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Improving the Rainfall to Pasture Growth: Scoping study

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Improving the Rainfall to Pasture Growth Outlook Tool – scoping study

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The Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) was formed following the merger of the Australian Bureau of Agricultural and Resource Economics (ABARE) and the Bureau of Rural Sciences (BRS) in 2010–11.

Contents

Summary

ABARES conducted a series of workshops with livestock producers to provide information that may assist in the re-development of the Rainfall to Pasture Growth Outlook Tool (RPGOT).

The RPGOT is a decision support tool that delivers online access to current and forecast pasture growth information for more than 3300 locations across southern Australia.

The information gathered for this report was provided by producers as well as public sector and private advisors and consultants, representing a variety of livestock industry sectors across four climatic zones.

The general consensus emerging from the workshops was that a freely available support tool that provides pasture growth information through a simple and intuitive platform would be a useful addition to existing sources of information that are available to support decision-making in the livestock production sector.

A list of improvements and additions to the current tool and their technical and financial feasibility is provided in this report.

The current RPGOT seems to have little uptake, most likely due to a current lack of communication and support. Investment into the redevelopment of a new RPGOT needs to be supported by a sound communication strategy to ensure broad uptake so that more producers can benefit from improved decision-making and resulting profits.

ABARES recommends utilising the existing networks of producer groups to facilitate regional and local workshops and follow-up activities, following redevelopment.

A work plan for the redevelopment of the RPGOT, including features and key development activities, is provided in this report.

1 Introduction

The Rainfall to Pasture Growth Outlook Tool (RPGOT) is a decision support tool available via the Meat & livestock Australia (MLA) website that uses a pasture growth model and ABARES statistical models to provide access to current and forecast pasture growth rates for more than 3300 sites across southern Australia. It was developed in 2005 by the former Bureau of Rural Sciences (BRS) and has been one of the technical information and management tools promoted through the MLA extension programs. One of the limitations of the RPGOT is that it uses the GROWEST model, a highly simplified pasture simulation model with known constraints.

The development of improved pasture growth models and advancements in information and communications technology (ICT) provide an opportunity to improve the functionality of RPGOT and its relevance for producers. The aim of this scoping study is to ensure that redevelopment of the existing tool is aligned with user needs.

To achieve this, stakeholders and users of the existing tool were engaged through a series of workshops, consultant interviews and an online survey. ABARES conducted the workshop series while the MLA conducted the consultant interviews and online survey. The objective of this engagement was to understand how producers currently use the RPGOT, what the perceived benefits and shortcomings of the tool are and how the RPGOT can be improved and extended to better support on-farm decision-making. To aid in the further development of future extension programs, as well as other decision support tools, the workshops were also designed to glean information on the timing of tactical decisions in the different climate zones (trigger points) and general requirements for decision support in the livestock industries.

This report summarises the outcomes of the consultation workshops and provides a priority listing of desired improvements based on producer feedback and identifying the technical feasibility and financial implications. These are incorporated into a work plan, outlining options for implementing the identified improvements, to provide information that may assist in an investment decision by the MLA about future development of the RPGOT.

Rainfall to Pasture Growth Outlook Tool

The RPGOT provides a set of complementary outputs that can be used in conjunction with other sources of information to improve tactical and strategic on-farm decision-making. The underlying GROWEST model uses weekly solar radiation, temperature and available soil moisture (derived from rainfall and soil type data) to estimate a dimensionless plant growth index. The index presents plant dry matter production as values ranging between zero (completely limiting conditions) and one (non-limiting conditions).

The first section of the outputs, the ‘Station Description’, provides users with graphs of annual rainfall, pasture growth and soil moisture patterns. This part of the tool can aid strategic decision-making by giving producers historical trends of rainfall and related pasture seasonal growth for their location. Joining, calving, turn-off times and other long-term planning decisions can be supported within a regional context.

The second section of the outputs contains up-to-date graphs of weekly rainfall, pasture growth and soil moisture with a three-month outlook. These graphs can be used to identify trigger-points and indicate the likelihood of possible future pasture growth. They provide an indication of feed on offer and support tactical management of, for example, stocking rates, herd condition and supplementary feeding.

The current outputs of the RPGOT have been developed in close collaboration with producers. In particular, the depiction of the reliability of the outlook component was designed to enable users to

clearly identify what the utility of the forecast system is at any given point in time. As with most other risk management tools the RPGOT may not make a difference every season but will help producers improve their overall decision-making and their profitability, particularly in years of above or below average conditions.

