'Trigger Points' for stocking decisions in Western NSW

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Abstract

Stocking rate decisions in western NSW are complicated by variable and largely non-seasonal rainfall. While seasonal risk assessments based on the SOI phase system can provide useful medium-term pasture growth outlooks in the winter-spring period, no similar capacity exists in the critical summer-autumn period. We therefore sought to define 'trigger points' that could assist stocking decisions, by defining the historical pattern of pasture growth. Long-term daily pasture growth simulations obtained from the WinGRASP model were used to calculate pasture growth throughout the year. These were then used to identify Trigger points, beyond which de-stocking decisions should not be delayed, and to prompt stock purchases during the time of maximum expected pasture growth. We worked with pastoralists throughout the Western Division to define 3-monthly pasture growth profiles for 27 locations, together with the broad country types on their properties. This information should enable many other pastoralists to define trigger points that can assist stocking rate decisions in the absence of skilful seasonal risk assessments, or further support decisions at those times when useful skill is available.

Keywords

Stocking rate, risk assessment, pasture growth, SOI, Western Division.

Introduction

Making management decisions that involve taking a chance on future climatic conditions is always difficult – and more so when rainfall is not strongly seasonal, as in western NSW. Assessment of the relationship between seasonal climate indicators (SOI and SST) and pasture growth strongly suggested that the SOI phase system can provide a useful medium-term pasture growth outlook in the winter-spring period (Hacker *et al.* 2006). However, this capacity does not exist during the critical summer-autumn season. During these periods, having a rule of thumb about how long de-stocking decisions can reasonably be delayed in the hope that the season may improve, should assist with these difficult decisions. Alternatively, a rule of thumb about when might be the best time to buy, if the season already looks promising, might assist in getting the best productivity, consistent with prudent risk management.

This paper tries to encapsulate this idea of 'rules of thumb' in the form of 'trigger points' for making stocking decisions. Trigger points are times of the year – calendar dates – when the prospects of future pasture growth are high or low based on the long-term climatic record. Understanding this long-term growth pattern should be useful, when combined with first hand knowledge of the current season, in deciding whether its time to buy or sell.

Methods

A pasture growth model called WinGRASP was used to calculate daily pasture growth from long-term (>100 years) daily records of rainfall, temperature, evaporation and other environmental and meteorological data for several locations. To identify the best profile for particular locations, we provided graziers across the region with growth potential and critical percentile profiles from likely alternative versions, based on climatic data from the most appropriate long-term weather station. We then sought advice on which version, if any, provided a good description of the local pasture growth pattern. From this information, trigger points were identified for 27 locations as follows:

1. For each year, the amount of growth produced in 3-month periods was calculated, starting at fortnightly intervals throughout the year;
2. The set of data for each starting point was summarised in a way that allowed maximum and minimum values- i.e. trigger points- to be identified among the 26 starting points.

Results and discussion

The results of the analysis are summarised in two ways as shown in Figure 1.

Growth potential index

This index summarises the historical growth data for each starting date as a single figure. Technically, the index is equal to the area under the cumulative probability curve (i.e. the curve that gives the probability of exceeding any given level of pasture growth). This area, and thus the value of the index, will be high for those starting dates associated with generally high growth periods, and low for those that commence periods of generally low growth.

Critical percentiles

This approach summarises the historical data by specifying the growth values that correspond to the 20th, 50th (median) and 80th percentiles.

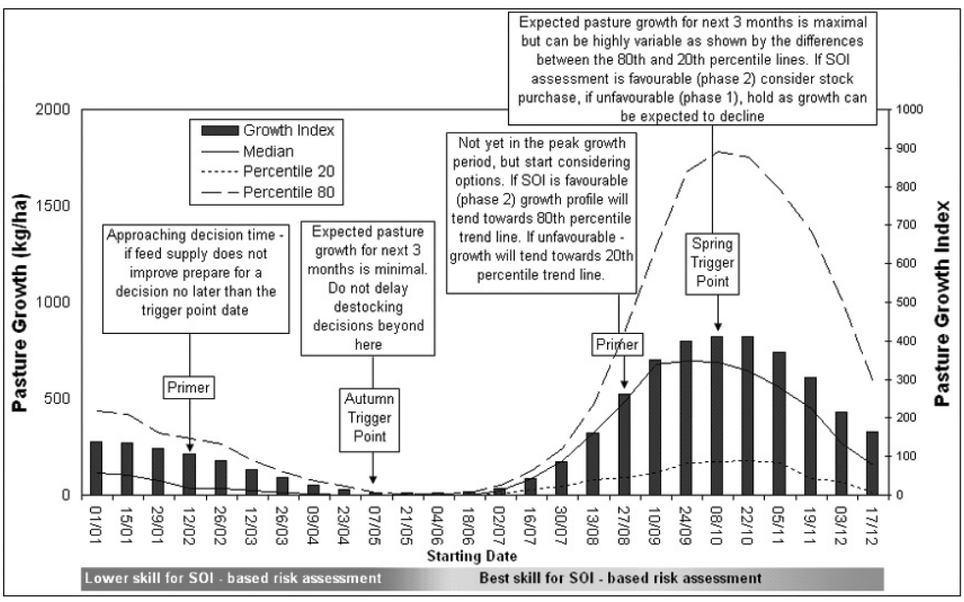

Figure 1. Example of how to use the pasture growth profiles and critical percentile values to determine trigger points beyond which decisions that depend on future growth should not be delayed. Note the 'primer' point, some time before the trigger point, when preparation for a decision and consideration of options should start.

Defining trigger points from this information is straightforward for the growth potential index, as the highest and lowest values are easily identified although, in some instances, where the index values are similar for a number of starting dates, there may be no strong reason to choose one date over another.

Defining trigger points using critical percentiles has the advantage of providing an indication of the historical variability of pasture growth associated with each starting date – indicated by the difference between the 20th and 80th percentile values. This information may lead to some adjustment of the trigger points that would otherwise be identified from the 50th percentile (median) values (or the growth index) alone.

Significantly, the time of peak pasture growth coincides with the time when the skill (reliability) of seasonal climate outlooks also reaches a maximum (Winter/Spring) in the region. So, at these times, it should be possible to use both the trigger point date and the seasonal growth outlook based on the SOI phase to help with stocking decisions. However, the period of minimum growth potential occurs at times when there is little value in the SOI phase outlook (Summer/Autumn). At these times, knowing when the period of minimum pasture growth is about to start should help with stocking decisions.

Reference:

Hacker RB, Alemseged Y, Carberry PM, Browne RH, Smith WJ (2006) 'Betting on Rain – Managing Seasonal Risk in Western New South Wales'. (NSW DPI: Orange, NSW)