Australian Government
Department of Agriculture and Water Resources

Dairy Australia

Smarter Irrigation for Profit Project

Hunter Optimised Dairy Irrigation Farm (NSW)

'Glenhaven' Irrigated Pasture Update

December 2017

Prepared by Peter Smith (Sapphire Irrigation Consulting) &
Dan Clydesdale (Clydesdale Rural Pty Ltd)

Irrigation Report

Irrigation tips for January

- The weather outlook for January is for wetter and cooler conditions with a 65% chance of above median rainfall (which is 64 mm) and only a 40% chance of above median temperature. Streamflow is forecast to be below average. Pastures should be irrigated in accordance with evapotranspiration (ET) measurements or soil moisture readings to avoid stress and lost production. Consider not entirely filling the profile to increase the opportunity for rainfall capture if rainfall looks likely.

Comment for December

December continued the run of dry weather with only 25 mm of rain recorded at Scone airport (up to 26th December). The long-term median rainfall for December is 79 mm. The reference crop evapo-transpiration (ETo) for Scone airport was 181 mm (up to 26th December).

The lucerne was irrigated three times in December with a total of 90 mm applied plus about 25 mm of rain, a total of 115 mm. From 'IrriSat', the crop water use was about 232 mm. Assuming that all rainfall and irrigation applied was available to the plants, the crop water demand was undersupplied by 117 mm and the pasture was in stress for significant periods of time. (Refer to the Agronomy Report for further detail.)

The seasonal summary of irrigation, rainfall and soil moisture from the Scheduling Irrigation Diary (SID) overleaf demonstrates the growing season to the end of December and highlights the pasture stress. The continued drier weather and limited irrigation meant that the Lucerne suffered stress for about a fortnight at the beginning of December and another three days in mid-December (the green line). As the weather gets warmer, the applied water must be increased to meet the crop water demand if severe stress and reduced yield is to be avoided.

This Project is funded by Dairy Australia and the Australian Government Department of Agriculture and Water Resources as part of its Rural R&D for Profit program.

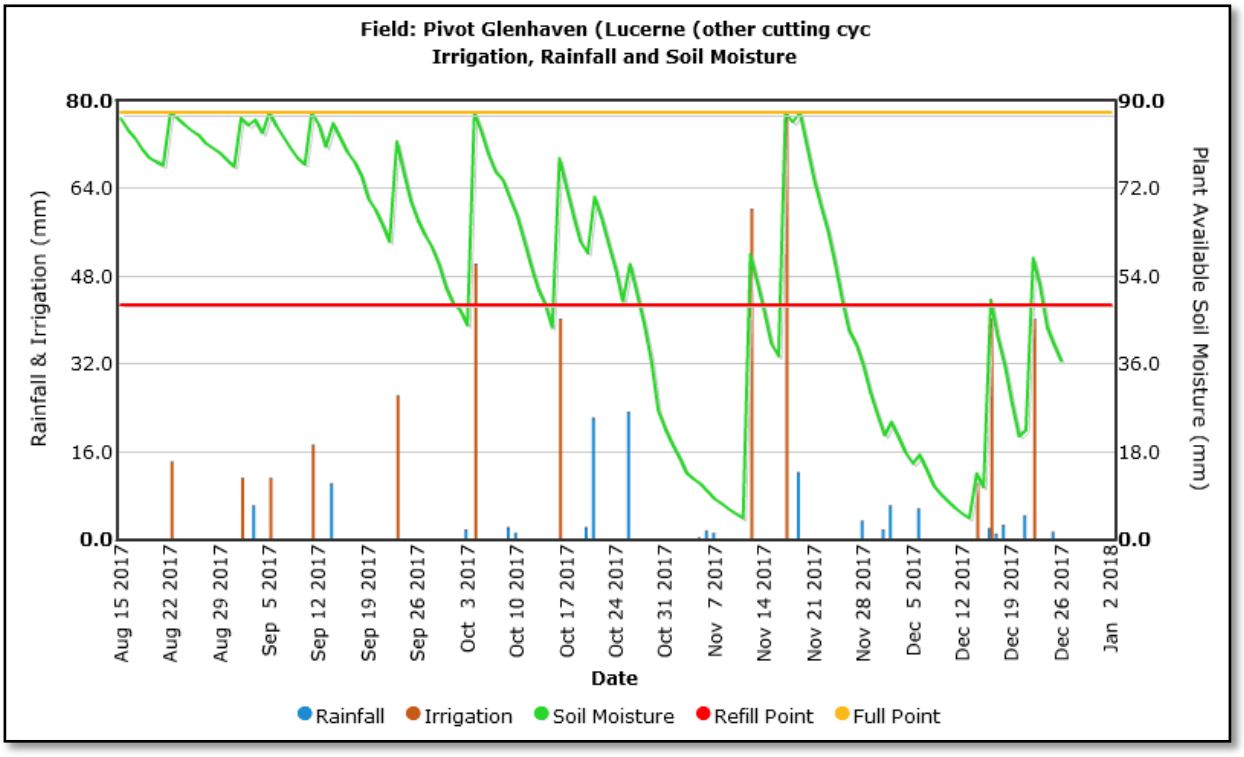
The project is also supported in the Hunter region by the following organisations:

