Introduction
Seasonal climate forecasts (SCFs) have potential to improve productivity and profitability in agricultural industries (e.g. McIntosh et al., 2007; Meza et al., 2008; Klemm & McPherson, 2017), but are often underutilised by farmers in making key farm management decisions. This is attributed to the perception that SCFs are far from certain, despite significant advances over recent decades (e.g. Kirtman & Pirani, 2009; Doblas-Reyes et al., 2013). Unless uncertainty is explicitly and realistically incorporated into models of forecast use, a gap will always exist between expectations of forecast use and actual adoption by farmers (Kusunose & Rezaul, 2016).

In this study, we demonstrate the value of integrating SCFs at various forecast quality (skill) levels to reduce investment or opportunity losses for a grazing enterprise case study at Charters Towers, Queensland.

Methods

• A seasonal forecast system based on ENSO (El Niño Southern Oscillation) phases was parameterised by forecast quality to predict seasonal precipitation tercile (i.e. wet, neutral and dry) categories.

• Using ag-systems production simulation software (i.e. GRASP, NABSA) calibrated using the case study information, we simulated pasture growth, herd dynamics and annual economic returns under different climatic conditions.

• We developed a bio-economic model of forecast use, explicitly incorporating forecast uncertainty, allowing the value of imperfect SCFs to be determined.

• We then employed a regret and value function approach to quantify the potential economic value of using SCFs at various forecast skill levels in decision making in grazing enterprise management.

Results and Discussion
Applying this conservative economic modelling approach, we show that skilled SCF systems contribute considerable value to farm level decision making. At the current SCF skill level of 60% (derived by correlating the ENSO signal and historical climate data at Charters Towers), a forecast value of AUD 6,000 per annum was realised; improvement of 10% in forecast skill (to 70% accuracy) would potentially result in AUD 2,000 additional annual benefit; and a perfect (no regret) forecast could result in increased return of AUD 19,000 per annum (18% of the case study average annual net profit of AUD 104,000).

Significance
Improvements in the skill and reliability of SCFs is likely to drive wider uptake of climate forecasts in agricultural decision making. We also anticipate that an integrated framework, such as that developed in this study, will provide a pathway for better communication with end users to support improved use of forecasts in agricultural decision making.

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References:

Investigating the value of seasonal climate forecast for beef grazing enterprises: Charters Towers case study
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