



Barossa Improved Grazing Group Survey Report

Use and application of BIGG's weather monitoring station data

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Summary

An online survey of Barossa Improved Grazing Group (BIGG) subscribers was conducted to determine the use and application of data being recorded from BIGG's weather monitoring stations. A key aim was to determine how the data was being used to assist farm decision-making.

Twenty-five subscribers responded to the survey and of these, 80% had previously viewed the recorded data from the monitoring stations. Of those that had accessed the data, 60% checked it at least weekly during the growing season (April-October).

When accessing the monitoring station data online, respondents viewed various information however they mostly checked:

- Raw weather data (e.g. rainfall, air temperature, humidity, wind speed)
- Plant available water data

The survey established that producers use the data to assist in making numerous on-farm decisions. The key decisions being:

- Suitability of conditions for spraying
- Estimating the length of the growing season (for feed availability and associated feed decisions)
- Stocking rates
- Application of nitrogen fertiliser

Survey respondents also gave feedback on 'knowledge gaps' of the data and how its online presentation might be improved. Some of the key responses included:

- Further information/training on data interpretation and how the data can be better applied to decision-making
- Making the webpage (which displays the recorded data for each monitoring station) more mobile friendly
- Having access to wind direction data for all stations
- Linking data with Bureau of Meteorology (BOM) forecasts to help predict feed on offer

The responses throughout the survey also highlight the importance of local producers having access to local soil moisture and weather data to confidently assist their decision-making. This is especially important given the vagaries of recent seasons.

Background

In 2013, BIGG initiated a project to monitor soil moisture in local grazing systems. This involved the establishment of telemetry based monitoring stations located in three representative Barossa pasture paddocks, which was the first time a farming systems group in Australia has demonstrated soil moisture monitoring in pastures.

Each monitoring station comprises a sub-surface capacitance probe measuring moisture to a depth of 85cm, an automatic rain gauge and sensors measuring air temperature, relative humidity, wind speed and radiation. These are connected to a solar powered telemetry unit with the data being recorded in near real-time and publically available online. The recorded data (including interpretive graphs) are accessed on a separate webpage for each station. For further information visit <http://biggroup.org.au/project/soil-moisture-monitoring/>.

In 2017-18, BIGG initiated the development of a web-based Pasture Modelling Tool to assist producers in determining their stocking rates through estimating local paddock grazing capacity. The tool is 'driven by' the data recorded from the monitoring stations, however additional modeling, including field validation of the tool is required before it can be publically released.

In January 2019, BIGG received a 'Supporting Sustainable Primary Production' grant from the Adelaide and Mount Lofty Ranges Natural Resources Management Board, for the project, *'Ongoing soil moisture monitoring and communication activities in Barossa grazing systems'*.

As part of the project, a survey was conducted on the use and application of the monitoring station data being recorded. Its key aims were to determine:

- How regularly data is being accessed
- Which data is most useful for users
- How the data is being used to assist farm decision-making

A 10-question survey questionnaire (Appendix 1) was developed using the survey tool SurveyMonkey and emailed to BIGG's subscribers (304) who responded to it online. The survey was open from 15 April to 2 June 2019.

On completion of the survey, the responses were aggregated and analysed.

The survey results are presented in this report.

Survey results

Q1. Survey participation and profession of respondents

Twenty-five out of 304 BIGG subscribers responded to the survey, representing eight percent of the survey pool. The vast majority of respondents were local producers/land managers (Table 1).

Table 1: Profession of survey respondents.

Profession	Responses	
	(#)	(%)
Producers/land managers	22	88
Consultant/advisors	2	8
Unknown (profession not specified)	1	4

Q2. Enterprises managed by survey respondents

The majority of survey respondents ran or specialised in more than one farm enterprise, with most managing sheep (64%), beef cattle (40%) or grape enterprises (40%) (Table 2).

Table 2: Enterprises run or specialised in by the survey respondents*.

Enterprise	Responses	
	(#)	(%)
Sheep	16	64
Beef cattle	10	40
Dairy cattle	3	12
Broad-acre crops	7	28
Perennial pasture	9	36
Native pasture	7	28
Grapes	10	40
Land management	3	12

*Respondents (25) selected as many options as applicable from the listed choices (producers/land managers listed enterprises they ran and consultant/advisors listed enterprises they specialised in).

Q3. BIGG weather monitoring station awareness

One hundred percent (25/25) of survey respondents were aware that BIGG manages weather monitoring stations located at Flaxman Valley, Keyneton and Koonunga.

