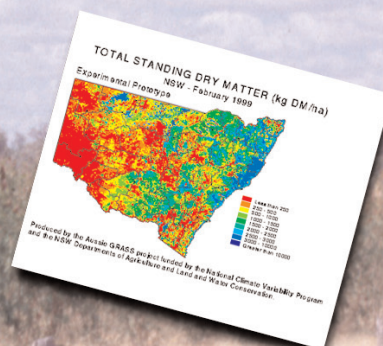
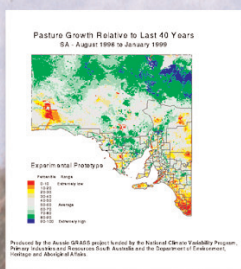
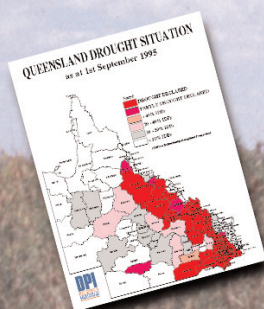


A SURVEY OF THE ASSESSMENT OF SEASONAL CONDITIONS IN PASTORAL AUSTRALIA

Benchmarking in the *Aussie GRASS* Project

PART 4: NORTHERN TERRITORY



**Queensland Department of Primary Industries Report Series QO99017
(published for Queensland Centre for Climate Applications)**

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CONDITIONS IN PASTORAL AUSTRALIA**

Benchmarking in the *Aussie GRASS* Project

PART 4: NORTHERN TERRITORY REPORT

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Fisheries, Northern Territory**

A product of The Aussie GRASS Project

A collaborative research and extension project carried out by:

Queensland Department of Natural Resources
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Primary Industries and Resources South Australia
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General Disclaimer

Information contained in this publication is provided as general advice only. For application to specific circumstances, professional advice should be sought.

The Department of Primary Industries, Queensland has taken all reasonable steps to ensure that the information contained in this publication is accurate at the time of production. Readers should ensure that they make appropriate enquiries to determine whether new material is available on the particular subject matter.

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CONTENTS

FOREWORD	page iv
The Aussie GRASS Project.....	iv
The Survey.....	iv
Method.....	v
Feedback in other States.....	vi
INTRODUCTION	1
SUMMARY	1
General Information.....	1
Monitoring Seasonal Conditions.....	1
Paddock Information and Decision-making.....	1
‘Big-picture’ Information Products.....	2
Communication.....	2
Seasonal Assessment in Pastoral Areas.....	2
METHOD	2
RESULTS – NORTHERN TERRITORY	2
Part A: General information about respondent.....	3
Part B: Monitoring seasonal conditions.....	5
Part C: ‘Big-picture’ information.....	8
Part D: Scaled attitudinal responses.....	11
DISCUSSION	13
General Information.....	13
Monitoring Seasonal Conditions.....	13
Paddock Information and Decision-making.....	14
‘Big-picture’ Information Products.....	14
Communication.....	14
Seasonal Assessment in Pastoral Areas.....	14
ACKNOWLEDGEMENTS	15

FOREWORD

Australian rangelands have an extremely variable climate which has contributed to land degradation on some pastoral areas over the years. In order for graziers, agribusiness and policy-makers to make timely, profitable and sustainable management decisions, they need to have access to accurate up-to-date information on current and forecast seasonal conditions.

The Aussie GRASS Project.

Pasture research over the last 30 years, combined with modern technologies, is opening up new possibilities for assessing seasonal conditions and improving pasture management decisions. From 1991 to 1996, a spatial modelling framework was developed for Australia to provide up-to-date simulations and forecasts of pasture growth and utilisation, but with an emphasis on Queensland. This work integrated climatic and natural resource data, remote sensing, historical agronomic research and simulation modelling. While seasonal rainfall explained only 40% of the variation in seasonal pasture growth, models of soil water and pasture growth explained approximately 70% of observed variation.

