


Establishing pasture into heavy stubble at Mount Cooper

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RESEARCH

Searching for answers



Location
Mt Cooper - Gunn family

Rainfall
Av. Annual: 435 mm
Av. GSR: 325 mm
2017 Total: 320 mm
2017 GSR: 233 mm

Yield
Potential: 7.3 t/ha (pasture)
Actual: 0.3 t/ha

Trial History
2017: Medic pasture
2016: Barley
2015: Mace wheat

Soil Type
Red loam

Plot Size
20 m x 4 m x 3 reps

and diseases while retaining stubble to maintain or improve soil health, and reduce exposure to wind erosion. The major outcome to be achieved is increased knowledge and skills allowing farmers and advisers to improve farm profitability while retaining stubble in farming systems on upper Eyre Peninsula (EP).

One issue Mount Cooper farmers identified as an issue was the establishment of self-regenerating medic pastures into heavy stubble residues. The trial reported here was designed to compare medic establishment and production, with different management strategies imposed on the previous crop stubble residues.

How was it done?

In late December 2016 three residue treatments were imposed on a barley stubble of 12 t/ha at Mount Cooper which had been harvested as high as possible. The stubble treatments were: cut high (30 cm), cut low (15 cm, with small plot header) and stubble removed (using ride on mower and rake). The paddock was a self-regenerating medic pasture in 2017. On 8 March 2017 three further treatments were imposed on each of the initial treatments of either: light tickle with prickly chain, rolling using a pea roller (twice over the plots so stubble was on the ground) or stubble left standing.

Measurements taken in 2017 were soil moisture at the end of the season, soil-borne disease inoculum, medic emergence counts and late dry matter. Data were analysed using Analysis of Variance in GENSTAT version 18.

What happened?

The red loam was slightly alkaline pH (7.6 in CaCl_2), P reserves of 20 mg/kg in 0-10 cm (Colwell P), and low N reserves (40 kg mineral N /ha in 0-100 cm). All soil-borne disease inoculum levels were below detection levels at the start of 2017.

The stubble load was very heavy at Mount Cooper, and the stubble remaining on plots data are shown in Table 1. The cut low stubble treatment had greater dry matter in March, a similar result over several seasons has also been observed at Minnipa in the stubble trial, this may be due to greater amounts of previous year's stubble being retained on the surface. Despite trying to remove the 2016 stubble there was still a reasonable amount present on the soil surface at the beginning of the 2017 season.

2017 had a very dry start on upper Eyre Peninsula, including Mount Cooper. Small rainfall events resulted in very low medic plant numbers for the season and very little growth. There were no interactions between stubble management and tillage so the results are presented as the main treatments only. Initial plant counts on 25 July for medic pasture regeneration were similar and low for all treatments. Late plant populations were higher with stubble removal but tillage had no impact on numbers or dry matter production. Dry matter production was also greater with removed stubble.

Removal of stubble also resulted in lower soil moisture at the end of the season, (Table 2), possibly due to better medic production, and/or greater evaporation during the season.

Key messages

- In 2017 the removal of a high barley stubble load resulted in better medic plant numbers late in the season (September), and increased (but still very low) dry matter production.
- Heavy barley stubbles from harvesting either high or low resulted in similar medic regeneration.
- Treating heavy barley stubbles with either rolling, a light tickle or left standing did not change medic establishment or dry matter production in 2017.

Why do the trial?

The GRDC project 'Maintaining profitable farming systems with retained stubble - upper Eyre Peninsula' aims to produce sustainable management guidelines to control pests, weeds

Table 1. Average stubble dry matter following stubble management and tillage treatments at Mount Cooper, March 2017.

Stubble management	Tillage treatment	Dry matter (t/ha)
Cut high	Standing	8.3
Cut high	Rolled	7.6
Cut high	Light tickle	9.5
Cut low	Standing	10.0
Cut low	Rolled	12.0
Cut low	Light tickle	13.4
Removed	Standing	4.6
Removed	Rolled	3.6
Removed	Light tickle	4.2

Table 2. Pasture and soil measurements following barley stubble treatments at Mount Cooper in 2017.

Treatment	Medic establishment 25 July (plants/m ²)	Medic establishment 14 Sept (plants/m ²)	Medic dry matter 10 Oct (t/ha)	Volumetric soil moisture (mm)
Stubble management				
Cut high	6.6	6.8	0.10	202
Cut low	7.0	6.2	0.16	211
Removed	21.4	24.4	0.51	152
<i>LSD (P=0.05)</i>	<i>ns</i>	<i>10.2</i>	<i>0.18</i>	<i>25</i>
Tillage treatments				
Standing	10.7	7.7	0.22	195
Light tickle	16.0	15.1	0.29	183
Rolled	8.2	14.5	0.26	188
<i>LSD (P=0.05)</i>	<i>ns</i>	<i>ns</i>	<i>ns</i>	<i>ns</i>

What does this mean?

In 2017 the dry seasonal conditions resulted in low medic establishment and very little growth. The removal of the high stubble load resulted in better medic establishment later in the season and increased (but still very low) dry matter production.

Stubble management of cutting height, or standing compared to rolling showed no differences in germination or production. This was a similar result to that achieved in 2015 at Mount Cooper in wheat stubble. The tillage treatments in 2017 had no effect on medic establishment or dry matter production. In 2015 similar results were achieved, with no differences in medic pasture regeneration and

production given different harvest stubble heights (cut high or low), stubble management (standing or rolling) or tillage (harrowed, mowed to the ground (residue removal), cultivated with offset disc or the untreated control).

Grazing stubbles significantly reduces stubble biomass so possibly targeting paddocks which are going to be self-regenerating pasture in the following season with extra grazing may remove more of the stubble load and potentially increase the medic performance in the following year.

The results from this research over four seasons have showed little differences in crop or pasture establishment or production, due

to stubble management and tillage treatments. There were no major weed or pest issues at these sites.

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