Q4. Access to BIGG's weather monitoring station data

Eighty percent (20/25) of survey respondents had previously viewed the recorded data from BIGG's monitoring stations.

Q5. Non-access of BIGG's weather monitoring station data

Twenty percent (5/25) of survey respondents had not previously accessed data from BIGG's monitoring stations. The key reasons (Table 3) were they:

- Didn't know how to access the data
- Don't know how the information is valuable
- Use other weather data

Table 3: Reasons why survey respondents did not access data from BIGG's weather monitoring stations*.

Reasons for not accessing data	Responses	
	(#)	(%)
I'm aware of the stations but don't know how to access the data	3	60
Didn't know the data is free to access	2	40
Data and information presented is too overwhelming	0	0
Data and information presented isn't applicable to me	2	40
Don't know how the information is valuable to me	3	60
We have our own weather station	0	0
I use Bureau of Meteorology data / weather report from the news, or other sources of information (e.g. Elders Weather)	3	60
I use a weather app; easier than a website	1	20

*Respondents (5) selected as many options as applicable from the listed choices.

Q6. Location of BIGG weather monitoring stations

Survey respondents nominated which monitoring stations they generally accessed, with all stations similarly represented (Table 4, Figure 1).

Table 4: Location of BIGG's weather monitoring station generally accessed by survey respondents*.

Weather monitoring station location	Responses	
	(#)	(%)
Flaxman Valley	7	35
Keyneton	5	25
Koonunga	8	40

*Respondents (20) selected one option from the listed choices (the Moculta station was not included in the survey as it was only installed just prior to the survey starting).

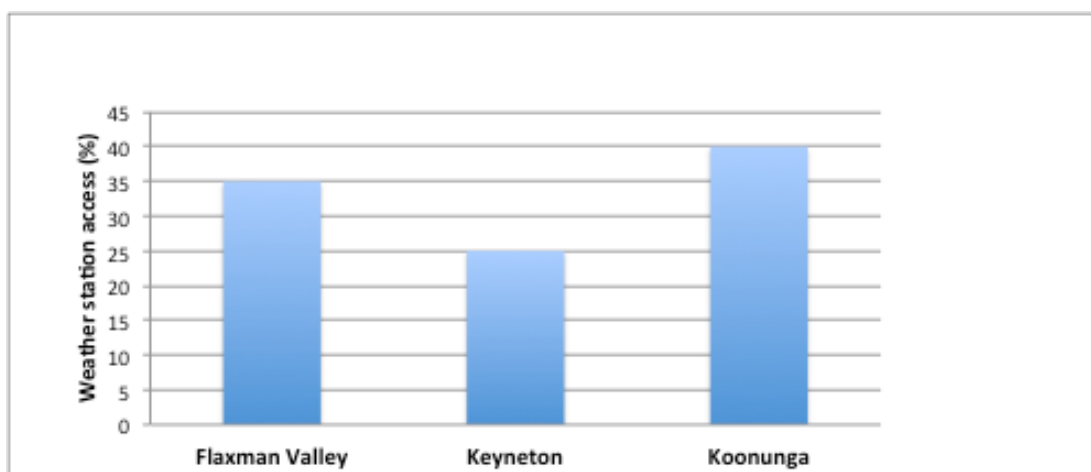


Figure 1: Location of BIGG's weather monitoring station generally accessed by survey respondents.

Q7. Frequency of data access

Sixty percent of survey respondents viewed BIGG's monitoring station data at least weekly during the growing season (Table 5, Figure 2).

Table 5: Frequency BIGG's weather monitoring station data is accessed during the growing season (April-October)*.

Frequency of data access	Responses	
	(#)	(%)
Daily	0	0
Two-three times per week	8	40
Weekly	4	20
Fortnightly	3	15
Monthly	2	10
Once every two months	3	15

*Respondents (20) selected one option from the listed choices.