The second stage of the project, called Aussie GRASS, commenced in April 1997. It involves nationwide collaboration of organisations in New South Wales (NSW), Northern Territory (NT), Queensland (Qld), South Australia (SA) and Western Australia (WA), in both research and extension; the aim is to expand the spatial modelling framework and make it operational to enable regular assessment of the condition of Australia's grazing lands. The Queensland Department of Natural Resources is lead agency in the Project, which is supported by funding from the National Climate Variability Program (administered by the Land and Water Resources Research and Development Corporation).

A range of 32 spatial mapping products has been produced for the States of Queensland, New South Wales, South Australia, Western Australia and the Northern Territory (including some generic Australia-wide maps). These products can be divided into the following groups: recent rainfall, current pasture production/condition, drought situation, seasonal climate outlook indicators, forecast rainfall/pasture condition, and integration of products. Most products are currently available on one or more of the following information systems: Internet World Wide Web - 'The Long Paddock'; SOI Fax Hotlines; Farmfax - Climate section; and SOI Phone Hotline.

These widely available products will enable more timely and improved assessment of seasonal conditions, recognition of climate-related opportunities and threats, and thus influence management decisions such as stocking rate and burning. This will lead to grazing industries and other resource managers being better in tune with changing seasonal conditions and the natural resource base. As a result, proactive management decisions will minimise land degradation during drought events, and government drought policy will be more transparent and nationally consistent.

The Project involves liaison and interaction with a wide range of stakeholders, agencies and related programs and projects, as the products can help with a wide range of decisions.

The Survey

The purpose of the survey was to provide a benchmark profile of Australian graziers for the Aussie GRASS Extension sub-project. The survey was designed to gain information primarily from graziers. However, some feedback was also sought from agribusiness operators in pastoral areas who could contribute up to a maximum of 10% of the sample.

The aims of the survey were:

1. To measure the knowledge, attitudes, skills and aspirations of graziers and pastoral agribusiness managers pertaining to the assessment of seasonal conditions, including the use of seasonal climate forecasting;

2. To ascertain how pastoralists currently assess seasonal conditions, the decision-support information/tools they access, and how the information is used in making key property management decisions; and
3. To provide a sound basis for the development of communication and extension strategies in order to achieve effective and efficient transfer of information and technological outputs of the Aussie GRASS research program.

Method

A standard covering letter and questionnaire were used in the survey. The Results section uses the structure and actual questions of the questionnaire in order to systematically report on the responses of participants. The eight key questions in the survey were:

- KNOWLEDGE about making sound pasture management decisions regarding stocking rates (Question 16);
- ATTITUDES about the usefulness of ‘big-picture’ information (Questions 19a and 19d);
- SKILLS in accessing relevant information systems (Question 21e); and
- ASPIRATIONS regarding commitment to adoption of sustainable management practices (Questions 17c, 25, 28 and 30)

The aim was to survey a ‘representative’ sample of at least 50 graziers and pastoral agribusiness managers (up to a maximum of 10% of the total sample) in each of NSW, SA, WA, NT and Qld – that is a total of 250 people. Location, property size, land system, pasture species and enterprise(s) were all considered when developing a ‘representative’ sample in each State/Territory.

Samples for surveying were obtained in various ways in the collaborating States and the NT. Many of the extension officers in pastoral areas were involved in the distribution of survey forms and collection of completed survey forms.

Most people in the sample were phoned prior to sending out the survey form in order to obtain some commitment to providing feedback. However, time constraints did not always permit this.

Survey forms were mailed in March 1998. The generic covering letter was customised by each State/Territory to indicate local involvement in the Project, as was a follow-up letter to those who had not responded within one month of mailing the survey forms.

As promised, those who provided their names and addresses were sent a coloured poster showing historical Australian rainfall maps and SOI graph, and their names were placed in the draw for 16 book prizes. The book prize winners for the State/Territory were named in the covering letter sent with the posters. Again generic covering letters sent with the posters and the book prizes were customised by each State/Territory prior to sending.

An electronic version of the survey form was produced by the Queensland Centre for Climate Applications, and placed on the SILO World Wide Web site. Each State/Territory then entered their own data that was placed in a relational database. Printed copies of the data entered for respondents were then checked and the errors corrected.

Summaries of the data for each State/Territory were distributed to facilitate production of these detailed reports on the findings for each State/Territory. These reports were then used to compile a national report summarising the overall findings of the Survey.