2 Methodology

Workshops

Producer groups, extension officers and consultants were engaged to set up workshops in four major agro-climatic zones. ABARES developed the workshop agenda and acted as facilitator. The agenda was designed to generate discussion and gather information to direct the redevelopment of the RPGOT as well as facilitate a better understanding of the information needs of producers across different industry sectors and regions (Appendix A).

As preparation for the workshop, producers received a questionnaire in the week leading up to the workshop (Appendix B). The questions were structured around the main themes of the workshop and were intended to lead into and facilitate the discussions on the day (Appendix C).

Workshops were held in Maffra, Victoria; Dongara, Western Australia; and Armidale, New South Wales in November and December 2010, with a total of 21 producers attending. A fourth workshop was planned for Struan, South Australia, but producer participation at this workshop did not eventuate, and ABARES instead facilitated a discussion with extension officers.

Participants in the workshops included beef, beef–sheep and livestock–cropping producers, as well as private and government advisers and consultants. Levels of experience with the RPGOT ranged from ‘never heard of it’ to ‘several years use’.

The workshops were structured for open group discussions that provided opportunities for participants, using their own experiences and expectations, to expand on comments and ideas. Within this framework, ABARES facilitated the discussions to cover the following questions:

- Which tactical and strategic decisions could be improved through better information?
- Does the currently available information help and which sources are accessed by producers?
- What are other products/information that RPGOT could complement?
- How can the current tool be improved?
- How much information does the user need about the model / freedom to customise?
- What levels of detail/information do users want?
- What is the required frequency of updates?
- Can the current display of ‘uncertainty’ be improved?

The workshops provided valuable information on climate-dependent decision points for livestock industries across different climatic zones and identified preferred delivery mechanisms across a range of users. However, given the small number of participants, this report presents a descriptive summary of the outcomes rather than a quantitative analysis.

3 Key issues and feedback emerging from the workshops

Seasonal decision points

Information for decision support was viewed by most participants as an important way to increase productivity and reduce input costs. Both can be achieved through improved decision-making based on information about current and future climate and pasture conditions.

Producers' decision points throughout the year vary with climatic zone, regional location and production system, but can vary even for similar production systems in the same area. Based on the feedback gathered for this report, it seems impractical to deliver predetermined decision points through a tool even if these were available for each region. Users need the ability to determine their own trigger-points that match their requirements.

A similar theme across climatic zones was that producers are looking for information to help determine stocking rates and improve herd condition. Early indicators for either buying-in or selling-off were seen as critical to improving the chances to 'beat' markets and achieve better prices. For breeders, fat scores and ewe/cow condition were critical for fertility as well as the condition of offspring. Another related area of decision-making highlighted across the regions was supplementary feeding, as well as sowing and management of fodder crops, including the application of fertiliser.

In climatic zones with a pronounced seasonality in rainfall (Dongara and Armidale), information related to timing and length of the growing season and the available soil moisture were identified as essential to the decision-making.

In climatic zone with a more uniform rainfall pattern (Maffra), information was required all year, with some emphasis on the times of calving and weaning. Rainfall reliability also influenced the information requirements, and producers in less-reliable areas were indifferent to the potential for additional information that could improve their decision-making. In comparison, producers in Dongara were very much looking for additional information about out-of-season summer rainfall, which is their least reliable time of the year.

Key seasonal decision-points identified at the workshops for the individual regions are listed below.

Maffra, Victoria:

- stocking rates
- supplementary feeding
- weaning
- calving (May/August)
- finishing/selling (May/August)
- fertiliser application (rates and type)
- irrigation (summer).

Dongara, Western Australia, winter dominant rainfall:

- timing of start of season, particularly early breaks and false breaks (May)
- frost
- timing of end of season, particularly early cut-out
- out-of-season summer rainfall
- stocking rates (buy in at start and sell-off at end of season)
- decisions to sow fodder crops or not (annual and perennial).

Struan, South Australia:

- autumn
- spring.

Armidale, New South Wales:

- winter

- beginning and end of spring
- late summer to autumn (de-stocking for winter)
- stocking rates
- calving, need to maintain cow fat scores
- pre-joining, need to maintain reproductive capacity
- supplementary feeding
- agistment and stock movement.

Sources of information

Most producers at the workshops had access to computers and regularly visited websites to get information. Only one producer stated that he had no computer and relied entirely on television, radio and newspapers. Information about rainfall and other weather conditions (such as frost and wind), particularly short-term weather forecasts, was the most commonly mentioned type of information sought.

