## Appendix 4: An historical analysis of the changes in pasture production, growing season and the number of wet and dry days in three dairy regions of South East Australia

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**Abstract**

The production of high quality perennial ryegrass (Lolium perenne L.) is a strong determinant of business success for pasture-based dairy systems in Australia (Beca, 2005; Chapman et al., 2008). There is concern regarding the influence of a changing and variable climate on these systems, with evidence that the global climate has changed over the past century and that the risk of extreme events and abrupt changes in climatic patterns is increasing (NRMMC 2006). It is important to quantify these changes and their effects in order to identify and explore potential system adaptations. For pasture-based dairy systems in South East Australia, seasonal and annual pasture production, the commencement, length and reliability of the growing season and the duration of wet and dry periods are all significant factors that influence management decisions and profitability. Using the biophysical pasture simulation model DairyMod (Johnson et al. 2008), the current study quantified the changes and variability of these factors, by undertaking a historical analysis (1960 - 2009) across three dairy regions in South East Australia: Terang (South West Victoria, Mediterranean climate); Ellinbank (Gippsland, Victoria, temperate climate); and Elliott (North West Tasmania, cool-temperate climate).

A significant linear relationship between year and commencement date of the growing period at Elliott ($P = 0.04$) and Terang ($P = 0.01$) indicated that for every 10 year period, between 1960 and 2009, the commencement date of the growing period for these regions was 1.5 days earlier. There was no evidence that the commencement date of the wet and dry periods has changed over the last 50 years. However, during the last 4 to 5 years, all three sites have experienced an unusually low number of days in the year when soil moisture content has exceeded field capacity, and an unusually high number of days when the readily available water in the root profile has been exhausted. Although unpredictable to date (i.e. there was no significant ($P > 0.05$) linear relationship between year and the number of days for the wet and dry periods at any of the sites over the last 50 years), the observation that the length of wet periods may be decreasing and length of dry periods may be increasing, has important implications for farm management decision-making.

**References**

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