Feedback in Other States

This report was produced as five separate publications in order to encourage and facilitate the interpretation, distribution and fruitful use of the results on a State/Territory basis:

- Part 1: Queensland Report, Queensland Department of Primary Industries Report Series QO99014, ISSN 0727-6281;

- Part 2: New South Wales Report, Queensland Department of Primary Industries Report Series QO99015, ISSN 0727-6281;
- Part 3: South Australia Report, Queensland Department of Primary Industries Report Series QO99016, ISSN 0727-6281;
- Part 4: Northern Territory Report, Queensland Department of Primary Industries Report Series QO99017, ISSN 0727-6281; and
- Part 5: Western Australia Report, Queensland Department of Primary Industries Report Series QO99018, ISSN 0727-6281.

Each of these reports provides the complete survey results on a regional basis, including all individual responses to open questions, and local interpretation of the responses. In addition, a national summary of the survey results (based on these State/Territory reports) will be published shortly by the Land and Water Research and Development Corporation as an Occasional Publication.

Col Paull

Leader

Aussie GRASS Extension sub-project

INTRODUCTION

The Northern Territory survey was conducted as part of the national Aussie GRASS survey. An outline of the Aussie GRASS Project, the aims of the survey, the survey design and method used, and publication of the results (in a national summary and for each State/Territory) are covered in the Foreword. The detailed results for the Northern Territory, on a regional basis, are given below.

SUMMARY

Approximately 55 seasonal climate information feedback survey forms were sent to individual producers throughout the Northern Territory. Individuals thought to be willing and agreeable to filing in the form were targeted. A total of 23 completed survey forms were returned. The feedback collected covered four areas: general information about respondent; monitoring seasonal conditions; 'big-picture' information; and scaled attitudinal responses. Detailed responses to all questions are given, including all individual responses received from open questions.

The main results and conclusions from the survey were:

General Information

All survey participants that responded, with the exception of one, were beef producers, mostly in the Katherine and Victoria River regions. Fourteen of the twenty-one respondents managed properties in excess of 100,000 ha, with 74% of businesses having an annual turn over of at least \$200,000. The responses reflected managers had considerable experience, with 82% having been in the industry between 10-50 years.

The vast majority of properties received summer dominant rainfall, with 55% receiving at least 600mm pa on average. 96% kept daily rainfall records, 61% having records greater than 20 years. Most records of rainfall were considered complete or fairly complete.

Monitoring Seasonal Conditions

Compared with the climate of the 1960's and 1970's, 26% of producers thought the climate was drier in the 1980's and 1990's as a result of climate change, while 34% regarded rainfall as being more variable. Of interest was that 44% considered that the climate was hotter and 27%, more humid.

87% regarded their judgement of future climatic conditions as being either moderately important or very important in their planning and decision making. Burning pasture and buying stock were considered the most important management decision affected by climatic conditions, with stocking rate decisions scored in only one response. A vast majority of managers (96%) however, do not use long term climate records to assist their decision making but with 71% regarding probability based information as being slightly or moderately useful in the management of their business. The use of seasonal climate forecast information such as SOI, El Nino and Indian Ocean Temperatures were only adopted by 18% of respondents.

Paddock Information and Decision-making

The survey revealed that 70% of producers recorded individual paddock information with stock numbers recorded in 70% of cases, while pastures, rainfall and monitoring sites were recorded on less than 15% of properties. Pastoralists used a range of indicators to assess the health of their pasture and stock, including pasture composition (26%), ground cover (22%) amount of feed (13%) and the use of monitoring sites (13%). All pastoralists used observations of pasture growth and condition to determine stock numbers to carry through the year.

‘Big picture’ Information Products

Most people (72%) considered big picture information was at least slightly important in their planning, risk management and decision making. Recent rainfall maps (39%) and seasonal rainfall forecasts (43%) were the most commonly used types of information. Some producers however did utilise recent pasture growth maps and seasonal pasture growth forecasts. 61% of producers regarded this information as being at least moderately useful, however most considered it difficult to access.