NSW GOVERNMENT Local Land Services Hunter

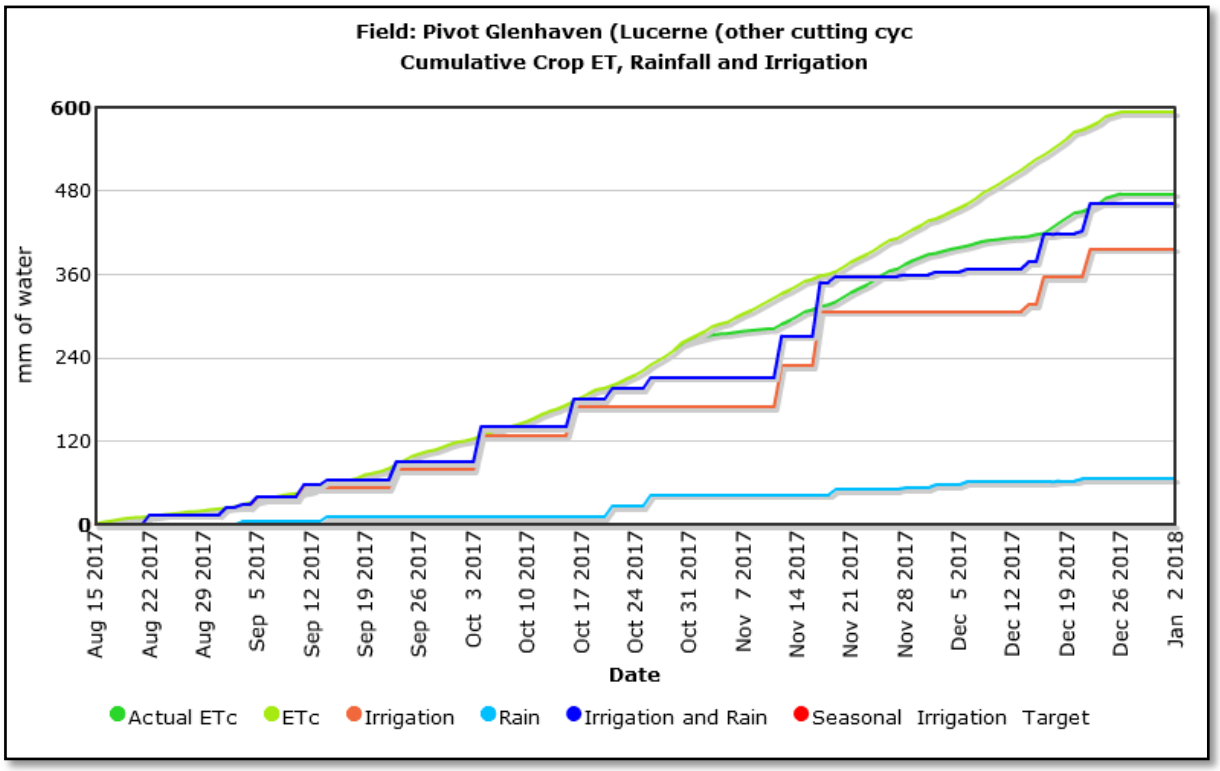
BLOOMSWATER

TainData Tierra Soil Moisture Logger

Seasonal summaries from the Scheduling Irrigation Diary (SID) for Glenhaven



The stress of the pasture is also evident in the cumulative ET, rainfall and irrigation summary (below). It shows that at the end of December there was a shortfall of applied water (blue line) of 8 mm compared to Actual ETc (dark green line) but of 118 mm compared to potential ETc (olive green line). If the applied water (blue line) was more closely matching the potential ETc (olive green line), the yield from the field would be much higher.



