HOW DO PASTURE TYPES RESPOND IN DIFFERENT SEASONS ON COMMON SOIL TYPES?

WHY DID WE DO THIS?

To help producers better understand how some common soil types and pasture types are likely to respond to soil moisture levels, particularly in spring, summer and autumn.

BACKGROUND

As part of the Farming Forecaster project, we have been monitoring pastures at a selection of Tasmanian soil moisture probe sites from September 2023 to May 2024. The 16 analysed sites represent a sufficient range of pasture, soil types, and climatic conditions experienced by graziers. The kilograms of dry matter per hectare (kgDM/ha) was measured using a rising plate meter (RPM). Species composition and ground cover were also recorded. We defined improved pasture as sown exotic pasture species, with other introduced legumes. We thank NRM North for their contributions to the northern data collection.



PASTURE GROWTH & SOIL MOISTURE

Seasonal rainfall variability is a key climatic factor influencing the amount of pasture growth. When pastures receive adequate soil moisture, they can actively grow in warm temperatures. However, during periods of low soil moisture, growth may be stunted even if temperatures are favourable.

PASTURE SPECIES & SOIL TYPES

Pasture species have been found to respond differently to the same moisture levels, such as phalaris pulling more moisture from the soil compared to annual pastures due to deeper rooting characteristics and a longer growing season, leading to significantly more dry matter. Additionally, soil types respond uniquely to seasonal changes and varying moisture levels, impacting overall productivity. For example, a soil with a higher percentage of fine clay and silt particles has a higher water-holding capacity, compared to coarse sandy soils. This can lead to better plant growing conditions.

OUR KEY FINDINGS



Improved pastures dominated by species such as **cocksfoot and perennial ryegrass appears to actively stop growing when plant available moisture in the top 70cm is exhausted.**



A late summer/autumn rainfall event(s) of **at least 20 – 30mm was required for improved pasture species to become active again,** provided the moisture infiltrated and remained within the top 40cm of the profile.



Sites where the dominate pasture species were annual grasses or grass weed species, legume (predominantly clover) appeared to have a greater response (increased foliage) to autumn rains.



EXAMPLE 1

Example 1 is located in Fingal Valley. This site has a **gradational sandy loam over clay soil**, with 1 metre of clay starting at 30-45cm depth. These soils typically allow:

- Good water retention, providing more consistent moisture throughout profile for plants
- Easier root penetration and access to water and nutrients due to gradual texture change

This improved pasture of cocksfoot, perennial ryegrass, and fescue was sown in 2011, fertilised annually and has gibberellic acid applied in late winter. **During our surveys, we found the fescue pasture was dominant and maintained active growth until moisture was inadequate in February.**



December 2023: Active growth until December, with the **pasture pulling moisture from 60cm and deeper**

10cm	0%
20cm	0%
30cm	0%
40cm	0%
50cm	0%
60cm	11%

February 2024: Active growth stopped due to inadequate soil moisture in the soil profile.

10cm	0%
20cm	0%
30cm	0%
40cm	0%
50cm	0%
60cm	0%

Soil moisture reading (%)



10cm	14%
20cm	18%
30cm	13%
40cm	12%
50cm	3%
60cm	1%



Gradual sandy loam over clay soil



Please use this information as a guide only. We encourage you to monitor your own soil moisture and pasture growth to implement best decision-making on your farm.

EXAMPLE 2

Example 2 is located in Northern Midlands. This site has a **strong duplex soil**, with a distinct change from a sandy loam to a hard clay sub-soil. These soils typically allow:

- Medium to poor water retention in the topsoil and good water retention in the clayey subsoil
- Potential drought stress for shallow-rooted plants if low water availability in the topsoil.
- Root depth can be limited if clay subsoil is too difficult for roots to penetrate

This site is a fescue perennial based pasture with cocksfoot, phalaris, barley grass, and subterranean clover, sown in 2017 and last fertilised in 2021.





October 2023: Proportion of legume reduced with lower moisture availability, compared to earlier in the season.

10cm	29%
20cm	34%
30cm	33%
40cm	46%
50cm	67%
60cm	36%



January 2024:

Fescue and phalaris based pasture drew moisture deeper in the soil profile before active growth stopped.

10cm	14%
20cm	9%
30cm	10%
40cm	9%
50cm	1%
60cm	2%

Soil moisture reading (%)



May 2024: Autumn rain of 30 to 40mm was required to activate growth, and legume proportion begun to increase.

10cm	10%
20cm	9%
30cm	7%
40cm	9%
50cm	5%
60cm	2%



Strong duplex soil (sandy loam to a hard clay sub-soil)



For more information on soil moisture and projected pasture growth, please visit our Farming Forecaster website: <u>https://farmingforeca</u> <u>ster.com.au</u>







This project is supported by NRM South through funding from The Australian Government's Future Drought Fund, Drought Resilience Soils and Landscapes program. We thank NRM North, TIA & DCP for