Although most weather and climate information in Australia is provided by the Bureau of Meteorology (BoM), the majority of producers seemed to prefer the Weatherzone and Elders websites over the BoM website. The Water and the Land section of the BoM website, which has been specifically designed for agricultural producers, was not mentioned at all and only a small number of producers said they knew about it when asked.

The Long Paddock website of the Queensland Climate Change Centre of Excellence was mentioned by one producer in Armidale.

Pasture growth information was used regularly by only a minority of the workshop producers. In general, models were deemed to be too unreliable and not valid for the specific on-farm conditions. Despite these generally held views, the only pasture growth information that seemed to be used, at least locally, was the Pastures from Space information provided weekly by ABC radio in Western Australia. The information is provided on a shire basis, and regional stations report only the shires in their transmission area.

Despite its unspecific nature, workshop participants in Western Australia stated that they could use the Pastures from Space information as a guide, by inferring conditions on their farm from the average conditions in their shire. None of the workshop participants reported that they had ever paid a consultant to get pasture growth information, even though the Yield Prophet concept was mentioned as an example of a useful complex tool.

The need for additional information depends partly on the scale of the enterprise and the ability to directly assess on-ground conditions. Many of the available support tools were viewed as useful on a larger scale, such as a regional context, but not for a single family enterprise.

RPGOT feedback

Most producers were not familiar with the RPGOT or had only heard about in the lead-up to the workshop. Of the producers that had previously used it, only three received training through an MLA extension course; one of the advisers participated in a Train the Trainer course.

A consistent theme identified at the workshops was that a freely available support tool that provides pasture growth information through a simple and intuitive platform would be a useful addition to existing sources of information. Pasture growth outlook was seen as highly relevant for decision-making, particularly if it could be made more accurate and reliable.

Most producers liked the RPGOT concept but thought that, although it had a lot of potential, it was not delivered and promoted in a way that ensured relevance and uptake. The most common cause

identified for the lack of uptake was a lack of extension activities to promote its use and explain how it could improve decision-making throughout critical points in the season.

A major concern about the RPGOT was the complexity of the interface. Many of the producers that had specifically tried to familiarise themselves with the site for the workshop found it to be not intuitive enough and had trouble understanding it. Another common concern was the lack of stability and technical issues that prevented users from accessing the site altogether (login issues) or affected parts of the system.

When asked whether they would use a system like the RPGOT now that they are aware of it, some producers indicated that they could not see any value-add to the information on rainfall and weather conditions that they were already receiving. Most producers altered their opinion after a short tutorial on how the rainfall and pasture growth curves differ throughout the seasons and how they can be used to assess current production conditions and the most likely future pasture growth scenario.

The other tools available on the MLA website were also either not known to producers or were thought to be too inaccurate. Several producers stated that they used a stocking rate calculator that is based on the one available on the MLA website but that had been customised to suit their needs.

A general comment that was made during all workshops was that the tools available through the MLA website were not well promoted and lacked the necessary support through communication and extension activities.

Features of a new system

Producers' views on the design of a new system ranged from 'make it simpler and more intuitive' to 'provide more complexity and customisation options'. These two concepts are not mutually exclusive and could be readily accommodated in one interface that enabled users to choose the level of complexity that suited them.

The following list of features is a summary of ideas that were discussed at the workshops. Most of them were raised by producers, although some were intentionally raised by ABARES to generate feedback.

- Improve accuracy of pasture model

Even though the quality of outputs was not questioned, producers did agree that improved accuracy was an important feature of a new system. GROWEST is a simple pasture model requiring only a limited number of parameters that provides users with an estimate of potential plant growth. The accuracy of RPGOT outputs can only be improved if a more complex pasture model is incorporated.

It is worth noting that the web tool itself is essentially independent of the underlying pasture model and could work with any of several available options as long as the models can be customised to run on the relevant servers and provide the required outputs. The Sustainable Grazing Systems (SGS) pasture model, developed by IMJ consulting provides a cost-effective solution that would readily enable all desired improvements outlined in this document. ABARES has a longstanding relationship with IMJ consulting and has had a part in the development of some of the SGS system components. The implementation of SGS as the underlying pasture model is recommended (as outlined in section 4).

- Improve outputs
    - Provide pasture growth as kilograms (kg) dry matter / hectare (ha) rather than as an index

Most producers did not like the pasture growth index derived by GROWEST and would prefer a measure like kg dry matter / ha. The SGS pasture model accommodates this measure and this feature can be implemented in the proposed work program.