Outlook from 'IrriSat'* for January

		Glenhaven		
		ETo	**Chance of rain**	**Forecast**
Sat	6	8		Clear throughout the day
Sun	7	9.4	10%	Partly cloudy overnight
Mon	8	5.8	28%	Overcast throughout the day.
Tues	9	7.3	28%	Overcast throughout the day.
Wed	10	5.7	37%	Overcast throughout the day.
Thurs	11	6.1	21%	Mostly cloudy until evening
Fri	12	8.1	16%	Mostly cloudy throughout the day

*Using data from both Landsat satellites and on-ground weather stations, Irrisat is a web based tool more broadly used in the cotton industry to calculate crop coefficients and forecast crop water use. The *NSW Smarter Irrigation for Profit project* has been trialling its application to dairy pasture systems.

Data records for December

ETo at Scone Airport (mm)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
7.2	3	5.6	6.3	5.4	5.7	7.8	9.7	6.7	6.9	7.8	7.6	7.2	9.3	8.8	6.8	8.4

18	19	20	21	22	23	24	25	26	27	28	29	30	31	**Total**
8.3	9.2	10.9	3.5	5.3	6.3	9.5	3.9	3.7	-	-	-	-	-	**180.8+**

Rainfall received at Scone Airport (mm)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1.6		6.2			5.4										1.8	0.8

18	19	20	21	22	23	24	25	26	27	28	29	30	31	**Total**
2.4			4.2				1.2		-	-	-	-	-	**24.6+**

Note: ETo and rainfall readings for Scone Airport were available only to 26th December.

Rainfall at Glenhaven (mm) (manual rain gauge)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1.6	6				5.4										1.8	0.8

18	19	20	21	22	23	24	25	26	27	28	29	30	31	**Total**
2.4			4.2				1.2		-	-	-	-	-	**24.4+**

Irrigation events (mm) (from Scheduling Irrigation Diary)

Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Glenhaven														10		40	

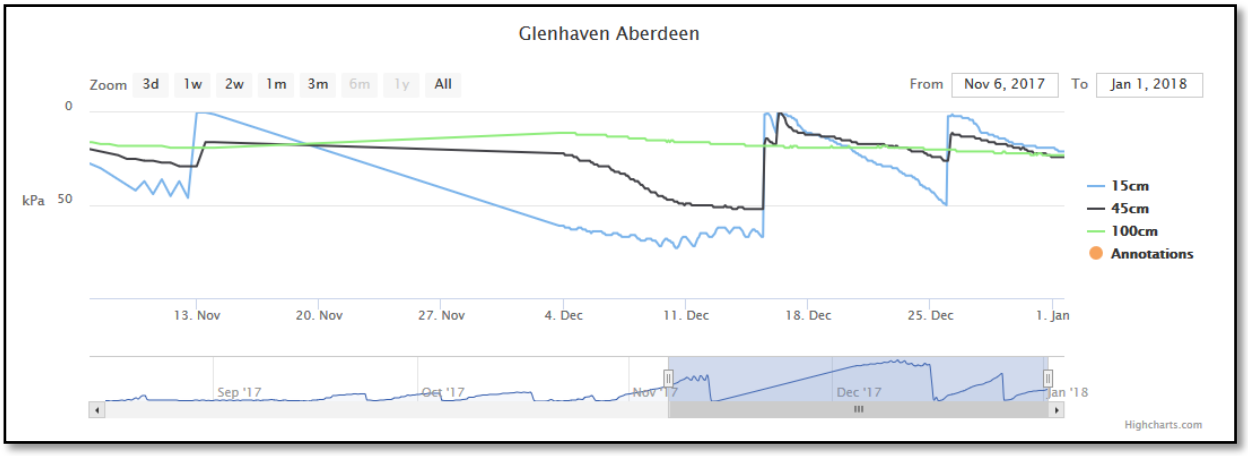
Date	18	19	20	21	22	23	24	25	26	27	28	29	30	31	**Total**
Glenhaven					40										**90**

The Readily Available Water (RAW) at soil probe sites in the Upper Hunter region:

Soil probe site	Crop	Root depth	Soil texture	RAW
Glenhaven	Lucerne	100 cm (assumed)	Light Medium to Sandy Clay	48 mm
Garoka	Mixed pasture	40 cm (assumed)	Sandy Clay	24 mm
Rossett Park	Mixed pasture	40 cm (assumed)	Light Medium to Medium Clay	22 mm
Dalara	Mixed pasture	40 cm (assumed)	Clayey Sand to Loamy Sand	18 mm

Soil moisture watch

Glenhaven soil probe traces as at 1/01/18



As there were problems getting the full month's data for the November report, the soil moisture traces are shown from mid-November to the end of December. All three traces are straight lines from 14th November to 3rd December as there were no data points logged over this period. From 3rd December, the sensors displayed a wide range of activity, and water use is evident at all three depths indicating that the Lucerne is actively growing.