Communication

Surprisingly, 83% of the producers surveyed had a computer however only 3 out of 23 had internet access. Most people (91%) used fax machines and considered these the most convenient way to access seasonal outlook information. The TV, radio and Internet rated highly but considered less convenient than fax information.

Seasonal Assessment in Pastoral Areas

Some people thought these questions leading. I am inclined to agree. 61% of producers thought it better to respond to changing seasonal climate conditions rather than anticipating or reducing seasonal climatic risk. (Some people may have misunderstood this question). 90% agreed that seasonal climate forecasts be expressed as probabilities, however 61% thought at present there was undue responsibility on users to interpret the information.

The provision of advanced (3-6 month) stock feed shortage warnings was considered a valuable aid to decision making by 62% of producers, however 33% thought that there was inadequate experience and information available to link climate related information to pastoral property management (compared to 42% of producers who did).

Producers generally thought that warnings of possible pasture deterioration at a district level, before the main growing season, would be valuable in making management decisions. 38% agreed while 24% strongly agreed. Advanced warnings of possible soil deterioration however were considered less useful with most people having no opinion and 31% agreeing that it would be useful.

The rural press received a mixed response regarding the credibility and usefulness of its seasonal climate information. Most people had no strong opinion, while 31% agreed that it was useful.

Although many people thought there were useful applications for big picture information in some responses throughout the survey when questions as to whether scientific seasonal climate forecasting was a valuable tool for property management in the face of seasonal variability 50% had no opinion either way. 19% disagreed, while 33% agreed that it would be a valuable tool.

METHOD

Approximately 55 seasonal climate information feedback survey forms were sent to individual producers throughout the Northern Territory. Individuals thought to be willing and agreeable to completing the form were targeted.

RESULTS – NORTHERN TERRITORY

A total of 23 completed survey forms was received:

Total	Katherine	Alice	Douglas	Barkly	VRD	Mt Isa	Goyder
19	4 (21)	3 (16)	1 (5)	2 (11)	7 (37)	1 (5)	1 (5)

The following answers and comments were obtained in response to the various questions ('Q1' is an abbreviation for 'Question 1' and so on; the total number of responses in each category is indicated in bold type, followed by the percentage of those who responded to the specific question shown in brackets):

PART A: General Information about Respondent

Q1: What is your nearest town? _____ In what State? _____

These results are not documented in this report.

Q2: What is the name of your local government area/district? _____

A summary of responses is contained in the table above.

Q3: How big is your property?

There were 21 responses to this question:

0 - 10 000 ha	2	(10)
> 10,000 – 100,000 ha	3	(14)
> 100,000 – 1,000,000 ha	13	(62)
> 1,000,000 – 10,000,000 ha	1	(5)
> 10,000,000m ha	2	(10)

Q4: How big is your business? (\$ turnover per annum)

There were 23 responses to this question:

Up to \$20,000	1	(4)
> \$20,000 - \$200,000	5	(22)
> \$200,000 – \$2,000,000	16	(70)
> \$2,000,000	1	(4)

Q5: What industries are you in?

There were 23 responses to this question (one respondent gave more than one answer):

Horticulture	1	(4)
Beef	22	(100)

Q6: How long have you been a primary producer?

There were 17 responses to this question:

0 – 10 years	1	(6)
> 10 – 20 years	5	(29)
> 20 – 30 years	2	(12)
> 30 – 40 years	5	(29)

> 40 – 50 years	2	(12)
> 50 years	2	(12)

Q7a: Do you keep daily rainfall records?

There were 23 responses to this question:

Yes	22	(96)
No	1	(4)

Q7b: How many years have you kept these records?

There were 20 responses to this question:

Up to 10 years	5	(25)
> 10 – 20 years	4	(20)
> 20 – 30 years	6	(30)
> 30 – 40 years	4	(30)
> 40 – 50 years	0	(0)
> 50 years	1	(5)

Q7c: How complete are these records?

There were 22 responses to this question:

Complete	9	(41)
Fairly Complete	11	(50)
Patchy	2	(9)

Q8: What is your average annual rainfall?

