) were applied to prevent nitrogen stress and initial levels of soil water and mineral nitrogen were reset to the crop lower limit and to base nitrogen levels on January 1 to ensure the same starting levels for each year of the simulation.

The team compared the economic value of crop biomass for livestock production to the value of grain yield based on expectations of animal performance, commodity prices and other costs.

It also investigated the sensitivity of these outcomes to changes in commodity prices.

As expected, higher grain yields were simulated in the higher rainfall environments and on the better soils with greater water holding capacity.

Grain yields were most consistent - but low - on the poorest soil, while the variation in biomass at 100 days after sowing was largest on the poorest soils, particularly in lower rainfall environments.

"This indicates that, in these environments, there are a number of years when large amounts of biomass are not effectively converted to grain yield," Dr Bell said.

"As well, less forage from other sources is likely to be produced in these dry and low yielding years, and cereal crops could add a valuable feed source for livestock.

"Obviously in-season decisions would not have perfect knowledge of final grain yield, as in this analysis, but the use of prediction tools, such as Yield Prophet®, could mean greater
confidence about this decision.

"And, while our analysis suggests there may be some capacity to profit from tactically grazing cereal crops, this may be limited by the farmers' capacity to obtain or manage livestock to utilise the additional forage."

Dr Bell said issues of validation of livestock performance and grazing management still needed to be resolved.

For more information about the Grain & Graze National Feedbase Project or for full research results, contact Lindsay Bell on 07 4688 1221, Lindsay.Bell@csiro.au or Michael Robertson on 08 9333 6461, Michael.Robertson@csiro.au.