The shallow 15 cm sensor (blue line) indicates that it reached about –70 kPa around 8th December and maintained this until the irrigation applications on the 14th and 16th December. The flat pattern indicates that the refill point was reached and maintained at this soil depth. The combined applications of 10 mm and 40 mm refilled the soil to 45 cm but it did not reach 100 cm (green line). The 15 cm trace shows two brief periods of waterlogging on 15th and 16th December, followed by a consistent downward slope to 25th December indicating healthy plant water use. The irrigation event on the 22nd refilled the profile to 45 cm once again, with the 15 cm trace prior to this showing no change of slope, indicating that the soil at this depth was not depleted to refill point and the pasture did not get stressed. It showed a slightly longer period of waterlogging this time and then resumption of a healthy pattern of plant water use.

The 45 cm sensor (black line) shows a similar pattern to the 15 cm trace only not reaching the same extremes. The slope changes to virtually flat at –50 kPa from 10th December, a couple of days later than the 15 cm trace. The flat period for both the 15 cm and 45 cm traces corresponds with the deficit period indicated in the seasonal summary of irrigation, rainfall and soil moisture in the Scheduling Irrigation Diary. The 45 cm trace shows only one very brief period of waterlogging on 16th December. A healthy pattern of water use resumed sooner than the 15 cm trace, indicating that the plants were actively extracting water from this depth while the shallower layer above continued to drain. This means that pasture growth was most likely reduced for only a very short period by the waterlogging. The irrigation on

the 25th December did not completely fill the profile at 45 cm so the healthy pattern of water extraction was not interrupted.

The 100 cm sensor (green line) shows a slow, constant level of water use from 3rd December. This indicates that the Lucerne is actively growing and drawing water from the whole soil profile. Neither irrigation event penetrated to this depth, but the slope of the trace flattens slightly after each event, indicating that the plants are preferring to extract water from the shallower soil depths when it is readily available.

Note: The dates from the SID and the Tain soil moisture loggers do not always agree. This is due to how data is logged and recorded. The SID data extracted from the Scone weather station is generally a day or more behind, as the BOM records any event up to 9:00am as occurring on the day before. The dates of irrigations and on-farm rainfall input by the farmer will depend on his method of record keeping and could easily be a day or two different from the BOM. Water movement through the soil profile will vary depending on how much water is already there and some other factors. The Tain loggers record in real time – as long as the time register is correct – so are usually a day different to the BOM.

Agronomy Report

Agronomy tips for January

- With many areas receiving little rainfall, irrigation scheduling becomes increasingly important. Take notice of evapotranspiration and the crops/pastures requirements and schedule irrigation accordingly.
- Summer crops such as sorghum and millet should be utilised to ensure maximum quality is achieved. Grazing management through this period should also aim at leaving adequate residual to allow regrowth of the crop for subsequent grazing.
- If you haven't already, consider soil testing so that the results can be used as a tool for the 2018 season.
- The time for autumn planting is fast approaching. Paddock planning and sowing requirements for the autumn should be made this month.

Lucerne based pasture for direct grazing

Since the commencement of the project the following activities have occurred.

- 16th July - Barley Sown
- 12th October – Cut for Hay Silage
- 7th November – Grazing Commenced (8 feeds)
- 7th December – Grazing Commenced (7 feeds)

December Grazing

The dry matter under the pivot was measured before grazing commenced on the 7th December with the electronic pasture meter. The results showed: -

- An average dry matter of 2116kg/DM/ha
- A range of 459kg/DM/ha to 2669kg/DM/ha.
- The Lucerne pasture was cut with a mower conditioner prior to grazing.

- Scott Wheatley aimed to allocate the 290 cows 8kg/Lucerne Pasture/each graze
- An average residual of 619kg/DM/ha was measured after grazing.
- Utilised 1497kg/DM/ha.
- This utilisation equates to 7.34kg/DM/cow/grazing.

To find out more about the Smarter Irrigation for Profit- Hunter Optimised Dairy Irrigation Farm Project, please contact:

Marguerite White
Project Manager, ICD Project Services

Phone: 0447 500 415 or Email: mwhite@icdprojectservices.com.au

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