- Use deciles rather than percentiles or use categories (poor/normal/good)

Some producers stated that deciles are more commonly used in the farming sector and their use would improve the simplicity of the system. Alternatively, categories could be used to identify above and below average conditions.

All features identified above would be implemented under option 1 of the recommendations (see section 4).

- Improve the interface and customisation options for users
  - increasing the number of modelled pasture species (C4) / pasture communities
  - selectable soil type
  - stocking rates
  - fertiliser application
  - store farm profiles for future use
  - model several paddocks per farm

- Expand the range to all of Australia

Even though all producers interviewed are currently covered by the existing tool, they did agree that the proposed extension of the range would be a useful feature.

All features identified above would be implemented under option 2 of the recommendations (see section 4).

- 'What if' scenarios

If I get 20 mm of rain over the next fortnight, what would the pasture growth response be? Some producers suggested this approach to forward planning and scenario building. This could be built into the customisation options, for example, with predetermined scenarios.

- Provide improved soil moisture estimates

Some producers liked the soil moisture outputs and suggested that improved accuracy and more levels (upper and lower) would be useful for a future tool.

- Improve forecasting

The outlook component in the RPGOT is based on analogue years of Sea Surface Temperature (SST) values, a statistical forecast. Statistically based seasonal forecasting systems often provide only moderate value to the agricultural community and their skill and utility is diminished by a changing climate. The influence of SSTs is also largely restricted to eastern Australia, and producers and/or extension officers in Western Australia and South Australia commented that the RPGOT analogue years are not meaningful in their regions. While the future of seasonal forecasting lies in the use of so-called dynamical (sometimes called physical) models, real advances in this area of research are still several years away.

To provide interim measures until more accurate dynamic seasonal forecasts are available, a redeveloped RPGOT could contain an improved statistical forecast that takes regional differences in climate drivers into account. In the future, these could be substituted as the dynamic forecasting models become available.

- Integrate MLA calculators

Feedback from workshop participants on the calculators that are available through the MLA website and promoted through MLA extension programs was generally negative. Most producers did not use them despite knowing about them. The producers that did use them indicated that they had customised the Excel-based tools to suit their needs.

The suggestion to add the calculators to the website and connect them to the SGS outputs was received somewhat positively, on the understanding that a major rework of the calculators to improve their relevance was part of the development. Nevertheless, some producers warned that this could overload the website with extra functionality that was not needed.

- Calibration options for local growth response

Producers who were critical of the fact that the results of a generic pasture model would never be entirely reflective of their specific on-ground conditions suggested a calibration option that could allow producers to add a conversion factor or something similar. The feasibility of this suggestion would need to be examined before deciding on the merit of this feature.

- Enabling the input of user data

When questioned, producers responded mostly positively to the idea that the website could be run on farm-based rainfall data collected and entered by users. Using BoM data from nearby stations did not, on the other hand, concern any of the workshop participants. Given the substantial technical challenges that this feature would present, it appears unlikely that an investment in such a development would pay off.

All of the above features could potentially be integrated into the RPGOT redevelopment. Some features require a higher level of investment than others and not all will deliver a corresponding level of returns. When considering recommendations for a redeveloped RPGOT, ABARES has carefully assessed which features of the new system have the highest priority in terms of user requirements and can be achieved with a moderate level of investment (see options 1 and 2 of the recommendations in section 4).

Simplicity vs. complexity

During all workshops, producers emphasised the importance of an intuitive and simple interface. This was deemed to be the single most important factor for the general uptake and use of the website. For example, most producers who had just logged on to the current website for the first time to prepare for the workshop rated it as too complex. The station selection process in particular was criticised as too cumbersome.

This presents a considerable challenge for the layout and design of a new site. To enable access for users without training or extension, the main site should be almost entirely self-explanatory and should require only minimal intervention and manipulation in order to produce meaningful results. At the same time, the site has to cater for advanced users who want to make use of customisation options and set the site up as an ongoing risk management tool for their particular enterprise.

A design solution that integrates two separate areas could provide both options. For example, the main site could have a very simple feature to select a location (no mapping interface) and then provide a set of outputs without any further interaction. A link on the same site could then provide access to a separate interface that contains customisation options.

Extension/delivery of outputs

The main concern that producers raised throughout the workshops was that the existing tool had not been communicated well. Not all producers had participated in the MLA extension programs, and the ones that had done so indicated that there had not been enough follow-up.