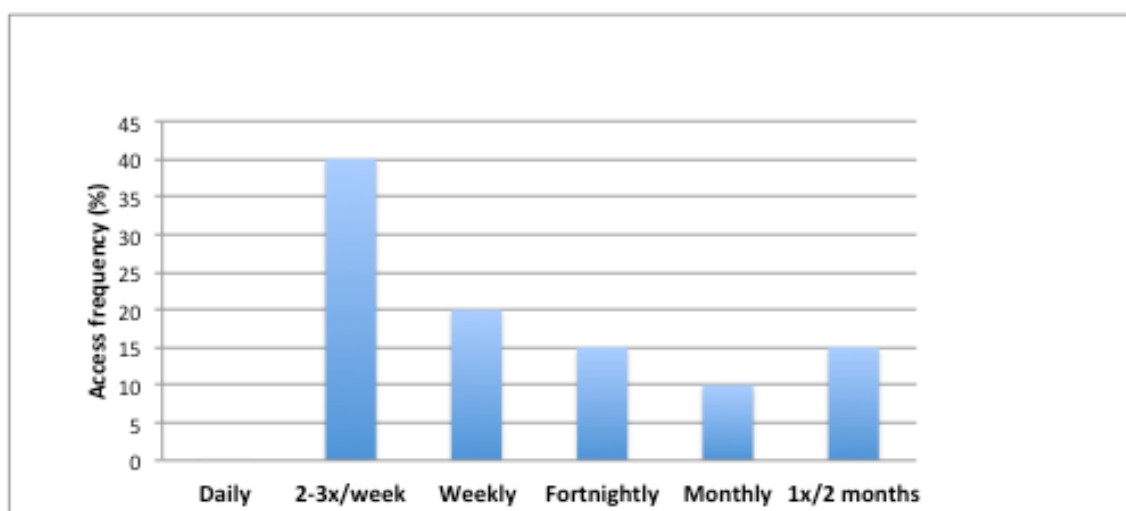


Figure 2: Frequency BIGG's weather monitoring station data is accessed during the growing season (April-October).

Q8. Type of data accessed

When respondents accessed BIGG's monitoring stations data, they mostly checked (Table 6):

- Raw weather data (e.g. rainfall, air temperature, humidity, wind speed) – 90% of respondents
- Plant available water data (graphs showing how full the soil moisture profile is, including a comparison of 'this year versus last year') – 85% of respondents

Table 6: Data accessed from BIGG's weather monitoring stations by survey respondents*.

Type of data accessed	Responses	
	(#)	(%)
Raw weather data	18	90
Growing season rainfall	13	65
Plant available water estimate	17	85
Soil temperature	11	55
Soil moisture stacked	11	55
Soil moisture deficit	9	45
Fire danger index	6	30
Spray conditions (index)	9	45
Frost conditions (index)	5	25
Sheep chill index	1	5
Sheep fly strike index	0	0

*Respondents (20) selected their top five options from the listed choices (for a full explanation of each option see Appendix 1, Question 8).

Q9. Enterprise decisions made by accessing data

Seventeen survey respondents listed 44 decisions or actions they have previously made through accessing BIGG's weather monitoring station data (Table 7). These individual responses were grouped into 13 categories with the key ones being:

- Suitability of conditions for spraying (47% of respondents)
- Estimating the length of the growing season for feed availability and associated feed decisions (35% of respondents)
- Determining stocking rates (29% of respondents)
- Determining nitrogen fertiliser application (29% of respondents)

It is likely that most decisions were made based on accessing the plant available water/soil moisture information (Table 7).

Table 7: Enterprise decision or action made by survey respondents accessing data from BIGG's weather monitoring stations*.

Enterprise decision/action	Responses	
	(#)	(%)
Accessing plant available water/soil moisture information**		
Length of the growing season for feed availability, including feed budgeting/fodder purchases	6	35
Stocking rates and timing of destocking	5	29
Nitrogen fertiliser application in winter/spring	5	29
Sowing crops, including summer fodder crops	3	18
Timing of hay cut	1	6
Irrigating vines	2	12
Planting vines	1	6
Accessing index and raw data information**		
Suitability of conditions for spraying	8	47
Suitability of conditions for crop harvesting	3	18
Assessment of frost events (in broad acre crops and grapes)	4	24
Accessing raw data information**		
Suitability of conditions for hay/silage making	3	18
Rainfall check of weather station to help determine work program for nearby property	2	12
Spray record keeping	1	6

*Respondents (17) gave as many options as they wished.

**In an attempt 'to link the data respondents accessed to the decision made', the author classified each decision/action under one of three groups.

Q10. Improved presentation of current data and information

Survey respondents gave feedback on 'knowledge gaps' of the monitoring station data and how its online presentation might be improved. Thirteen respondents gave multiple answers to this question. The separate responses were listed under one of four categories (Table 8). Some of the key responses included:

- Further information/training on data interpretation and how the data can be applied to decision-making
- Making the webpage more mobile friendly
- Having access to wind direction data for all stations (currently it is only measured at the Moculta station)
- Linking data with BOM forecasts to help predict feed on offer

In the case of linking forecast information with the monitoring station data to help predict feed on offer, pending future funding this is one of the key features that BIGG plans to incorporate into its Pasture Modelling tool.