There were 20 responses to this question:

0 – 300mm	4	(20)
> 300 – 600mm	5	(25)
> 600 – 900mm	6	(30)
> 900 – 1200mm	2	(10)
> 1200 – 1500mm	1	(5)
> 1500mm	2	(10)

Q9: When do you receive most of your rainfall?

There were 27 responses to this question (some of the 23 respondents gave more than one answer):

Summer	23	(100)
Autumn	1	(4)
Winter	2	(9)
Spring	1	(4)
Evenly Spread	0	(0)

PART B: Monitoring Seasonal Conditions. This section is about how you monitor seasonal conditions and respond to a changing situation. The following questions ask for your opinions and your reasoning. These might

be based on information or advice from outside sources and/or your own observations, ‘rules of thumb’ and so on. There are no ‘right’ or ‘wrong’ answers.

Q10: From your experiences and knowledge, do you believe that your climate during the 1980s and 1990s has changed compared with that of the 1960s and 1970s?

Q10a: Rainfall

There were 23 responses to this question:

Don't know	6	(26)
No change	8	(35)
Drier	6	(26)
Wetter	3	(13)

Q10b: Rainfall variability

There were 23 responses to this question:

Don't know	5	(22)
No change	5	(22)
More variable	8	(35)
Less variable	5	(22)

Q10c: Summer daytime temperatures

There were 23 responses to this question:

Don't know	8	(35)
No change	5	(22)
Hotter	10	(44)
Cooler	0	(0)

Q10d: Frost

There were 21 responses to this question:

Don't know	9	(43)
No change	10	(48)
More frost	0	(0)
Less frost	2	(10)

Q10e: Humidity

There were 22 responses to this question:

Don't know	9	(41)
No change	7	(32)
More humid	6	(27)

Less humid	0	(0)
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Q10f: In what year were you born?

There were 23 responses to this question:

1920s	2	(9)
1930s	1	(4)
1940s	6	(26)
1950s	9	(39)
1960s	4	(17)
1970s	1	(4)

Q10g: Any other comments?

Nil

Q11: How important are your judgements of future climatic conditions (over the next 3 to 12 months) in your planning and decision-making?

There were 23 responses to this question:

Not at all important	1	(4)
Slightly important	2	(9)
Moderately important	8	(35)
Very important	12	(52)

Q12: Do you currently use long-term (20 years or more) climatic records to assist your decision-making?

There were 23 responses to this question:

No	22	(96)
Yes	1	(4)

Q13: In your business/industry, what are the three most important annual decisions you make in which the outcomes are affected by future climatic influences?

There were 59 responses to this question (some of the 23 respondents gave more than one answer):

Selling/agisting of stock	20	(87)
Buying stock	9	(39)
Forward selling/hedging	5	(22)
Sowing crops/pastures	5	(22)
Burning pastures	11	(48)
Weed/disease/pest control	9	(39)

Other Important annual Decisions:

Other important annual decisions included mustering and weaning, changing from dry to wet season supplements and determining paddock numbers.

Q14: How useful is probability-based information in the management of your business?

There were 21 responses to this question:

Don't use it	5	(24)
Not useful	1	(5)
Slightly useful	8	(38)
Moderately useful	7	(33)
Very useful	0	(0)

Q15: Do you currently use seasonal climate forecasts, for example information on SOI/ El Nino/ Indian Ocean temperatures/ other indicators, to assist with any of your decision-making?

There were 21 responses to this question:

No	17	(81)
Yes	4	(19)

Q16: If you keep stock, how do you decide what stock numbers to carry through the months of the year when feed shortages are most likely to occur?

There were 25 responses to this question (some of the 22 respondents gave more than one answer):

Observe pasture/growth conditions	22	(96)
Measure pasture/growth conditions	2	(9)
Use seasonal climate outlook/forecast	1	(4)

Use of Other Aids:

Other aids used included visual assessment of available pasture at the end of the wet season, condition of livestock, and setting safe carrying capacities arrived at from years of experience.

Q17a: What signs or indicators do you look for in a paddock to assess the health of your pasture or stock?

Pastoralists used a range of indicators to assess the health of their pasture and stock, including pasture composition (26%), ground cover (22%) amount of feed (13%) and the use of monitoring sites (13%).