If a redeveloped RPGOT is to be successful, it will need to be credible, usable and visibly supported. From a risk management perspective, the use of a tool like the RPGOT can only pay off if it is applied for an extended period and as part of seasonal decision-making processes. While the system will not provide a substantial benefit in all years, if used over an extended period, it can provide a tool to help producers maximise their returns in favourable years and cut their losses in unfavourable years.

Getting producers to integrate a decision support tool into their business for an extended period requires an ingrained belief that it will provide a benefit at the end and an ongoing network of support from industry and other producers. Based on discussions throughout the workshops, the existing network of producer groups seems to be the best option to maintain this support and provide necessary feedback in the future. Several representatives of producer groups indicated that they would be happy to work with the MLA to generate a long-term plan for a new tool, assuming the benefits are apparent. An initial Train the Trainer program could provide a starting point that is cost effective and provides a long-term outlook for the RPGOT.

Developing a new tool and investing in a communication and extension program that stops after one or two years would be unlikely to deliver the desired outcomes.

Cost–benefit analysis

The cost–benefit ratio of the proposed investment in a redeveloped website would depend largely on uptake and on the performance of the site. As identified above, the uptake would principally depend on the communication and extension efforts but also on how intuitive and functional the site is. The performance of the site will be characterised by how well the redesigned outputs match user needs and how closely the new pasture model emulates on-ground conditions.

Given that these two factors are largely unknown, a cost–benefit analysis will be speculative and can provide only an indicative picture of how easy or difficult it will be to recoup the investment. For example, if 200 producers use the website for a period of five years and, on average, improve their profitability by $500 annually, an investment of up to $500 000 may be justified. As stated above, in a risk management context, continuous usage of the site for at least five years would be the ideal situation. An improvement to business decisions that leads to an average increase in farm profitability of $500 is considered a conservative target if the website performs well.

4 Recommendations

A redeveloped RPGOT could theoretically contain any or all of the features identified in the workshops. However, as each feature requires a level of investment, consideration needs to be given to those features that have the highest priority in terms of user requirements. In developing the recommendations below, the user requirements assessed as a priority have been carefully balanced against the investment required for each.

The recommended solution for redevelopment of the RPGOT consists of three components:

- the Sustainable Grazing Systems (SGS) pasture model
- an updated web application to replace the existing Rainfall to Pasture Growth Outlook Tool (RPGOT)
- a customised email service to provide farmers with regular updates based on individual profiles.

The first two components would provide an enhanced interface and default outputs from the SGS model across Australia. The web application will serve as an introduction to the system. As with the existing tool, producers can select local weather stations and get a selection of default outputs from the SGS model. Outputs will be based on producer feedback gathered through workshops and online surveys. The number of outputs will be restricted and users will not be able to customise settings for their farm business.

The third component is aimed at encouraging ongoing use of the system and increased relevance for producers. The email service will allow producers to sign up to receive regular emails of outputs that are customised according to their business needs. To do this, users would create a 'profile', defining the stations the producer is interested in, the specific outputs and formats required, and any custom parameters selected for running the SGS model. More than one set of specific settings per user would be possible so that different production environments within one business can be modelled.

These features of the SGS model would not be accessible through the web application described above. The email service would provide a range of customisation options to users, such as:

- specifying pasture communities
- selection of specific soil characteristics
- management options such as fertiliser application and grazing pressure.

Having established a profile, the producer will receive a regular email containing the outputs requested. Receiving outputs via email rather than continuously revisiting a website was the most desired improvement identified at the workshops.

This approach has two key benefits:

- For the producer, it is 'set-and-forget'. The profile is set up once, and updates are then provided every week, month or season depending on the individual preference. The initial set-up would be facilitated through an intuitive online form and could be done at home, during an introductory workshop, as part of an extension program or by a consultant.
- For the MLA, it is another way to establish an ongoing line of communication with members. The email updates could also be customised by region, industry and time of year to include relevant messages and announcements from the MLA.

If considered desirable, other features identified in the workshops could be incorporated in the redevelopment of the RPGOT or in a separate, later development.

Work plan

ABARES is proposing two possible options for the new Rainfall to Pasture Growth System. The first option includes the SGS model and a new web application to provide improved outputs. The second option also includes the email service, which gives users the ability to establish a profile and request custom SGS model outputs. These options are described in more detail below.

In both cases, ABARES would develop and host the software required to run the SGS model and make the outputs available online. MLA would be responsible for developing or contracting the development of a website to make outputs available to users. Detail on these options is provided below. The options do not include website design and development, as it is assumed that MLA will use their staff or contractors for this component of the project.