Table 8: Feedback received from survey respondents about 'knowledge gaps' of BIGG's monitoring station data and how its online presentation might be improved*.

Information interpretation and extension	<ul style="list-style-type: none"> - On-line training or recorded webinar about data interpretation - Conduct a workshop or online tutorial on how the data can be used and applied as part of a decision making process - Drop-down help boxes to improve understanding, interpretation and use of data - Information for some instrument panels can be confusing - Previously unaware of the many graph options until mentioned in this survey - first step is to ensure all options are promoted and explained - Put an advert in the local paper's alerting people to BIGG's monitoring station information
Web presentation and layout	<ul style="list-style-type: none"> - Rainfall figures are recorded as 'calendar day' but when checking figures against own rainfall gauge it can be confusing as the standard is to measure at 9am - Legibility, size and font colour (for those who are colour blind) of some graphs. For example, the scale of the rainfall graphs - the rainfall bars generally take up only the very bottom of the graph while a high amount of space remains at the top of the graph to show large rainfall events, however these are infrequent - Possibly too many graphs to digest on the 'trends page' - less is more!
New measures	<ul style="list-style-type: none"> - Webpage more mobile friendly (x2) - Wind direction data recorded at Moculta is useful, would benefit from these sensors at other stations (x2) - Link data with BOM forecasts to get forward predictions of Feed on Offer - Maybe an app!
Other	<ul style="list-style-type: none"> - Information is user friendly 'as is'. - I think the information presented is fine for the purposes that I access it for - Data availability is generally very good. However sometimes there is a data lag or gap - it is particularly important to have real time data for fire and spray indices

*Respondents (13) gave as many suggestions as they wanted.

Appendix 1 – Survey Questionnaire

Q1. What is your role or profession?

- Producer/land manager
- Land holder/non commercial
- Consultant/advisor
- None of the above

Q2. Which enterprises do you run on your property, or if a consultant/advisor which enterprises do you specialise in? (select as many as applicable)

- Sheep
- Beef cattle
- Dairy cattle
- Broad-acre crops
- Perennial pasture
- Native pasture
- Grapes
- Land management
- Other (please specify)

Q3. Were you aware that BIGG manages three local-weather monitoring stations (located at Flaxman Valley, Keyneton and Koonunga)?

- Yes
- No

Q4. The data from these weather monitoring stations is publically available and can be accessed online via the BIGG website. Do you use these stations, or have you ever viewed data from these stations before?

- Yes (go to Q6)
- No (go to Q5)

Q5. If not, what are the reasons you are not accessing data from the weather monitoring stations? (select as many as applicable, then go to the end of the survey and click 'DONE')

- I'm aware of the stations but don't know how to access the data
- Didn't know that the data is free to access
- Data and information presented is too overwhelming
- Data and information presented isn't applicable to me
- Don't know how the information is valuable to me
- We have our own weather station
- I use Bureau of Meteorology data / weather report from the news, or other sources of information (e.g. Elders Weather)
- I use a weather app; easier than a website
- Other (please specify)

Q6. Which weather monitoring station do you generally check, or check the most frequently?

- Flaxman Valley
- Keyneton
- Koonunga

Q7. During the growing season (April-October), how often do you generally view the weather monitoring station data?

- Daily
- Two-three times per week
- Weekly
- Fortnightly
- Monthly
- Once every two months

Q8. Of the weather monitoring station data currently being recorded and presented online, what data are you checking the most? (Select your top five)

- Raw weather data (*e.g. rainfall, air temperature, humidity, wind speed*)
- Growing season rainfall (*graph showing the daily and cumulative rainfall throughout the growing season*)
- Plant available water estimate (*graphs showing how full the soil moisture profile is, including a comparison of 'this year versus last year'*)
- Soil temperature (*graph showing the soil temperature at different depths*)
- Soil moisture stacked (*graph showing the amount of water available at various depths throughout the soil profile*)
- Soil moisture deficit (*graph showing the moisture percentage that the soil profile is in deficient by*)
- Fire danger index (*graph showing if weather conditions are safe for crop harvesting*)
- Spray conditions (*graph showing if weather conditions are safe for spraying*)
- Frost conditions (*graph showing the occurrence of frost*)
- Sheep chill index (*graph showing the level of sheep chill*)
- Sheep fly strike index (*graph estimating the likelihood of sheep being struck by blowflies*)

Q9. Please list the enterprise decisions or actions you have made through accessing information from the weather monitoring stations?

Q10. How can the data and information from the weather monitoring stations be better presented to help increase your use and understanding of it?