Q17b: Do you record information for individual paddocks? (for example pasture species, stock numbers).

There were 23 responses to this question:

No	7	(30)
Yes	16	(70)

Q17c: What do you measure or record in individual paddocks?

The survey revealed that 70% of producers recorded individual paddock information with stock numbers recorded in 70% of cases, while pastures, rainfall and monitoring sites were recorded on less than 15% of properties.

Q18: Do you regularly compare property management options by actual calculations of the production and financial outcomes of all options?

There were 23 responses to this question:

No	11	(48)
Yes	12	(52)

PART C: ‘Big-picture’ information. Several groups have recently developed seasonal climate outlook information, seasonal climate forecasting systems (based on the Southern Oscillation, El Niño, SOI, sea-surface temperature patterns), pasture production computer models and satellite imagery (see ‘Definitions’ on last page). This work has resulted in a range of ‘big-picture’ products being made available, usually in the form of a map, covering recent rainfall, recent pasture growth, drought-declared areas, seasonal rainfall outlook and pasture growth prospects. The following questions ask for your thoughts on this ‘big-picture’ information. There are no ‘right’ or ‘wrong’ answers.

Q19a: How important is this big-picture information in your planning, risk management or decision-making?

There were 22 responses to this question:

Unaware or information	4	(18)
Not at all important	2	(9)
Slightly important	8	(36)
Moderately important	5	(23)
Very important	3	(14)

Q19b: Have you used any of the following types of ‘big-picture’ information?

There were 27 responses to this question (some of the 15 respondents gave more than one answer):

Recent rainfall maps	9	(60)
Recent pasture growth maps	3	(20)
Drought declared areas	3	(20)
Seasonal rainfall forecasts	10	(67)
Seasonal pasture growth forecasts	2	(14)

Q19c: Generally to what extent has the information, which you have used, been useful?

There were 18 responses to this question:

Not useful	0	(0)
Slightly useful	7	(39)
Moderately useful	7	(39)
Very useful	4	(22)

Q19d: To what extent do you think this ‘big-picture’ information could be useful to you?

There were 16 responses to this question:

I have no idea	5	(31)
Not useful	2	(13)
Slightly useful	0	(0)
Moderately useful	7	(44)
Very useful	2	(13)

Q19e: What problems have you had in using this ‘big-picture’ information?

There were 26 responses to this question (some of the 21 respondents gave more than one answer):

Access to it is difficult	10	(48)
I don’t use this information	6	(29)
It is difficult to interpret/use	5	(24)
No problems	4	(19)
Information not detailed enough	1	(5)

Q19f: What ‘big-picture’ information would help you to make better management decision, and when or how often is it required?

- ‘A satellite imagery map of the property every three months: 1st Jan, 1st April, 1st July, and 1st October.’
- ‘More accurate information on the movement of low pressure systems over land, to allow time for flood preparation.’
- ‘Probability of rainfall distribution. We always get sufficient rain for pasture growth, distribution is more important than amount.’
- ‘Radio broadcasts of weather forecasts.’
- ‘Rainfall, drought, pasture growth, stock numbers, movement monthly.’
- ‘Recent pasture growth maps and seasonal rainfall forecasts, before and after wet season.’
- ‘We only use cyclonic and isobar information. If anything else is not 100% reliable, it is totally unreliable.’

Q21a: Do you have a computer?

There were 23 responses to this question:

No	4	(17)
Yes	19	(83)

Q21b: Do you currently have access to the Internet?

There were 23 responses to this question:

No	20	(87)
Yes	3	(13)

Q21c: Do you have a facsimile machine?

There were 23 responses to this question:

Yes	21	(91)
No	2	(9)

Q21d: What would be the most convenient ways for you to access seasonal climate outlook information?

There were 61 responses to this question (some of the 23 respondents gave more than one answer):

TV	10	(44)
Radio	8	(35)
PhoneRecordings	4	(17)
DailyPapers	1	(4)
LocalPaper	2	(9)
RuralPaper	8	(35)
ComputerPackage	1	(4)
Neighbours	4	(17)
Fax	17	(74)
E-mail	5	(22)
MySourceSCO	1	(4)

Q21e: Which of the following sources of seasonal situation/outlook information have you used at least once?

