

Enhanced forecasting of farm financial performance

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Location: Canberra, Toowoomba and Brisbane

Principal investigator

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The need

The project is divided into three subprojects.

1. ABARE: Farm management deposits and the Southern Oscillation Index

Farm income is influenced significantly by climate variability. Managing farm income risk caused by climate variability involves predicting the likelihood and extent of adverse events, and taking cost effective steps to limit their impact. If farmers could use information such as the Southern Oscillation Index (SOI) to plan when and how much money to set aside, the likelihood of farmers realising years of very low income could be reduced.

2. Agricultural Production Systems Research Unit (APSRU): Determining winter crop area planted using MODIS satellite imagery

Other studies have used remote sensing to determine net primary production, vegetation cover, land use patterns and the impact of climate variability on vegetation dynamics. However, prior to APSRU's work little or no research had used remote sensing satellite data to determine crop area planted and, more specifically, to discriminate between different winter crops in Australia. Up to date information about current production patterns is important for industry and government. The cessation of annual agricultural censuses by the ABS elevates the need for objective assessments of crop area planted.

3. Queensland Department of Mines and Natural Resources (QLDNRM): Improving estimates of liveweight gain (beef production) and wool yield from the AussieGRASS spatial modelling framework

Indices of pasture growth and number of growth days are correlated with farm income, but more direct indices of animal production such as live weight gain and wool yield could provide an improved basis for economic modelling. Better economic forecasting can lead to improved farm viability.

How this project fits with MCV objectives

This project is aligned with the MCV objective of providing farmers with tools and services that help them to manage climate risk.

Project objectives

The objective of this project is to analyse alternative development options for the system of forecasting farm incomes by:

1. enhancing projections of winter area cropped based on expected seasonal conditions
2. enhancing projections of liveweight gain and wool yield based on expected pasture growth
3. enhancing the economic model so that the financial and risk reduction benefits of farm management deposits (FMDs) can be explored

Methods

ABARE examined the effect on a farmer's breakeven probability of using seasonal climate information in the form of the SOI to make more informed decisions about how much money should be placed in or removed from an FMD account. A decision rule compels the simulated farmer to try and put aside enough money so that income in relatively low income years can be shifted to a more tolerable level.

APSRU analysed Multi-temporal Moderate Resolution Imaging Spectroradiometer (MODIS) imagery for a specific area in the Darling Downs region of Queensland. The aim was to determine crop area planted to various winter crops. The results of the various techniques were compared with ABARE estimates of shire production to determine accuracy.

QLDNRM checked and generated data tables and data input rasters for use in the AussieGRASS model. These data came from a variety of sources and was used to simulate livestock mass and wool yields which were then compared with historical data.

Desired outcomes

ABARE: to illustrate the possible benefits in risk reduction of using FMDs in conjunction with the SOI; the approach is expected to provide a clear indication to clients, such as financial institutions, policy makers, and industry representatives, how the technology can be exploited, which in turn is expected to lead on to more demand-driven developments in the future

APSRU: a) to identify the best discriminating spectral vegetation indices for crop acreage area mapping, and b) to estimate classification accuracy for MODIS imagery and thereby measure its usefulness

QLDNRM: a statistical analysis of modelled and measured data at the state scale and an assessment of the potential for targeted forecasts for livestock production indices

Achievements to date

ABARE: Results show that some regions can benefit in terms of farm's increasing their probability of breaking even by knowing what SOI phase is expected in the next season.

APSRU: The true overall accuracy in discriminating between winter crops and non cropping areas was greater than 90%. 70% of wheat, 90% of barley and 90% of chickpea were correctly classified.

QLDNRM: At the national level, simulated estimates of mean beef liveweight gain were very close to historical levels. A similar outcome was found for mean wool production.

What is left to do?

ABARE: Refine the relationship between SOI phases and farm incomes

APSRU: Determine how early in the season area estimates can be made

QLDNRM: Improve the model by incorporating the effects of better feed quality in southern Australia compared with Queensland, and better ways of incorporating irrigated pasture where it exists. At the state level, the model suffered from having insufficient data on interstate livestock transfers, particularly between Victoria and New South Wales.

MCV is a collaborative program between the Grains, Rural Industries and Sugar Research and Development Corporations; the Australian Government Natural Heritage Trust and Department of Agriculture, Fisheries and Forestry; Dairy Australia; Meat & Livestock Australia; and Land & Water Australia. The National Farmers Federation and Australian Wool Innovation Limited are associate partners.

For more information on MCV, visit <http://www.managingclimate.gov.au>
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