Modelling Report

Mixed species trial at Mangoplah

Does the use of perennials (phalaris) increase productivity/profit/resilience to drought compared with an annual grass pasture, like barley grass?

To complement the pasture trial site at Mangoplah, modelling (GrassGro) has been conducted to demonstrate the longer-term impacts of pasture management and the impacts of variable climate.

Summary

Key learnings from the modelling report are summarised below:

- Productive pastures allow higher stocking rates which are a key profit driver. Financial reserves will improve resilience of a business to drought.
- Gross margins may be increased through use of perennial rather than annual pastures if additional income produced is greater than establishment and maintenance costs. Long-term persistence is necessary to minimise costs.
- An established perennial Phalaris pasture was more productive than barley grass and growth was greater in poor seasons.
- Low growth potential pastures, as may be driven by low soil fertility, can cause large reductions in pasture production and the ability to generate income from sheep enterprises.
- Strategic sale of stock in response to dry seasons may reduce the impact on pasture persistence, risk of low groundcover and requirement for supplementary feeding.

Australian Government Department of Agriculture, Fisheries and Forestry | Future Drought Fund | SOUTHERN NSW Innovation Hub SUSTAINABLE AGRICULTURE, LANDSCAPES AND COMMUNITIES | Holbrook Landcare Network

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Results

The modelling was beneficial in displaying long-term differences in productivity between annual vs perennial pastures in poor, average and good seasonal conditions.

Growth potential

Growth potential (soil fertility scalar) impacted the growth rates of annual vs perennial pastures.

Phalaris growth rates were 10% higher than barley grass growth rates during winter in the driest 10% of seasons (growth potential based on the same soil fertility).

Pasture growth during average and good seasons gave overall similar biomass and subtle differences in seasonality. This analysis doesn't consider the animal health and carcass contamination issues caused by Barley grass in late maturity.

