Making Smart irrigation decisions in dry periods

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In some regions over the past few years we have seen below average rainfall and higher than average evaporation rates, which has put pressure on pasture and crop growth rates. Irrigation water supplies, be that ground water or supplemented water, are becoming tight, with crop water requirements increasing over this time. There is no better time than now to think about completing a water budget and to make crop choices based on this.

A simple way of completing this is by using the Irrigation Calculator (iCalc available on dairyinfo.biz). The Irrigation Calculator uses effective rainfall, evapotranspiration rates and crop factors to determine irrigation water requirements (crop demand). iCalc shows that in below average rainfall years irrigation water requirements for ryegrass can be up to 10 ML/ha to meet crop demand.

Given this, it may be an important risk management decision to calculate total water available (allocation) vs crop water demand to calculate an area to plant to reduce risk of underperforming crops. Table 1 below shows the average annual irrigation requirement and the highest irrigation requirement for barley, oats and ryegrass in a number of locations.

	ML/ha	Barley	Oats	Ryegrass
Allora (travelling gun)	Average	2.7	2.6	5.7
	Highest	4.2	4.3	9.4
Beaudesert (travelling gun)	Average	3.1	3	6.4
	Highest	4.6	4.8	10.1
Conondale (solid set)	Average	2.1	2	4
	Highest	3.4	3.2	6.8
Gatton (travelling gun)	Average	3.4	3.3	7.1
	Highest	5	5	11.4
Gympie (solid set)	Average	2.2	2.1	4.4
	Highest	3.8	3.8	8
Harrisville (travelling gun)	Average	3.3	3.2	6.8
	Highest	4.9	5.1	10

Table 1

Crop	Area (ha)	ML/ha required	Total ML	t DM/ha	Total t DM
Barley	20	4.6	92	6	120
Ryegrass	10	10.1	101	13	131.3
Total	**30**		**193**		**251.3**

Table 2 *An example of a water budget for a Beaudesert farm with 30 ha of irrigation ground and 200 ML available for winter in the highest irrigation requirement year.*

Irrigation scheduling is one of the biggest determinates in water use efficiency (t DM/mm). Determining irrigation scheduling practices is a complex process. There are many factors which impact on when and how much water to irrigate each crop with. A simple approach used by many agricultural industries is the FAO65 method. This method uses daily evapotranspiration rates from the Bureau of Meteorology (BOM), crop factor and effective rainfall. The table below shows an example of irrigation requirement per month using this method for a barley crop at Warwick. Please note to take account of the irrigation system's application efficiency you multiply the Net Irrigation Requirement (shown in Table 3) by system efficiency eg. 1 ML x 95% = 1.05 ML

Crop Stage	Crop Factor	Average Daily Evapotranspiration 2018 (mm/day)	Effective Rainfall (mm)	Net Irrigation Requirement (ML/ha)	Gross Irrigation Requirement (ML/ha)
Emergent *(June)*	0.3	2	16.5	0.02	0.021
Growth *(July)*	1	2.4	12.1	0.6	0.63
Growth *(August)*	1.5	3.3	6.7	1.5	1.6
Harvest (September)	1	3.8	14.5	1	1.05
Total				**3.12**	**3.3**

Table 3

It is important to note that this method assumes that planting occurred on a full profile of water. In many cases where a full profile of water is not present at plant, it presents a risk to the yield and the ability for irrigation events to keep up the available water in the soil at optimum levels. *For more information on irrigation scheduling visit dairyinfo.biz.*

Improving Water Use Efficiency

In periods of reduced water available, low rainfall and high evaporation rates, farmers should consider reducing the area of irrigation and irrigating a crop to its full potential. Measured yields of ryegrass in the Mary Valley region have shown a 50% reduction in yields when water is stretched over a greater area compared to irrigating the crop requirements.

Glossary

Crop water demand is defined as the amount of water needed to meet the water loss through evapotranspiration.

Crop factor refers to the stage of growth of a plant and its relationship with evaporation replacement required to meet crop water needs.

Irrigation scheduling refers to the frequency and amount of water applied through an irrigation system.

Evapotranspiration is a collective term for the transfer of water, as water vapour, to the atmosphere from both vegetated and un-vegetated land surfaces. It is affected by climate, availability of water and vegetation. BOM calculates this on a daily basis.

Effective rainfall is the amount of rain that can be absorbed by the soil. For the purposes of this article effective rainfall is determined as anything more than 5mm and less than 50mm per day.

For more information on irrigation scheduling visit dairyinfo.biz.