There were 27 responses to this question (some of the 21 respondents gave more than one answer):

Fax Services	19	(91)
Private Consultant	2	(10)
SOI Fax Hotlines	2	(10)
Internet Site	2	(10)

Other Sources of Seasonal Situation/Outlook Information:

- 'Rural newspaper; QCL info based on Qld Dept. Natural Resources.'

Further comments:

Nil

Q21f: Considering all of the seasonal situation/outlook information sources you know of (including media sources, those above, personal contacts etc.), which source(s) do you think are best, and briefly, why?

Most people (91%) used fax machines and considered these the most convenient way to access seasonal outlook information. The TV, radio and Internet rated highly but considered less convenient than fax information.

PART D: Scaled Attitudinal Responses. How do you respond to the following statements concerning seasonal situation assessment in pastoral crop areas? Tick the box that indicates your ‘position’ on the scale, where: 1 = I strongly disagree; 2 = I disagree ; 3 = I neither agree nor disagree; 4 = I agree; 5 = I strongly agree.

Q22: “It is better management to simply respond to changing seasonal conditions, rather than try to anticipate and reduce seasonal climatic risks.”

There were 21 responses to this question:

Strongly disagree	2	(10)
Disagree	4	(19)
Neither agree nor disagree	1	(5)
Agree	8	(38)
Strongly agree	6	(29)

Q23: “I accept that seasonal climate forecasts are better expressed in terms of probabilities (eg. ‘60% chance that the next three months will be drier than average’) than like a traditional weather forecast.”

There were 21 responses to this question:

Strongly disagree	1	(5)
Disagree	0	(0)
Neither agree nor disagree	1	(5)
Agree	13	(62)
Strongly agree	6	(29)

Q24: “At present, SOI and probability-based forecasting places undue responsibility on ‘users’ to interpret the information.”

There were 21 responses to this question:

Strongly disagree	0	(0)
Disagree	2	(10)
Neither agree nor disagree	6	(29)
Agree	11	(52)
Strongly agree	2	(10)

Q25: “Warning of possible stock feed shortages in 3-6 months time, at a district level, would be valuable in making my management decisions.”

There were 21 responses to this question:

Strongly disagree	4	(19)
Disagree	1	(5)
Neither agree nor disagree	3	(14)
Agree	7	(33)
Strongly agree	6	(29)

Q26: “At present, adequate experience and information are available to enable me to link climate-related information/forecasts to practical property management.”

There were 21 responses to this question:

Strongly disagree	5	(24)
Disagree	2	(10)
Neither agree nor disagree	5	(24)
Agree	7	(33)
Strongly agree	2	(10)

Q27: “I am comfortable with the increasing level of climate-related materials now becoming available via computer programs and computer networks.”

There were 20 responses to this question:

Strongly disagree	0	(0)
Disagree	3	(15)
Neither agree nor disagree	9	(45)
Agree	6	(30)
Strongly agree	2	(10)

Q28: “Warnings of the possible pasture deterioration (for example weed invasion, loss of desirable species) at a district level, before the main growing season, would be valuable in making my management decisions.”

There were 21 responses to this question:

Strongly disagree	1	(8)
Disagree	0	(0)
Neither agree nor disagree	7	(33)
Agree	8	(38)
Strongly agree	5	(24)

Q29: “Generally, the rural provide credible and useful sources of seasonal climate forecast information.”

There were 21 responses to this question:

Strongly disagree	0	(0)
Disagree	4	(19)
Neither agree nor disagree	10	(48)
Agree	6	(29)
Strongly agree	1	(5)

Q30: “Warnings of possible soil deterioration (for example reduced ground cover, soil loss) on a district basis, before the level of pasture ground cover became critical, would be valuable in making my management decisions.”

There were 20 responses to this question:

Strongly disagree	1	(5)
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Disagree	0	(0)
Neither agree nor disagree	12	(60)
Agree	6	(30)
Strongly agree	1	(5)

Q31: “Scientific seasonal climate forecasting is a valuable tool for managing my property in the face of seasonal variability.”

