IRRIGATED FORAGE

NOVEMBER 14 UPDATE

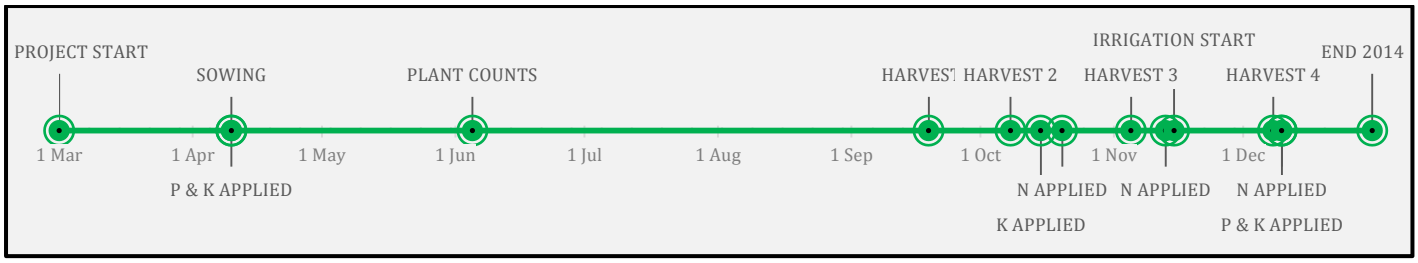
The Herbage Development Program's Irrigated Forage project seeks to evaluate perennial pasture options for intensive grazing systems in the Midlands region of Tasmania. It compares alternative grass and legume combinations with the commonly sown perennial ryegrass – white clover based pastures. The project has a strong focus on evaluating the contribution of legumes in a sward in terms of dry matter, feed quality, and nitrogen fixation. It will also evaluate the effects of nitrogen applications on maintaining legumes within swards and the competition from grasses. This update focusses on the establishment of the trial, presents early production data, and outlines the next steps in the project.

R. Smith 18/12/14

ESTABLISHMENT

The existing degraded pasture was eradicated by a series of herbicide applications and left fallow over a 12 month period. The trial was then direct drilled with a precision drill in April 2014 (See Appendix for sowing rates). A long establishment period (163 days) was implemented prior to the first yield evaluation harvest to ensure that the slower establishing grasses and legumes were well established and not disadvantaged by the first simulated grazing (cutting). In addition, some plots were not harvested at the first harvest event (September) as there was insufficient growth. Following the first harvest, all plots were mown to 5 cm. All plots were harvested in October, after which point the trial was regarded as established. The data presented below provides only an initial snapshot of the production of these species under high input management.

Project timeline



Harvest 1 – 19th September 2014

Dry matter yields (kg DM/ha) at the first harvest were dominated by grasses as expected and followed a predictable trend. Yields of perennial ryegrass > tall fescue > phalaris, with cocksfoot, coloured brome and pure legume swards not being cut due to slower establishment and low biomass (Table 1). In general, pure grass swards had higher yields (although not significantly) than mixed swards containing the same grass, most likely due to higher sowing rates of the grass in the former. Dry matter yield (kg DM/ha) of perennial ryegrass swards were significantly higher than other grass swards. Although the pure perennial ryegrass treatment was higher, there was no significant difference (P>0.05) between perennial ryegrass based plots with and without legumes. Most mixed swards contained less than 5% legume in the harvested dry matter.

Table 1 Least square means of dry matter yield (kg DM/ha) for Harvest 1

Common name	*Grass DM*	*Legume DM*	*Total DM*	
Perennial ryegrass	*3307*	*0*	*3307*	*a*
Perennial ryegrass – Strawberry clover	*3077*	*25*	*3102*	*a*
Perennial ryegrass – White clover	*2790*	*17*	*2807*	*ab*
Perennial ryegrass – Caucasian clover	*2799*	*0*	*2799*	*abc*
Perennial ryegrass – Red clover	*2734*	*40*	*2774*	*abc*
Tall fescue – White clover	*2206*	*31*	*2237*	*bcd*
Tall fescue	*2137*	*0*	*2137*	*cd*
Tall fescue – Red clover	*1873*	*50*	*1923*	*de*
Tall fescue – Strawberry clover	*1850*	*42*	*1892*	*defg*
Tall fescue – Caucasian clover	*1879*	*0*	*1879*	*defg*
Phalaris	*1687*	*0*	*1687*	*defg*
Phalaris – Caucasian clover	*1386*	*0*	*1386*	*efg*
Phalaris – White clover	*1313*	*62*	*1375*	*efg*
Phalaris – Red clover	*1147*	*91*	*1238*	*fg*
Phalaris – Strawberry clover	*1080*	*38*	*1118*	*g*

Note: 'Legume DM' was calculated by subtracting the 'Grass DM' from the 'Total DM' as the legume analysis was performed by using a square root transformation. Total DM means followed by the same letter are not significantly (P>0.05) different.

Harvest 2 – 8th October 2014

Following the first harvest, all plots were mown to a height of 5cm. This meant that although some plots had not been cut during Harvest 1, all plots had a maximum of 5cm growth on them to start the next growing phase. All plots were cut during Harvest 2. In contrast to Harvest 1, there was not such a distinguishable trend in total production between sward treatments. In fact there was no significant difference (P>0.05) between the top 14 sward treatments in terms of DM yield, with each of the grasses represented except phalaris (Table 2). This may indicate that during the height of spring there is very little difference in production between the grass species. In comparing the two harvests it should be noted of course that the growing period for harvest 2 was much shorter, only 19 days. Pure legume swards were significantly (P<0.05) lower in harvested DM yield than all mixed swards, with one exception. This is not unexpected given the slow establishment and cutting height. The contribution of legumes to the overall DM yield increased in Harvest 2, with some plots containing up to 10% legume.