Detailed proposals for these options, including estimated costs, will be submitted separately to MLA for discussion before the end of June 2011.

Option 1: updated website and SGS model outputs

Key user benefits

- More detailed and accurate pasture growth model
- Easier-to-use website, including better map functionality
- Enhanced web services
- Standard outputs from the SGS model across Australia

Key development activities

ABARES:

- Liaise with IMJ to deploy SGS model to Unix-based server
- Liaise with web developers to incorporate SGS outputs into website
- Develop framework to make SGS model outputs available as web services

IMJ:

- Develop SGS model to support RPGOT requirements
- Deploy SGS model to Unix server

MLA:

- Engage web design staff or third party to design and develop website

Key post-development activities

ABARES:

- Develop a separate maintenance contract for the ongoing hosting of SGS model by ABARES and the sustained delivery of SGS model outputs as web services to be signed at the release of the new web interface

MLA:

- Ongoing hosting of website by MLA

Estimated timeframe

12 months

Option 2: As with option 1, with the addition of an email service delivering custom SGS outputs

Key user benefits

- More detailed and accurate pasture growth model
- Easier-to-use website, including better map functionality
- Enhanced web services
- Standard outputs from the SGS model across Australia
- Users have the option of registering and requesting customised SGS model outputs, to be delivered by email
- Users receive regular updated pasture growth information, directly to their email address

Key development activities

ABARES:

- Liaise with IMJ to deploy SGS model to Unix-based server
- Liaise with web developers to incorporate SGS outputs into website
- Develop framework to make SGS model outputs available as web services
- Develop email service to provide customised model outputs

IMJ:

- Develop SGS model to support RPGOT requirements, including custom outputs for email service
- Deploy SGS model to Unix server

MLA:

- Engage web design staff or third party to design and develop website
- Provide input for design of emails

Key post-development activities

ABARES:

- Develop a separate maintenance contract for the ongoing hosting of SGS model and email service by ABARES and the sustained delivery of SGS model outputs as web services to be signed at the release of the new web interface

MLA:

- Ongoing hosting of web site by MLA

Estimated timeframe

15 months

Appendix A

MLA / ABARE–BRS Workshop

Scoping the redevelopment of the Rainfall to Pasture Growth Outlook Tool

Background

The Rainfall to Pasture Growth Outlook Tool has been used by MLA producers and extension officers to improve grazing and pasture management decisions since its inception in 2005. The development of improved pasture growth models and advancements in Information and Communication Technology (ICT) provide an opportunity to improve the accuracy and relevance of the RPGOT. Improvements will focus on increasing the number of modelled pasture species, expanding the range across all of Australia, providing soil moisture estimates, enabling the input of user data and improving the interface and interactive options for users.

To ensure that a re-development of the existing tool is aligned with user needs, this workshop is being held to gather feedback on:

- Timing of tactical decisions in various climate zones, and identification of trigger points
- General requirements for decision support in the livestock industries
- Benefits of the existing tool, and potential improvements.

The workshop agenda is designed to generate information that is useful for the RPGOT re-development as well as help design a richer and more complex climate risk management tool as suggested by the parallel project sponsored by MLA.

Appendix B

Participant questionnaire

So that we can make best use of your time in this workshop, we would greatly appreciate if you could answer the following questions before the workshop date, and be prepared to introduce yourself on the day, including this information.

1. What are your main business activities?
2. What are your key decision points in the year? Are they different between dry years and other years?
3. Do you currently use the RPGOT? Why or why not?
4. Is a website the best way for you to get this type of pasture growth information? Would you prefer to get regular email updates? Or a half-page report in the newspaper? Any other format you can think of?
5. …

Appendix C

Workshop agenda

10.00 am **Introduction**

- A brief introduction to the context of this project
- The existing Rainfall to Pasture Growth Outlook Tool (RPGOT)
- Other activities being undertaken by MLA
- Purpose, agenda and outcomes for today

10.30 am **Participant introductions**

- (Please refer to questions on following page)

11.00 am **Information requirements**

- Decision support tools
  - Participant experiences and preferences
  - Feedback on current RPGOT
- Alternative or better ways of communicating information
- Wish list for a new decision support tool

12.30 pm **Lunch break**

1.30 pm **Pasture models**

- What is the right balance between complexity and ease of use?
- How much freedom do participants want, to be able to set parameters on the model?
- What kind of outputs are needed at particular decision points

2.30 pm **Wrap-up**

- Outcomes and lessons from today

3.00 pm **Finish**