There were 21 responses to this question:

Strongly disagree	1	(5)
Disagree	3	(14)
Neither agree nor disagree	10	(48)
Agree	5	(24)
Strongly agree	2	(10)

Q32: Do you have any further comments to make, for example on what we may have missed in this questionnaire?

No significant additional comments.

DISCUSSION

General Information

All survey participants that responded, with the exception of one, were beef producers, mostly in the Katherine and Victoria River regions. Fourteen of the twenty-one respondents managed properties in excess of 100,000 ha, with 74% of businesses having an annual turn over of at least \$200 000. The responses reflected managers had considerable experience, with 82% having been in the industry between 10-50 years.

The vast majority of properties received summer dominant rainfall, with 55% receiving at least 600mm pa on average. 96% kept daily rainfall records, 61% having records greater than 20 years. Most records of rainfall were considered complete or fairly complete.

Monitoring Seasonal Conditions

Compared with the climate of the 1960's and 1970's, 26% of producers thought the climate was drier in the 1980's and 1990's as a result of climate change, while 34% regarded rainfall as being more variable. Of interest was that 44% considered that the climate was hotter and 27%, more humid.

Eighty-seven percent regarded their judgement of future climatic conditions as being either moderately important or very important in their planning and decision making. Burning pasture and buying stock were considered the most important management decision affected by climatic conditions, with stocking rate decisions scored in only one response. A vast majority of managers (96%) however, do not use long term climate records to assist their decision making but with 71% regarding probability based information as being slightly or moderately useful in the management of their business. The use of seasonal climate forecast information such as SOI, El Nino and Indian Ocean Temperatures were only adopted by 18% of respondents.

Paddock Information and Decision-making

The survey revealed that 70% of producers recorded individual paddock information with stock numbers recorded in 70% of cases, while pastures, rainfall and monitoring sites were recorded on less than 15% of properties. Pastoralists used a range of indicators to assess the health of their pasture and stock, including pasture composition (26%), ground cover (22%) amount of feed (13%) and the use of monitoring sites (13%). All pastoralists used observations of pasture growth and condition to determine stock numbers to carry through the year.

‘Big-picture’ Information Products

Most people (72%) considered big picture information was at least slightly important in their planning, risk management and decision making. Recent rainfall maps (39%) and seasonal rainfall forecasts (43%) were the most commonly used types of information. Some producers however did utilise recent pasture growth maps and seasonal pasture growth forecasts. 61% of producers regarded this information as being at least moderately useful, however most considered it difficult to access.

Communication

Surprisingly, 83% of the producers surveyed had a computer however only 3 out of 23 had internet access. Most people (91%) used fax machines and considered these the most convenient way to access seasonal outlook information. The TV, radio and Internet rated highly but considered less convenient than fax information.

Seasonal Assessment in Pastoral Areas

Some people thought these questions leading. I am inclined to agree. Sixty-one percent of producers thought it better to respond to changing seasonal climate conditions rather than anticipating or reducing seasonal climatic risk. (Some people may have misunderstood this question). Ninety percent agreed that seasonal climate forecasts be expressed as probabilities, however 61% thought at present there was undue responsibility on users to interpret the information.

The provision of advanced (3-6 month) stock feed shortage warnings was considered a valuable aid to decision making by 62% of producers, however 33% thought that there was inadequate experience and information available to link climate related information to pastoral property management (compared to 42% of producers who did).

Producers generally thought that warnings of possible pasture deterioration at a district level, before the main growing season, would be valuable in making management decisions. 38% agreed while 24% strongly agreed. Advanced warnings of possible soil deterioration however were considered less useful with most people having no opinion and 31% agreeing that it would be useful.

The rural press received a mixed response regarding the credibility and usefulness of its seasonal climate information. Most people had no strong opinion, while 31% agreed that it was useful.

Although many people thought there were useful applications for big picture information in some responses throughout the survey when questions as to whether scientific seasonal climate forecasting was a valuable tool for property management in the face of seasonal variability 50% had no opinion either way. 19% disagreed, while 33% agreed that it would be a valuable tool.

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