Table 2 Least square means of dry matter yield (kg DM/ha) for Harvest 2

Common name	*Grass DM*	*Legume DM*	*Total DM*	
Coloured brome – Red clover	*1721*	*151*	*1872*	*a*
Coloured brome – Strawberry clover	*1743*	*102*	*1845*	*ab*
Perennial ryegrass	*1795*	*0*	*1795*	*abc*
Perennial ryegrass – Caucasian clover	*1787*	*3*	*1790*	*abc*
Perennial ryegrass – Strawberry clover	*1767*	*18*	*1785*	*abc*
Perennial ryegrass – Red clover	*1729*	*34*	*1763*	*abc*
Coloured brome – White clover	*1498*	*120*	*1618*	*abcd*
Perennial ryegrass – White clover	*1505*	*21*	*1526*	*abcde*
Cocksfoot – Red clover	*1304*	*206*	*1510*	*abcde*
Coloured brome – Caucasian clover	*1428*	*9*	*1437*	*abcde*
Tall fescue – Strawberry clover	*1365*	*61*	*1426*	*abcde*
Cocksfoot – Strawberry clover	*1257*	*163*	*1420*	*abcde*
Coloured brome	*1367*	*0*	*1367*	*abcde*
Tall fescue – Red clover	*1278*	*43*	*1321*	*abcde*
Cocksfoot – White clover	*1171*	*132*	*1303*	*bcde*
Tall fescue – White clover	*1251*	*45*	*1296*	*cde*
Tall fescue	*1284*	*0*	*1284*	*cde*
Tall fescue – Caucasian clover	*1265*	*8*	*1273*	*cde*
Phalaris – White clover	*1099*	*100*	*1199*	*de*
Phalaris – Red clover	*1082*	*105*	*1187*	*de*
Cocksfoot	*1179*	*0*	*1179*	*de*
Phalaris – Caucasian clover	*1154*	*10*	*1164*	*de*
Phalaris – Strawberry clover	*1063*	*85*	*1148*	*de*
Phalaris	*1108*	*0*	*1108*	*de*
Cocksfoot – Caucasian clover	*1014*	*10*	*1024*	*ef*
White clover		*481*	*481*	*fg*
Red clover		*420*	*420*	*g*
Strawberry clover		*235*	*235*	*g*
Caucasian clover		*16*	*16*	*g*

Note: 'Legume DM' was calculated by subtracting the 'Grass DM' from the 'Total DM' as the legume analysis was performed by using a square root transformation. Total DM means followed by the same letter are not significantly (P>0.05) different.

Early Observations

Perennial ryegrass was clearly the fastest to establish and provided grazeable production in early spring. The other grasses were slower to establish, particularly coloured brome and cocksfoot. Caucasian clover has established poorly, perhaps not surprisingly given that it should be sown in spring and not autumn. Perennial ryegrass appears quite competitive against legumes, based on both the amount and percentage of legume in yield harvests. However, it is very early in the trial. The points of interest of this project lie primarily following establishment, as the interactions between grasses and legumes and the responses to irrigation and fertility begin to develop.

Next steps

The plots were split in half following harvest 2. Half of the plot now receives a nitrogen application following harvest, generally 40 kg/N/ha depending on growth rates. The other half of the plot receives no N fertiliser as we wish to monitor the contribution that legumes are making in terms of nitrogen fixation. The whole trial area receives phosphorus and potassium to replace nutrients removed in forage harvested. We are continuing to simulate grazing by mowing as we believe the number and range of different swards would result in some plots being preferentially overgrazed if livestock were used. Irrigation began during November with 20 mm being applied every 4-5 days without rain.

Appendix

Table 3 Summary of sown species/cultivars, sowing rates and type

Common name	*Species*	*Cultivar*	*Sowing rate*	*Type*
Perennial ryegrass	*Lolium perenne*	*Base*	*12 kg/ha (15)*	*Late maturing tetraploid*
Coloured brome	*Bromus coloratus*	*Exceltas*	*12 kg/ha (20)*	*High summer activity*
Cocksfoot	*Dactylis glomerata*	*Megatas*	*3 kg/ha (5)*	*Summer active continental*
Phalaris	*Phalaris aquatica*	*Advanced AT*	*3 kg/ha (5)*	*Winter active*
Tall fescue	*Festuca arundinacea*	*Quantum II MaxP*	*10 kg/ha (12)*	*Summer active*
White clover	*Trifolium repens*	*Bounty*	*3 kg/ha (6)*	*Medium leafed*
Red clover	*Trifolium pratense*	*Rubitas*	*4 kg/ha (6)*	*Stoloniferous*
Strawberry clover	*Trifolium fragiferum*	*Palestine*	*3 kg/ha (6)*	*Large leafed summer active*
Caucasian clover	*Trifolium ambiguum*	*Kuratas*	*4 kg/ha (6)*	*Summer active, but bred for more winter production*

Note: Sowing rate in brackets represents the sowing rate in pure swards

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