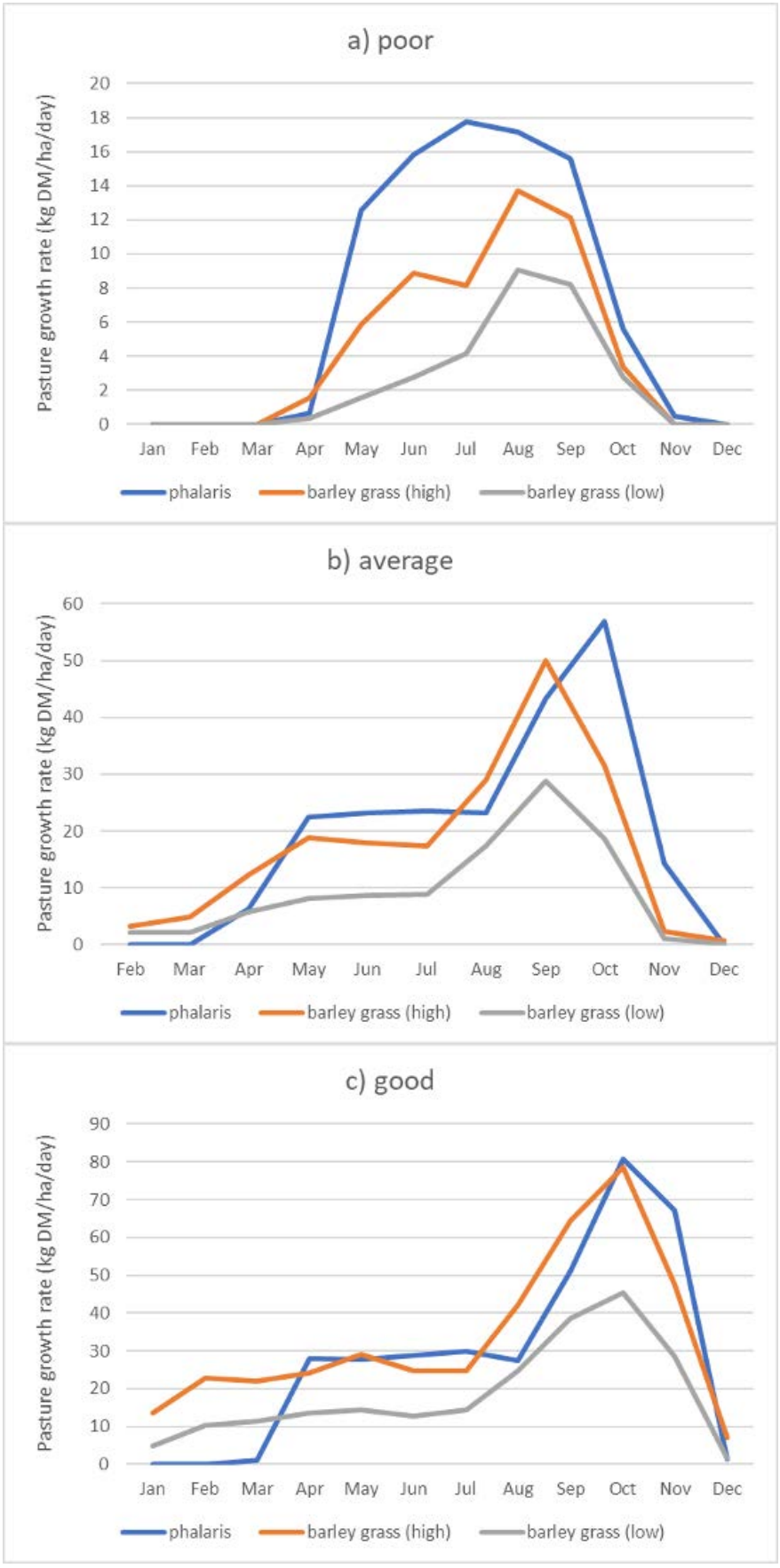

Figure 1. Average monthly pasture growth rates for phalaris/subclover and a barley grass/subclover pasture under high or low growth potential at Mangoplah in a) poor, b) average and c) good seasonal conditions when stocked at 3.5 ewes/ha.

Stocking rates

Stocking rate is well known to be a key driver of profitability in livestock systems. Phalaris pasture supported the production of more lambs per ewe and increased sale weights plus less supplementary feeding than barley grass at the stocking rate of 3.5 ewes/ha compared to 2.5 ewes/ha.

Figure 2 compares pasture types, stocking rates, and the impact on gross margin in dollars per hectare.

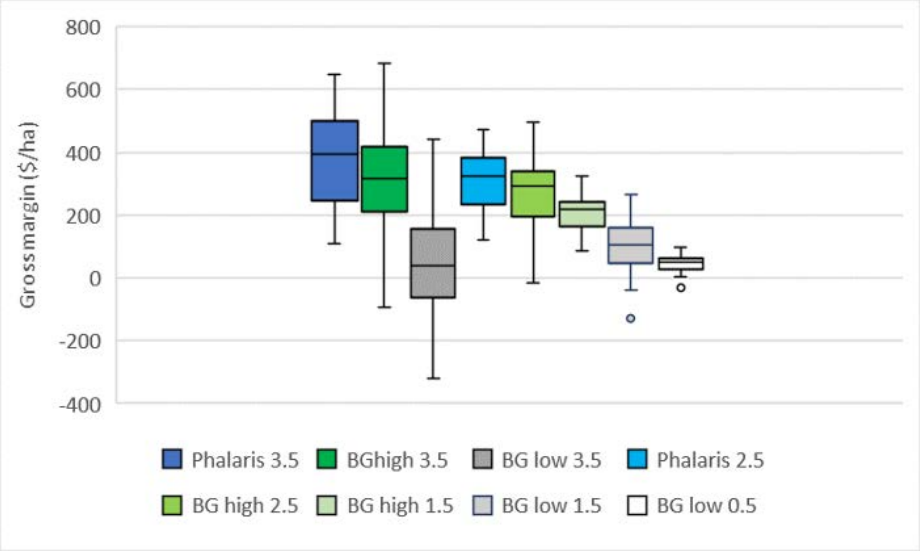

Figure 2. Box plots of gross margins for a prime lamb enterprise grazing barley grass (BG) of high or low growth potential and phalaris pastures at different stocking rates (3.5, 2.5, 1.5, 0.5) at Mangoplah 1970–2019. Boxplots represent median, range and interquartile range, and o indicates extreme values

Pasture production in drought years

In drought years the Phalaris pasture (stocking rate 3.5 ewes/ha) produced 4% more lambs per ewe as compared to barley grass with high growth potential (stocking rate 2.5 ewes/ha).

The low growth potential of barley grass pasture was unable to support a sufficient stocking rate to generate high incomes and incurred high feeding costs with increased stocking rates.

Drought years occurred at Mangoplah in 7 periods including 18 years in the period 1970–2019 as shown in figure 3.

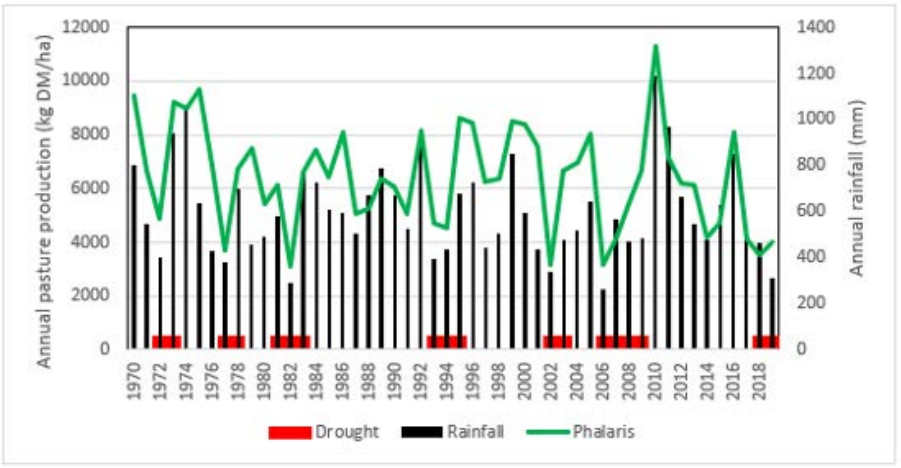

Figure 3 Annual rainfall (mm), production of phalaris pasture (kg DM/ha) and classification as a drought year for Mangoplah 1970-2019.

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